# Analysts' stock recommendations, earnings growth and risk

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**Abstract—**A key output of sell-side analysts is their recommendations to investors as to whether they should, buy, hold or sell a company's shares. However, relatively little is known regarding the determinants of those recommendations. This paper considers this question, presenting results that suggest that recommendations are dependent on analysts' short-term and long-term earnings growth forecasts, as well as on proxies for the analysts' unobservable views on earnings growth in the more distant future and risk. Furthermore, analysts who appear to incorporate earnings growth beyond the long-term growth forecast horizons and risk into their recommendation decisions make more profitable stock recommendations.

## 1. Introduction

Sell-side analysts are important information intermediaries in the capital market. Over the past four decades, a staggering number of published academic studies – more than five hundred to date – have examined the properties of analysts' earnings per share forecasts (for useful reviews, see, e.g., Brown, 2000; Ramnath *et al*., 2008a, 2008b; Bradshaw, 2011). However, Schipper (1991) notes that earnings forecasts are just one output of sell-side research; she calls for more study of how analysts reach their final judgments, expressed in the form of buy-sell-hold stock recommendations.

Some limited progress has been made in the two decades that have passed since Schipper (1991) reached this conclusion (Ramnath *et al*., 2008a; Bradshaw, 2011; Brown *et al*., 2015). However, much still remains to be done. One difficulty that researchers face is that the work analysts perform is unobservable. Nevertheless, as Bradshaw (2011) notes, we have reached a point where some penetration of the "black box" is required in order to develop deeper insights. He suggests that a potentially useful approach would be to simultaneously examine analysts' multiple summary outputs. This is the focus of the present paper.

We build on the prior literature within the context of a valuation framework. This provides a structured approach to think about the linkages between the forecasts and stock recommendations carried out by analysts. We predict that analysts' stock recommendations are positively associated with their forecasts of earnings growth in the short-term and in the medium-term. We also predict that analysts' stock recommendations will be positively influenced by their expectations of earnings growth in the more distant future, and be negatively associated with their views on risk, neither of which can be directly conveyed by analysts to investors in simple but credible metrics.

To test these predictions, we examine the relationships between analysts' stock recommendations and (1) their short-term earnings growth and long-term growth forecasts, (2) proxies designed to capture their expectations about earnings growth beyond their long-term growth forecast horizons, and (3) risk metrics employed to proxy for analysts' risk assessments. Our study uses U.S. data covering the 1995-2012 period.

We believe this paper is among the first to provide empirical evidence that analysts' long-term growth forecasts appear to incorporate the tendency of profitability to revert to the mean over time. We find that, all else being equal, firms with higher short-term earnings growth forecasts receive more favourable stock recommendations. Consistent with Bradshaw (2004), we show that the relationship between stock recommendations and long-term growth forecasts is positive, but in addition we show that the relationship is non-linear and declining, reflecting the valuation implication of profitability being mean-reverting. We also show that above-mean (below-mean) profitability has positive (negative) but diminishing effects on stock recommendations. We find that stock price volatility is negatively associated with stock recommendations. In contrast, market beta appears to enter analysts' recommendation decisions primarily through its adverse mediating effect on the sensitivity of recommendations to long-term growth forecasts.

Bradshaw (2004) suggests that the relationship between analysts' long-term growth forecasts and recommendations has a negative impact on the value of their stock recommendations.[1] This conclusion is based on Bradshaw's (2004) evidence that long-

[1] Previous studies have shown that recommendation revisions and levels of individual recommendations (when "hold" recommendations are treated as "sell" recommendations) are associated with future returns (e.g., Stickel, 1995; Womack, 1996; Jegadeesh *et al.*, 2004; Ertimur *et al.*, 2007). Bradshaw (2004), however, finds that consensus recommendations are not associated with abnormal returns. In our view, levels of consensus recommendations are more likely subject to distortions caused by analysts' conflict of interests than recommendation revisions, and thus might not be best suited for assessing the value of recommendations.

term growth forecasts are negatively associated with future stock returns. In contrast, Jung *et al.* (2012) show that the market appears to view long-term growth forecasts as informative, and reacts more strongly to recommendation revisions that are accompanied by long-term growth forecasts. Motivated by this line of inquiry, we also investigate whether analysts' incorporation of expectations about earnings growth beyond their long-term growth forecast horizons and their incorporation of risk is associated with the profitability of their stock recommendations. Our empirical analysis suggests that analysts who are employed by large brokerage firms and who follow less industries and have higher forecast accuracy and more firm-specific experience are more likely to incorporate earnings growth beyond long-term growth forecast horizons in making recommendations. We find that abnormal returns of stock recommendations issued by analysts who appear to take into account earnings growth beyond their long-term growth forecast horizons and risk are significantly higher than those of other analysts. Additional empirical analyses also suggest that our proxies for analysts' expectations about earnings growth beyond their long-term growth forecast horizons predict the realized actual earnings growth rates in the next ten years**,** and that the stock market appears to price the proxies in a way that is consistent with how they are linked to analyst recommendations.

This study contributes to the literature in several ways. First, it extends and complements previous studies that attempt to explain analysts' recommendation decisions (e.g., Block, 1999; Bradshaw, 2002, 2004; Brown *et al.*, 2015). Bradshaw (2004) documents a positive relationship between analysts' stock recommendations and long-term growth forecasts using a parsimonious empirical specification as a first pass to look at the issue. We build on this work by presenting results that suggest that stock recommendations are also dependent on analysts' short-term earnings growth forecasts and their expectations about earnings growth in the more distant future, as well as of their views about risk. Second, this study contributes proxies for constructs that are already in the models of analysts' decisions but cannot be conveyed by analysts to investors in a simple and credible metric. Third, we extend previous studies (e.g., Ertimur *et al.*, 2007; Jung *et al.*, 2012) that examine the relationship between analyst earnings and long-term growth forecasts and the economic value of their recommendations. We present results that suggest that analysts' incorporation of risk and expectations about earnings growth beyond long-term growth forecast horizons is associated with their providing more profitable recommendations. Not only do these findings enhance our understanding of analysts' recommendation decisions, they also have the potential to assist investors in identifying which recommendations are likely to signal positive returns and which will not.

The remainder of this study is organized as follows. Section 2 develops our theoretical framework and predictions, and describes our research design. Section 3 outlines our sampling procedure and data, and provides descriptive statistics. Section 4 reports results and presents our investigation of the effect of incorporation of risk and long-run earnings growth on recommendation profitability, while section 5 summarizes and concludes.

## 2. Theoretical framework and research design

### *2.1. Outputs of sell-side analysts*

Sell-side analysts are important information intermediaries in the capital market. In addition to providing detailed comments and discussions of the prospects of companies and industries they follow, analysts generally provide three summary outputs of their work: (1) a short-term earnings per share (EPS) forecast; (2) a forecast of growth in expected EPS, typically over a three-to-five year horizon; and (3) a recommendation to investors to buy, hold, or sell the stock.[2] While the first one has been extensively studied by accounting researchers, the last two have received much less attention.

A useful way of thinking about such recommendations and earnings forecasts is by reference to an accounting-based pricing equation of the sort developed by Ohlson and Juettner-Nauroth (2005). Ohlson and Juettner-Nauroth (2005) show that the economic value of an equity security at date *t*=0 is equal to the capitalized next-period (FY1) expected earnings per share, $eps_1$, plus the present value of capitalized abnormal growth in expected eps in all future periods:

$$\hat{P}_0 = \frac{eps_1}{r} + \sum_{t=1}^{\infty} R^{-t} \left\{ \frac{aeps_{t+1}}{r} \right\} \tag{1a}$$

where: $\hat{P}_0$ can be thought of as the analyst's view of how much the stock is really worth (which may differ from the current share price, $P_0$); $r$ is the cost of capital and $R = 1 + r$; and $aeps_{t+1} = eps_{t+1} - [eps_t(1+r) - r \cdot dps_t]$ is the abnormal earnings growth, defined as the change in EPS adjusted for the cost of capital and dividends ($dps_t$). To relate Equation (1a) to the earnings forecasts reported by analysts, it is helpful to break the stream of future payoffs into three sets, as follows:

[2] It is also commonplace for analysts to provide a so-called "target price," which is their prediction of the share price in the future (usually one year hence). We do not consider this metric further here as it is logically a function of the analyst's predictions of a firm's future performance. The central focus of this paper is the relationship between recommendations and earnings growth forecasts. Target price can be influenced by factors that fall outside the scope of this study, such as expectations of interest rate changes. Moreover, using target price as a proxy for expected price would shift the focus away from the relationship between recommendations and the earnings and earnings growth forecasts, which are the central outputs of the analyst's work and the primary concern of this paper.

$$\hat{P}_0 = \frac{eps_1}{r} + \sum_{t=1}^{4} R^{-t}\left(\frac{aeps_{t+1}}{r}\right) + \sum_{t=5}^{\infty} R^{-t}\left(\frac{aeps_{t+1}}{r}\right) \tag{1b}$$

For expositional purposes, assume that *aeps* grows at a constant compound rate $g_1$ during the medium term (years 3-5), i.e., $aeps_{t+1} = aeps_t(1+g_1),\ t = 2,...,4,$ and at $g_2$ thereafter. Assuming $g_2 < r$ , we can simplify (1b), as follows:

$$\hat{P}_0 = \frac{eps_1}{r} + \frac{aeps_2}{r}\left[\frac{1-\left(\frac{1+g_1}{1+r}\right)^4}{r-g_1}\right] + \left(\frac{aeps_2(1+g_1)^4}{r(1+r)^5}\right)\left[\frac{1}{r-g_2}\right]. \tag{2}$$

This provides the framework for thinking about the outputs of financial analysts.

The analyst provides two measures of future earnings: a forecast of one-year-ahead earnings per share, $eps_1$, and a forecast of what is conventionally but somewhat misleadingly referred to as “long-term” (really medium-term) growth in earnings, *LTG*, where $eps_{t+1} = eps_t(1+LTG),\ t = 1,2,...,4.$ From this, we could infer that the rate of growth, $g_1$, in abnormal earnings over this interval (together with the discount rate, *r*) will enable the analyst to arrive at an estimate of the second term on the right-hand side of Equation (1b). If a firm pays out all its medium-term earnings as dividends, abnormal earnings growth during this period will be reduced to $aeps_{t+1} = eps_{t+1} - eps_t$, and $g_1 = LTG.$ However, to complete the valuation exercise represented by Equation (2), the investor must also estimate $g_2$, the growth rate of *aeps* in the more distant future, and this cannot be discerned from the analyst’s published outputs. In what follows, we follow conventional market practices here and define what is really medium-term earnings growth as long-term growth (*LTG*), and define the unobservable “really-long-term growth” in *eps* as $g_2 = RLTG.$

Within this framework, we can treat $\hat{P}_0$ as a representation of the (unobservable) view the analyst has of how much the stock is worth, and the analyst's recommendation (*REC*) as a function of the difference between this unobservable amount and the stock's current price $P_0$. We can also treat $\hat{\boldsymbol{P}}_{\mathbf{0}}$ as dependent on (1) the analyst's observable forecasts of $eps_1$ and *LTG*, (2) the unobservable *RLTG*, and (3) the discount rate for the stock, the principal determinant of which is the analyst's (also unobservable) views on risk (*RISK*). Putting these together, we get:

$$\begin{aligned} REC &= f(\hat{P}_0 - P_0) \\ &= g(eps_1, LTG, RLTG, RISK). \end{aligned} \tag{3}$$

Logically, analysts ought to make a buy recommendation when intrinsic value is sufficiently larger than current price to justify the transaction costs involved (i.e., $\hat{P}_0 \gg P_0$), and vice versa when the reverse condition holds $(\hat{P}_0 \ll P_0)$. Being dependent on $\hat{\boldsymbol{P}}_{\mathbf{0}} - \boldsymbol{P}_{\mathbf{0}}$, *REC* therefore ought to depend on the extent to which analysts think their beliefs regarding $eps_1$, *LTG*, *RLTG*, and *RISK*, are at variance with those embedded in current prices.

However, analysts' views are not observable. Hence we formulate the reduced form of (3) in terms of the analysts' beliefs concerning the levels of these variables, i.e., as $REC = g(eps_1, LTG, RLTG, RISK)$. We use this framework to explore the relationship between analysts' stock recommendations and their forecasts of earnings ($eps_1$ and *LTG*), and how these relationships can be affected by their beliefs about *RLTG* and *RISK*. Because we are unable to identify the direction or extent to which our observable measures $eps_1$, *LTG*, *RISK* and our proxies for *RLTG* differ from current market beliefs, classification errors will result. This will reduce the power of our tests to detect relationships between *REC* and these measures.[3]

A starting point for our investigation is Bradshaw (2004) who examines how analysts use their earnings forecasts to generate stock recommendations. The author analyzes the associations between stock recommendations and value estimates derived from the residual income model and practical valuation heuristics using analysts' earnings forecasts. He finds that *LTG* better explains the cross-sectional variation in analysts' stock recommendations compared to residual income value estimates.

Bradshaw's (2004) empirical specification is parsimonious in that it involves regressing *REC* on *LTG* alone, and does not consider $eps_1$. However, our framework, and the huge amount of attention given to $eps_1$ in the financial press (Brown, 1993), suggests it is an important additional analyst output, and one therefore likely to be an important determinant of their recommendations. Bradshaw's (2004) empirical specification implicitly assumes that *LTG* will persist indefinitely, and thus no account need be taken of *RLTG* (i.e., of the analysts' unobservable views of the more distant future), or of *RISK* (their assessments of how risk should affect share valuations). Previous studies (e.g., La Porta, 1996; Dechow and Sloan, 1997) that examine the relationship between earnings expectations and stock returns have also used analysts' *LTG* forecasts to proxy for investors' expectations about earnings growth in all future years without explicitly considering the likely declining persistence of *LTG*.

[3] The rationale for this reduced-form expression is that cross-sectional differences in earnings forecasts will reflect differences in the extent to which forecasts have been revised (the further a forecast is away from the mean, the more likely it is to be the result of a forecast revision). This seems plausible, given that our focus is on consensus (rather than individual) recommendations and earnings forecasts.

To advance our understanding of the role of analysts' earnings growth expectations in their stock recommendation decisions, we analyze the effects of the short-term earnings growth rate (i.e., the proportionate increase in forecast $eps_1$ over the reported earnings per share of the previous fiscal year, $eps_0$), *LTG*, and proxies designed to capture the extent to which the latent variable *RLTG* differs from *LTG*.

There are good reasons to believe that earnings growth rates change over time. Standard economic arguments suggest that profitability is mean-reverting under competitive conditions: entrepreneurs seek to enter profitable industries and exit less profitable ones (e.g., Stigler, 1963). This prediction is consistent with the evidence (e.g., Brooks and Buckmaster, 1976; Freeman *et al*., 1982; Fama and French, 2000). Based on these arguments, we make two predictions:

1. *REC* is a positive but diminishing function of *LTG*: $\partial REC / \partial LTG > 0$ and $\partial^2 REC / \partial LTG^2 < 0$.
2. Above-mean (below-mean) past profitability will have a positive (negative) but diminishing effect on *REC*.

The first prediction reflects the attenuating effect the unobservable latent variable *RLTG* is expected to have on the analyst's estimation of intrinsic value, $\hat{P}_0$, and hence on *REC*. In our design, *RLTG* plays the role of a correlated omitted variable. We address this problem in our experimental design in two ways: by modifying our expectations concerning the relationship between *REC* and *LTG*, and by incorporating profitability mean reversion into the design.

If we hold all else equal, economic theory predicts that the risk-aversion of investors will result in high-risk companies having lower equity prices than low-risk ones. Not only will high predicted earnings growth attract competition, it will often be dependent on high-risk investments in R&D and other intangibles. We therefore predict that *REC* will be a negative function of *RISK*: $\partial REC / \partial RISK < 0$.

*2.2. Research design*

We use a quadratic model of *LTG*, $REC = g(LTG, LTG_{2\ldots})$ to test for the predicted attenuating effect of the correlated omitted variable *RLTG* on the analyst's estimation of intrinsic value, $\hat{P}_0$, and hence on *REC*. We predict *REC* will be positively associated with *LTG* and negatively associated with $LTG^2$, because the higher *LTG* is, the greater the potential deviation between *RLTG* and *LTG* and the less weight the analysts will place on *LTG* in estimating $\hat{P}_0$. To reflect the possibility that analysts respond differently to the mean reversion of losses and profits we also use an alternative model including two interaction variables between *LTG* and indicator variables representing the bottom and top *LTG* quartiles, respectively, to examine the relationship between *LTG* and recommendations.

We allow for the previously documented fact that the reversion of profitability to its mean can take a very long time (e.g., Fairfield *et al.*, 2009). The extent to which profitability deviates from its mean signals expected changes in profitability and earnings growth in the long run. Hence, we use this deviation to construct proxies for the latent variable, *RLTG*. We follow Fama and French (2000) both in our estimation of the mean of profitability and in how profitability reverts to its mean. We then examine the effects of the latent variable *RLTG* on stock recommendations using measures representing both the magnitude and direction of the deviations of profitability from its mean. We predict that analysts are likely to think favourably of firms with high past profitability, and their recommendations are likely affected by their expectations about how profitability will change in the long run. We predict above-mean (below-mean) past profitability will have a positive (negative) but diminishing effect on *REC*.

We define profitability in terms of return on equity (*ROE*), as analysts' work focuses on equities. We first estimate a cross-sectional regression model of the return on equity that closely resembles the one used by Fama and French (2000). We then use the coefficient estimates to compute the expected value of return on equity ( $E(ROE)$ ), i.e., a proxy for the mean of profitability, for a given firm:

$$ROE = d_0 + d_1 BM + d_2 DD + d_3 PAYOUT + d_4 LogMV + d_5 RD + d_6 LEVERAGE + \varepsilon \quad (4)$$

where: *BM* is the ratio of book equity to the market value of equity at the end of period *t*; *DD* is equal to 1 if the firm issues dividends during the period, and 0 otherwise; *PAYOUT* is the dividend payout ratio; *LogMV* is the natural log of market value; *R&D* is the ratio of research and development expenses to net sales; and *LEVERAGE* is the ratio of total liabilities to total assets. The explanatory variables in Equation (4) are chosen on the basis that: (1) book-to-market captures expected future firm profitability, (2) firms paying dividends tend to be much more profitable than those that do not pay any (Fama and French, 1999; Choi *et al*., 2011), (3) firms tend to relate dividends to recurring earnings, and the distribution of dividends thus conveys information about expected future earnings (Miller and Modigliani, 1961), (4) large firms tend to have higher and more stable profitability than small firms, (5) R&D investments affect earnings negatively in the near term, but foster future growth in earnings, and (6) financing activities raise funds for expansion and growth, and leverage affects the ROE denominator.

For each firm-month observation, we compute the deviation of past *ROE* from its expected value (hereafter, *DFE*) by taking the difference between *ROE* in the previous year and its expected value, $E(ROE): DFE_t = ROE_{t-1} - E(ROE_{t-1})$. Let *NDFE* denote $DFE_t < 0$ and *PDFE* denote $DFE_t > 0$. Fama and French (2000) find that the speed of mean reversion is faster when return on assets is below its expected value, and when it is further from the expected value in either direction. They use the squared values of *NDFE* and *PDFE* to measure the magnitude to which profitability is below and above its expected value, respectively. For the purpose of modelling the diminishing effect of above-mean (below-mean) past profitability on *REC*, the squared values of *NDFE* and *PDFE* are computed and denoted as *SNDFE* and *SPDFE*, respectively. We predict *REC* will be positively associated with *PDFE*, *NDFE*, and *SNDFE*, and negatively associated with *SPDFE*.

Before testing our predictions, we carry out an exploratory analysis to see whether analysts appear to incorporate mean reversion in profitability when forecasting *LTG*. Fama and French (2000) analyze the impact of profitability mean reversion on future earnings by regressing changes in reported earnings on measures that capture the magnitude and direction of deviations of profitability from its mean. We use their regression specification, simply substituting *LTG* for changes in reported earnings, the dependent variable in their model:

$$LTG = \alpha + b_1 DFE + b_2 NDFE + b_3 SNDFE + b_4 SPDFE + \varepsilon \quad (5)$$

Based on Fama and French's (2000) work, we make the following predictions concerning $b_1 < 0, b_2 < 0, b_3 > 0,\ b_4 < 0$.

Existing evidence on how analysts make allowances for risk is scarce. One possibility is that analysts adjust for the risk of equity by discounting future payoffs using a discount factor based on the Capital Asset Pricing Model (Sharpe, 1964; Lintner, 1965) (CAPM), an approach emphasized in standard valuation textbooks. Prior research, however, suggests that analysts tend to mainly rely on valuation multiples instead of present value models, and that they are concerned about risk in a firm-specific sense rather than in terms of its marginal impact on a well-diversified portfolio (e.g., Barker, 1999; Block, 1999). This raises the possibility that analysts do not adjust for risk by using a discount factor based on a formal pricing model such as the CAPM. Consistent with Kecskes *et al*. (2011), our own reading of brokers' reports suggests that risk is generally defined by reference to firm-specific operational and business risks, and uncertainties concerning macroeconomic factors that potentially affect a firm's future earnings. It is difficult, if not impossible, to construct a quantitative measure of analysts' risk assessments by codifying such qualitative discussions. At any rate, no such metric is currently available. Moreover, to our best knowledge, few brokerage houses generate quantitative risk forecasts, and no such data are available from any data vendor. Hence, instead of examining how analysts' (unobservable) risk assessments affect their stock recommendations, we step back and ask a different question: To what extent do analysts take into account traditional risk measures in making stock recommendations?

We mainly consider two traditional risk measures, market beta and stock price volatility. The CAPM assumes that only systematic risk (market beta) is priced. However, it has been demonstrated theoretically that in a market with incomplete information and transaction costs, rational investors price idiosyncratic risk (Merton, 1987) and there is evidence that idiosyncratic risk does indeed play a role in explaining the cross-section of average stock returns (Malkiel and Xu, 1997, 2006). Furthermore, sell-side analysts specialize by industry and usually follow a limited number of stocks (Boni and Womack, 2006), suggesting that they might not take full account of the big (diversification) picture when recommending individual stocks.

Fama and French (1992) argue that the risk of a stock is also a function of firm size and book-to-market. Behavioural studies (e.g., La Porta, 1996; Dechow and Sloan, 1997) argue that the book-to-market factor in returns is the result of market participants systematically overestimating (underestimating) the growth prospects of growth (value) firms. We do not address why size and book-to-market may affect returns, but simply include them as controls.

We also examine the potential interactions between risk and growth. The future earnings of high beta firms are likely to be more sensitive to changes in the overall economy. We predict that analysts are able to capture this earnings implication of market beta and discount the *LTG* forecasts of high beta firms when making recommendations. Meanwhile, for a firm with high growth but also a high degree of risk, analysts are likely to issue a less favourable recommendation. We allow for such possible interaction between *LTG* and market beta and stock price volatility in our empirical analysis.

We compute the analyst's short-term earnings growth forecast (hereafter, *SG*) using the formula: $SG = \left(EPS_1 - EPS_0\right)/EPS_0$. $EPS_1$ is one-year-ahead consensus earnings per share forecast, and $EPS_0$ is the last reported earnings per share. Because it is difficult to make economic sense of *SG* when $EPS_0 < 0$, we follow Bradshaw and Sloan (2002) by computing the short-term growth forecast only for observations with positive $EPS_0$. We predict *SG* to be positively associated with stock recommendations.

Prior research has shown that analysts' earnings forecasts are optimistically biased, possibly due to analysts' incentives to generate trading, to cultivate management, and to maintain good relationships with underwriting clients of their brokerage firms (e.g., Francis and Philbrick, 1993; Lin and McNichols, 1998; Jackson, 2005; Brown *et al.*, 2015). However, it is possible that the analysts may take into account the optimistic bias in their earnings forecasts when making stock recommendations. We include the signed forecast error of $EPS_1$ (*Forecast Error*) in our empirical specifications to capture this possible element in analysts' recommendation decisions. We predict the coefficient on *Forecast Error* to be negative, reflecting the analysts' effort to discount the optimistic bias in their earnings forecasts.

We primarily use an ordinary least squares (OLS) regression analysis to test our predictions. Following Bradshaw (2004), Barniv *et al*. (2009) and He *et al*. (2013), we use the monthly consensus (mean) stock recommendation as the dependent variable. We use consensus (i.e., average) data, both to facilitate comparison with key prior studies and because there are strong reasons to believe that average measures are likely to better reflect the price setting process in the market. In addition, we also examine our predictions using multinomial ordered logit regression analysis, in which the dependent variable is the quintile ranking of monthly consensus stock recommendation, a 5-point scale discrete variable.

We estimate the following regression to test our predictions:

$$\begin{aligned} REC = {} & \alpha_0 + \beta_1 SG + \beta_2 LTG + \beta_3 LTG^2 + \beta_4 NDFE + \beta_5 PDFE + \beta_6 SNDFE \\ & + \beta_7 SPDFE + \beta_8 Forecast\ Error + \gamma_1 Beta + \gamma_2 LTG \times Beta \\ & + \gamma_3 Volatility + \gamma_4 LTG \times Volatility + \gamma_5 LogMV + \gamma_6 BM \\ & + \sum_{j=1}^{9} \delta_j Industry\ Dummy + \sum_{i=1995}^{2012} \theta_i Yr\ Dummy + \varepsilon \end{aligned} \tag{6a}$$

where: *REC* represents either the monthly consensus stock recommendation or the quintile ranking of monthly consensus recommendations; *SG* represents the analyst's short-term earnings growth forecast; *LTG* represents the monthly consensus earnings growth forecast for the next three-to-five years; and $LTG^2$ represents the square value of *LTG*; *NDFE* represents negative deviations of ROE from its mean; *PDFE* represents positive deviations of ROE from its mean; and *SNDFE* and *SPDFE* represent the square of *NDFE* and *PDFE*, respectively.

*Forecast Error* is measured by dividing the difference between $EPS_1$ and the actual earnings per share ($EPS_a$) by the absolute value of $EPS_a$. *Beta* is calculated monthly using five years' monthly stock and market returns; *Volatility* represents the three-month stock price volatility; *LTG* × *Beta* and *LTG* × *Volatility* represent the interaction variables between *LTG* and *Beta* and *Volatility*, respectively; *LogMV* represents size as measured by market capitalisation; and *BM* is the book-to-market ratio. We predict the coefficients on *Beta*, *Volatility*, *BM*, and *LTG* × *Beta* to be negative and the coefficient on *LogMV* to be positive. We make no prediction with regard to the sign of *LTG* × *Volatility*. The model controls for both year and industry effects by including year indicator variables (*Yr Dummy*) and industry indicator variables (*Industry Dummy*) formed based on the 1st level Global Industry Classification Standard (GICS) industry classification.

To reflect the fact that the mean reversion of profitability can be up or down, we also analyze the potential effect of the latent variable *RLTG* on the relationship between *REC* and *LTG* using an alternative model that includes two interaction variables between *LTG* and indicator variables representing the bottom and the top *LTG* quartiles respectively. We expect the top (bottom) quartile *LTG* forecasts to have a weaker (stronger) effect on stock recommendation relative to the other two quartiles of *LTG* forecasts to reflect that high (low) profitability will revert to the mean in the long run. The regression equation we estimate is as follows:

$$\begin{aligned} REC = {} & \alpha_0 + \beta_1 SG + \beta_2 LTG + \beta_3 LTG\_Q^1 + \beta_4 LTG \times LTG\_Q^1 + \beta_5 LTG\_Q^4 \\ & + \beta_6 LTG \times LTG\_Q^4 + \beta_7 NDFE + \beta_8 PDFE + \beta_9 SNDFE + \beta_{10} SPDFE \\ & + \beta_{11} Forecast\ Error + \gamma_1 Beta + \gamma_2 LTG \times Beta + \gamma_3 Volatility + \gamma_4 LTG \times Volatility \\ & + \gamma_5 LogMV + \gamma_6 BM + \sum_{j=1}^{9} \delta_j Industry\ Dummy + \sum_{i=1995}^{2012} \theta_i Yr\ Dummy + \varepsilon \end{aligned} \tag{6b}$$

where: *REC* is monthly consensus stock recommendation; $LTG\_Q^1$ is 1 when the LTG forecast falls into the bottom quartile of *LTG* and 0 otherwise; $LTG\_Q^4$ is 1 when *LTG* belongs to the top quartile of *LTG* and 0 otherwise; and $LTG \times LTG\_Q^1$ and $LTG \times LTG\_Q^4$ are interaction variables between *LTG* and $\mathrm{LTG\_Q}^1$ and $\mathrm{LTG\_Q}^4$, respectively. We predict the coefficient on $LTG\_Q^1$ to be negative and that on $LTG\_Q^4$ to be positive. We expect the coefficient on $LTG \times LTG\_Q^1$ to be positive and that on $LTG \times LTG\_Q^4$ to be negative.

## 3. Sample selection, data and descriptive statistics

Our sample selection procedures are summarised in Table 1. The analyst data are from the Institutional Brokers' Estimate System (I/B/E/S). Our sample covers the period January 1995-December 2012. We obtain monthly consensus analyst forecasts including stock recommendations (mean), long-term growth (median), and one-year-ahead earnings per share ($\mathrm{EPS}_1$) for all U.S. firms listed on the NYSE, the AMEX, and on NASDAQ. I/B/E/S enters reported earnings on the same basis as analysts' forecasts. To ensure comparability, we use the actual earnings per share ($\mathrm{EPS}_0$) from the I/B/E/S detailed actual file for the estimation of *SG* and *ROE*. During the sample period, I/B/E/S analysts provide both recommendations and $EPS_1$ forecasts for 16,877 U.S. firms. *LTG* forecasts are available for approximately 79% of these firms. We eliminate duplicated monthly observations.

We merge I/B/E/S data with COMPUSTAT data used for the calculation of accounting variables. We require firm-month observations to have positive $EPS_0$ and book value per share for the estimation of *SG* and *ROE*, respectively. We estimate risk variables for firm-month units using firm and stock return data from the Center for Research in Security Prices (CRSP) database. *Beta* is estimated each month by regressing monthly returns of the stock on monthly market returns over a five-year period. *Volatility*[4] is measured using the annualized standard deviation of daily returns three months preceding the consensus recommendation dates. Definitions of variables used in empirical analysis are detailed in Table 2.

To mitigate the potential influence of outliers, we eliminate 1% of the lowest and highest tails of all variables except the consensus monthly stock recommendations. The sample we use to analyze whether analysts' *LTG* forecasts incorporate the mean reversion in profitability comprises 401,451 firm-month observations, representing 7,023 distinct firms. The sample used for the estimation of the full model of Equation (6a), includes 284,655 firm-month observations and 4,946 distinct firms. Following prior literature, the coding of recommendations is inverted to be 1= strong sell, 2=sell, 3=hold, 4=buy and 5=strong buy.

Panel A in Table 2 presents descriptive statistics for the main variables that will be used in the subsequent analysis. Both the mean and the median of consensus

[4] $Volatility = \sigma\left[\ln\left(1 - daychange\right)\right] \times \left(\frac{365 \times j}{m}\right)^{\frac{1}{2}}$, where σ is standard deviation; *j* represents the number of business days in the period; and *m* represents the number of days in the period.

recommendation are close to a buy rating (3.782; 3.800), revealing analysts' optimism that has been widely documented in prior literature. The mean and median of *LTG* are 0.170 and 0.150, respectively. The mean of *SG* is 0.192, higher than mean *LTG*. The average *ROE* of the sample firms is 8.6%. The mean and median of *DFE*, deviation of *ROE* from its expected value, are −0.002 and −0.010, respectively; the mean of negative deviations is −0.027 and that of positive deviations is 0.025. The mean (median) of market beta and stock price volatility are 1.085 (0.973) and 0.476 (0.409), respectively.

Panel B in Table 2 presents the results of Pearson correlation analysis of the main variables used in the subsequent empirical analysis. Stock recommendations are positively correlated with both the short-term and the medium-term earnings growth forecasts and with *ROE* but are negatively correlated with *DFE*. Both *Beta* and *Volatility* are positively correlated with recommendations. Note that the positive correlation between recommendations and *Volatility* possibly is caused by year effects (price volatility was extremely high during the two most recent stock market crashes). *LTG* is negatively correlated with past *ROE* and its deviation from its expected value *DFE*. *SG* is also negatively associated with both *ROE* and *DFE.* The moderate correlation between *Beta* and *Volatility* (0.332) indicates that the information content of the two risk measures is to some degree overlapping; *Volatility* and *Beta* are both manifestations of risk. This necessitates the control of each of the pair in the regression tests. The mean of *DD* was 0.462, indicating that in less than half of the sample firm-years were dividends paid.

Our OLS regression analyses use panel data pooled across firms and multiple periods (months). When the residuals are correlated across observations, OLS standard errors can be biased and the inferences about the coefficient estimates will be inaccurate. Following Petersen (2009), we therefore adjust the standard errors of the regression slopes in our regression tests for the possible dependence in residuals by clustering standard errors on firm and month dimensions.

Our sample covers three sub-periods marked by dramatic shifts in the economic conditions in the U.S. as well as important regulatory changes. The first sub-period is 1995-2000, which covers the dot-com bubble period, during which time analysts and investors were highly optimistic about the growth prospects of high-tech stocks. The second sub-period follows the introduction of Regulation Fair Disclosure (RegFD) and ends in 2006, a period often referred to as "the great moderation". RegFD was promulgated by the SEC in August 2000, after which analysts lost their privileged access to corporate management. RegFD changed the information environment and to some extent the incentives analysts face (Jung *et al*., 2012). The final sub-period from 2007 to 2012 covers the years of the financial crisis and its aftermath. Our empirical analyses are based on the sample covering the 1995-2012 period. We repeat the empirical analysis for each of the above sub-periods, but for space reasons report without tabulating the results.

## 4. Empirical results

### *4.1. Relationship between analysts' LTG forecasts and profitability mean reversion*

Panel A of Table 3 presents the results of the first-stage cross-sectional regression that is used to construct a proxy for the mean of *ROE*.[5] *PAYOUT*, *BM* and *R&D* are negatively associated with *ROE,* while *DD*, *LogMV* and *LEVERAGE* are positively associated with it. Panel B reports estimates of Equation (5) that analyzes the associations between *LTG*

[5] We use a sample pooled across firms and months for this regression test (Equation 4). As a sensitivity test, we also estimate Equation (4) for each GICS 1st level industry, and then recalculate *E(ROE)* and *DFE*, *NDFE*, *PDFE*, *SNDFE*, and *SPDFE* for each firm. We then rerun the regression tests of the study and the results are qualitatively consistent with those of our tabulated regressions.

and the mean reversion variables of *ROE*. Model 1 shows that *LTG* is negatively associated with the deviation of *ROE* from its mean, suggesting that analysts expect firms with higher levels of *DFE* to have lower earnings growth rates over the next three to five years. In Model 2, the coefficient on *DFE* is positive, while that on *NDFE* is negative, suggesting that, while analysts appear to consider high past *ROE* to be associated with high medium-term earnings growth, they predict earnings of firms with below-mean past *ROE* will grow at a faster pace in the following years. As predicted, the coefficient on *SNDFE* is positive and statistically significant, suggesting that analysts expect earnings growth of firms with extreme below-mean profitability to revert at a faster pace. *SPDFE* has the predicted negative sign, suggesting that analysts expect earnings growth of firms with extreme above-mean profitability to slow more rapidly over the next three to five years as their high profitability fades. It appears that the negative relationship between *LTG* and *DFE* in Model 1 is mainly attributable to the anticipated reversals of negative deviations and extremely negative and positive deviations of *ROE* from its mean. The results presented in Model 3 show that *LTG* is negatively associated with the level of previous year *ROE*. This suggests that analysts expect firms with higher past profitability to have lower earnings growth in the next three to five years, and vice versa.

These findings suggest that analysts understand the mean reversion property of earnings, and they appear to exploit it when issuing *LTG* forecasts. As a sensitivity check, we run the regression tests in panel B of Table 3 for the sub-periods 1995-2000, 2001-2006, and 2007-2012. The results (untabulated) are consistent with those reported in panel B of Table 3. The only exception is that *SPDFE* has the predicted sign but is not statistically significant in Model 2 for the 2007-2012 period.

### *4.2. Relationships between stock recommendation and the short-term growth forecast, LTG, RLTG and RISK*

The results of regression tests of our main predictions are presented in Table 4. The coefficient estimates of Equation (6a) are reported in panel A. Models 1-10 in the panel report OLS regression tests in which monthly consensus stock recommendation serves as the dependent variable. As predicted, in all the models, the coefficient on the short-term earnings growth forecast *SG* is positive and significant at the 1% confidence level. The results for Model 2 confirm the positive relationship between stock recommendation and *LTG* documented in Bradshaw (2004) and Jegadeesh *et al*. (2004). When $LTG^2$ is added to the regression in Models 3-4 and 7-10, the relationship between stock recommendation and *LTG* increases markedly and, as predicted, the $LTG^2$ coefficient is always negative and significant, indicating that the relationship between stock recommendation and *LTG* is positive but diminishing.

Models 5-7 analyze the relationships between stock recommendations and the mean-reversion variables (*NDFE, PDFE, SNDFE* and *SPDFE*) that are intended to serve as proxies to capture analysts' expectations about earnings growth beyond the three-to-five year *LTG* forecast horizons, and hence also serve as a proxy for the latent variable *RLTG*. The coefficients on the mean-reversion variables are largely consistent with predictions, suggesting that analysts do take account of this longer-run aspect of profitability. The relationship of recommendations to the mean-reversion variables is little affected by the addition of various controls that reflect relevant aspects of uncertainty (forecast error, book-to-market, firm size) and the relationships between the risk variables and recommendations are largely consistent with predictions except for *Size*. In particular, *Volatility* is significant and negative in Models 8-10, suggesting that firms with volatile stock prices tend to receive less favourable stock recommendations. The coefficient on *Beta* is positive in all models. However, the coefficient on *LTG* × *Beta* is significant and negative in Models 9 and 10. A possible explanation for this result is that analysts tend to be cautious about firms whose future earnings have a high degree of covariance with the overall economy (Fama and French, 1995) and consequently award them with less favourable recommendations. From this we infer that *Beta* enters analysts' stock rating decision-making primarily through its adverse mediating effect on the *LTG* sensitivity of stock recommendation.

Stock recommendations are measured on an ordinal scale. This raises the question of whether the $LTG^2$ variable is capturing a truncation effect caused by the upper bound on the ratings scale. To assess the sensitivity of our results to this feature, we use an Ordered Multinomial Logit regression (Model 11) to test the non-linear relationship between *LTG* and stock recommendations, measured as the quintile ranking of consensus stock recommendations (a 5-point scale discrete variable). Consistent with the OLS regressions, the results for Model 11 show that the likelihood of obtaining more favourable recommendations still decreases with $LTG^2$. This finding suggests that the OLS results cannot simply be attributed to the way recommendations have been scaled. We run all regression tests in panel A of Table 4 for the sub-periods 1995-2000, 2001-2006, and 2007-2012. Untabulated results reveal that these results hold for all three sub-periods exception that *SNDFE* has the wrong sign for the period 1995-2000.

Panel B of Table 4 reports results from estimating Equation (6b), a model that allows *LTG* to vary depending on whether the observation falls in the lowest quartile or not. Models 1-5 report the regressions based on the full 1995-2012 sample period. Contrary to prediction, the coefficient on $LTG \times LTG\_Q^1$, is negative in both Model 1 and Model 2, the latter model including the mean reversion variables, risks, and control variables. However, when allowance is made in Models 3-5 for whether the observation is in the pre- or post-financial crisis period by the inclusion of the interaction variable $LTG \times LTG\_Q^1 \times POSTY06$, it is apparent that the explanation can be found in the changed economic conditions. This can be seen most clearly by comparing the results for Models 2 and 5 that include all explanatory variables in Equation (6b). The coefficient on $LTG \times LTG\_Q^1$ in Model 5 is positive as predicted, suggesting that firm-months in the bottom quartile of *LTG* forecasts receive more favourable stock recommendations prior to the financial crisis. However, the coefficient on $LTG \times LTG\_Q^1 \times POSTY06$ is negative, indicating that the predicted relationship broke down after the crisis. This finding is consistent with the interpretation that, prior to the financial crisis, analysts expect future earnings of firms in the bottom quartile of *LTG* forecasts to grow at an increased rate over longer horizons due to the reversals in profitability, and they issue more favourable recommendations accordingly, but their beliefs that mean reversion would apply were punctured by the crisis. These results are confirmed in the separate regressions based on the sub-periods 1995-2006 and 2007-2012 (Models 6-9). The reasons are unclear, but may be due to how much analyst recommendations changed after the crisis. The relationships between recommendations and *SG*, the non-linear mean reversion variables, and the risk measures are qualitatively the same as those reported in panel A.

Our theoretical framework suggests that *LTG* is an important determinant of stock recommendations. It may also be a function of stock recommendations. If *LTG* and recommendations are jointly determined, OLS parameter estimates could be biased and inconsistent. To investigate the potential endogeneity between recommendations and *LTG*, and its potential influence on the coefficient estimates of our regression analyses, we use simultaneous equations methods to explore our main predictions. The results of a Hausman (1983) specification error test confirm that *LTG* and stock recommendations are endogenous. We therefore use a two-stage least squares (2SLS) regression analysis to rerun the main regression tests in Table 4. The untabulated results of the simultaneous-equation specification are consistent with those reported in previous sections. Hence, we conclude that the findings and inferences reported in previous sections hold after the endogeneity bias between *REC* and *LTG* is taken into account.

### *4.3. Relationship between profitability of stock recommendations and analysts' consideration of really long-term growth and risk*

In this section, we empirically explore whether analysts' incorporation of *RLTG* into their recommendation decisions positively affects the profitability of those recommendations. Risk analysis is undoubtedly an important part of securities appraisal. We also analyze how analysts' risk analysis can impact the profitability of their stock recommendations. Specifically, we seek to answer two questions: (1) Do analysts who consider the really long-term growth make more profitable stock recommendations than those who do not? (2) Do analysts who consider both really long-term growth and risk make more profitable stock recommendations? We use individual analyst recommendations and earnings forecasts along with *LTG* for this empirical analysis.

We identify which analysts are capturing *RLTG* when making recommendations by estimating the following reduced form of Equation (6a) by analyst for every analyst for whom we have at least 60 observations:[6]

[6] We estimate a reduced form of Equation (6) here because many of the analyst subsamples that contain the recommendation variable and proxies for *RLTG* are rather small (mean=21.61; Q3=26). The statistical

$$REC^{individual} = \alpha + \beta_1 DFE + \varepsilon \qquad (7)$$

where $REC^{individual}$ represents individual analyst stock recommendations, *DFE*, as discussed in section 2.2, represents the deviation of the firm's prior-year *ROE* ($ROE_{t-1}$) from its expected value. We then define a variable *ANYST_RLTG*, which is set equal to 1 if $\beta_1$ is negative, and 0 if it is positive, on the assumption that analysts with negative $\beta_1$ are paying attention to the mean reversion property of profitability and as such are more likely to take into account *RLTG* than are those with positive $\beta_1$ estimates.[7] We then identify analysts who consider both *RLTG* and risk in making profitable recommendations by estimating the following regression:

$$REC^{individual} = \alpha + \beta_1 DFE + \beta_2 Volatility + \varepsilon \qquad (8)$$

where $REC^{individual}$ and *DFE* are defined as earlier, and *Volatility* represents the twelve-month historical stock price volatility. We classify analysts who take into account both *RLTG* and *Volatility* when $\beta_1$ and $\beta_2$ estimates in their respective regressions are both negative, regardless of statistical significance; all remaining analysts are classified as those who do not take both *RLTG* and risk into consideration. We use an indicator variable *ANYST_RLTGVOL* that is equal to 1 if $\beta_1$ and $\beta_2$ are both negative, and 0 otherwise, to capture the two groups.

We examine the returns of stock recommendations issued by the 1,262 analysts for whom we have the necessary data. We calculate accumulative abnormal returns from event date *t* (the announcement day of the recommendation) to *t+s*. We examine three

power of regressions including all explanatory variables in Equation (6a) would not be sufficient to make reliable inferences in many analyst regressions.

[7] We choose to not base the classifications on both the sign and statistical significance of $\beta_1$ because of the concern that we are likely to face major power problems associated with small sizes of analyst subsamples.

return periods: a short 3-day event window (t-1 to t+1), a one-month window (t+30), and a twelve-month window (t+365). Following previous studies (e.g., Womack, 1996; Bradshaw, 2004), we calculate the size-adjusted abnormal return for a given firm's recommendation by subtracting the appropriate CRSP market capitalization decile returns from the firm's raw return given on the appropriate CRSP NYSE/AMEX/NASDAQ index data file. We also calculate standard deviation-adjusted abnormal returns by subtracting the appropriate CRSP standard deviation decile portfolio returns from the raw return of the sample firm given on the CRSP NYSE/AMEX or NASDAQ index file. We follow Ertimur *et al.* (2007) by notionally investing $1 in the stock for "buy" and "strong buy" recommendations, and going short $1 for "hold," "sell," and "strong sell" recommendations.

We use a multivariate regression analysis to examine the relationship between abnormal returns of recommendations and indicator variables *ANYST_RLTG* and *ANYST_RLTGVOL*, which measure analyst incorporation of *RLTG* and risk. We include the following characteristic variables at the brokerage firm, analyst, and firm level in our regressions to control for factors that could affect recommendation profitability. We include the natural logarithm of the number of analysts employed by a brokerage firm (*LogBSIZE*) to control for brokerage firm size because analysts at large brokerage firms have access to more resources, can benefit from their firms' stronger marketing abilities and they appear to issue more profitable stock recommendations (Clement, 1999; Stickel, 1995; Ertimur *et al.*, 2007). As proxies for analyst time constraints, the number of firms and industries covered by an analyst are expected to negatively impact forecast accuracy and recommendation profitability (Clement, 1999; Ertimur *et al.*, 2007). We therefore include the number of firms an analyst covers in a given year (*N_FIRM*), as well as the number of industries covered by the analyst in a given year (*N_IND*). We include the number of $EPS_1$ forecasts issued by an analyst for a firm in a given year ($FREQ^{EPS}$) to proxy for analyst effort (Clement, 1999; Jung *et al.*, 2012). We use the number of years an analyst has issued recommendations for a firm (*FIRM_EXP*), which is a firm-specific measure of experience, to control for analyst experience (Clement, 1999). Ertimur *et al.* (2007) show that earnings forecast accuracy is positively associated with recommendation profitability. We measure analyst forecast accuracy (*ACCUR*) as the absolute value of the difference between the actual earnings of a given fiscal year and the analyst's last $EPS_1$ forecast for that year, deflated by the absolute value of actual earnings. Firms with a high level of analyst following have better information environments and therefore stock reactions to recommendations of these firms are expected to be relatively weaker (e.g., Stickel, 1995). We use the number of analysts following a firm in a given year (*N_ANYST*) to capture this effect. We include the natural logarithm of the market value of the last fiscal year (*LogMV*) because market reactions to stock recommendations of small firms with poorer information environments tend to be stronger (e.g., Stickel, 1995). We include in the regression model the book-to-market ratio of the last fiscal year (*BM*) and an indicator variable of loss-making (*LOSS*) that is equal to 1 if the earnings before extraordinary items of the firm in a given year is negative, and 0 otherwise.

We estimate Equation (9a) to examine whether analysts who consider *RLTG* make more profitable stock recommendations:

$$\begin{aligned} CAR_{(t,t+s)} = {} & \alpha + \beta_1 ANYST\_RLTG + \beta_2 LogBSize + \beta_3 N\_FIRM + \beta_4 N\_IND \\ & + \beta_5 FREQ^{EPS} + \beta_6 ACCUR + \beta_7 FIRM\_EXP + \beta_8 N\_ANYST + \beta_9 LOSS \\ & + \beta_{10} BM + \beta_{11} LogMV + Industry\ effects + Year\ effects + \varepsilon \end{aligned} \quad (9a)$$

where $CAR_{(t,t+s)}$ represents the cumulative (size- or standard deviation-adjusted) abnormal return to the stock from recommendation announcement day *t* to *t+s*. The *ANYST_RLTG* indicator variable measures analyst incorporation of *RLTG*. We consider a positive and statistically significant estimate of $\beta_1$ as evidence that analysts who take into account *RLTG* make more profitable stock recommendations. We also control for year and industry effects. We cluster standard errors by analyst to correct for serial correlation.

We estimate Equation (9b) to examine whether analysts who capture both *RLTG* and risk make more profitable stock recommendations:

$$\begin{aligned} CAR_{(t,t+s)} = {} & \alpha + \beta_1 ANYST\_RLTGVOL + \beta_2 LogBSize + \beta_3 N\_FIRM + \beta_4 N\_IND \\ & + \beta_5 FREQ^{EPS} + \beta_6 ACCUR + \beta_7 FIRM\_EXP + \beta_8 N\_ANYST + \beta_9 LOSS \\ & + \beta_{10} BM + \beta_{11} LogMV + Industry\ effects + Year\ effects + \varepsilon \end{aligned} \quad (9b)$$

The *ANYST_RLTGVOL* indicator variable measures analyst incorporation of both *RLTG* and risk. We consider a positive and significant estimate of $\beta_1$ as evidence that analysts who take account of both *RLTG* and risk make more profitable stock recommendations.

We collect individual analyst stock recommendations, as well as $EPS_1$, and *LTG* forecasts from I/B/E/S for the 1995-2012 sample period. Accounting data come from COMPUSTAT, and stock return data come from CRSP. Among the 1,262 analysts in our sample, we find that 782 consider or are likely to consider *RLTG* when making recommendations (*ANYST_RLTG*=1), and the remaining 480 do not or are not likely to incorporate *RLTG* or earnings changes over time (*ANYST_RLTG* =0). The two groups issued a total of 240,366 stock recommendations during the sample period.

We perform univariate tests of mean and median differences of abnormal returns and the control variables between the two analyst groups and the untabulated findings are as follows. The recommendations issued by the *ANYST_RLTG*=1 group analysts tend to be more favourable. The means of the size-adjusted abnormal returns on the recommendations issued by analysts who tend to consider *RLTG* are statistically significantly higher than those of the recommendations issued by analysts who do not take account of *RLTG*. Furthermore, for all three return periods, the means and the medians of the standard deviation-adjusted returns of the *ANYST_RLTG*=1 group are both statistically higher than those of the *ANYST_RLTG*=0 group. Analysts who tend to take account of *RLTG* are generally employed by larger brokerage firms, and they appear to follow fewer industries and have more firm-specific experience than those who do not capture *RLTG*. They also appear to issue earnings forecasts more frequently and with lower forecast errors than those who do not incorporate *RLTG*. Finally, analysts who tend to take *RLTG* into account generally cover smaller firms with relatively lower analyst followings.

The results for Equation (9a) are reported in panel A of Table 5. The $R^2$s of the regressions are low, indicating (unsurprisingly) that stock returns are affected by many sources of news in addition to analysts' forecasts. The resultant coefficient estimates are unbiased but therefore lack precision. With that caveat in mind, the results reveal that the *ANYST_RLTG* coefficient is statistically significant at least at the 10% confidence level for all return periods, suggesting that analysts who consider earnings growth beyond the next three to five years are able to provide more profitable stock recommendations to investors. The direction of the effect of the control variables are broadly as expected. The results for Equation (9b) are reported in panel B of Table 5. Overall, the results for *ANYST_RLTGVOL* are weaker than for *ANYST_RLTG*, but they tend to suggest that analysts who take account of both *RLTG* and risk generate higher abnormal returns. The results of control variables are similar to those in panel A of Table 5.

Our analysis uses *DFE* to proxy for *RLTG*. As a test of the reliability of this measure, we calculate the realized actual earnings growth rate over the next year, five years, and six to ten years[8]in order to shed light on the extent to which *DFE* predicts actual earnings growth rates in the future. Untabulated results reveal that *DFE* is negatively associated with the realized actual earnings growth rates in the subsequent ten years. We interpret this as suggesting that above (below) mean profitability is associated with declines (rises) in the realized actual earnings growth rates, which suggests that *DFE* is indeed a reasonable proxy for very long run profitability. In addition, we perform regressions to examine the relationship between firms' raw returns and *DFE*. The untabulated results show that *DFE* is negatively associated with both one- and twelve-month returns, thereby suggesting that the stock market prices the change in the earnings growth rate over time correctly and in a way that is consistent with how it is related to analyst recommendations.

## 5. Summary and concluding remarks

Our study aims to enhance the understanding of analysts' stock recommendation decisions. We present a valuation framework that provides a way of thinking about the linkages between analyst recommendations and their expectations about earnings growth over the short-term, medium-term, and the really long-term future. We present results suggesting that while positive, the effect of *LTG* on stock recommendations declines the greater is *LTG*, which we attribute to the attenuating effect of earnings growth beyond the LTG forecast horizons (*RLTG*) on the analysts' value estimates for the stock, and hence

[8] We calculate the actual five-year average earnings growth rate by fitting a least squares growth line to the logarithms of six earnings before extraordinary items, a method used by I/B/E/S.

on their stock recommendations. For the first time in the literature, we employ profitability mean reversion variables from prior empirical literature to proxy for analysts' unobservable expectations about earnings growth beyond the *LTG* forecast horizons. We show how *RLTG* is associated with analysts' stock recommendations and that the effort analysts exert to study earnings growth beyond the *LTG* forecast horizons and risk enhances recommendation profitability.

To summarize, our study provides insights into analysts' stock recommendation decisions. Our findings suggest that it is important for empirical studies to explicitly recognize the really long-term growth factor when examining the relationship between stock returns and firms' future earnings and growth. Our proxy for the really long-term growth predicts the realized actual earnings growth rates over the next ten years, and thus could potentially act as a proxy for this latent variable. Furthermore, our study provides additional evidence that analysts' fundamental analyses, such as investigations into firms' growth prospects and risk, promotes the efficient allocation of financial resources in the capital market.

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Table 1
Data selection

Sample period: January 1995-December 2012

| Procedures | | | Remaining | |
|---|---|---|---|---|
| Step1: Collect consensus monthly forecasts from I/B/E/S | Obs. | Firms | Obs. | Firms |
| Stock recommendations | 1,073,545 | 17,987 | | |
| $EPS_1$ | 1,028,291 | 17,733 | | |
| Long-term growth forecasts (LTG) | 754,144 | 13,325 | | |
| Merge recommendations, LTG, and $EPS_1$; eliminate duplicate monthly data points | | | 744,274 | 13,181 |
| Step2: Collect accounting data from Compustat | | | | |
| Estimate book-to-market, LogMV, the dividiend indicator variable, payout ratio, leverage, and R&D ratio | | | | |
| Merge Compustat and I/B/E/S data | | | | |
| No. of firm-month observations with explanatory variables for estimating equation (4) | | | 429,698 | 7,437 |
| Step 3: Calculate ROE, SG, earnings forecast error, and other variables | | | | |
| Collect the last reported EPS ($EPS_0$) from I/B/E/S for firm-year units with I/B/E/S data | 68,677 | 12,240 | | |
| Calculate ROE for observations with positive book value | 530,952 | 8,480 | | |
| Remaining observations for estimating equations (4) and (5) | | | 401,451 | 7,023 |
| Calculate SG for firm-month units with positive $EPS_0$ | 594,079 | 10,624 | | |
| Step 4: Estimate risk variables using CRSP data | | | | |
| Calculate the five-year market beta for firm-month units | 444,192 | 6,973 | | |
| Calculate the annualized 3-month stock price volatility | 607,576 | 9,790 | | |
| Calculate idiosyncratic risk and the systematic risk component using one year daily return data | 608,952 | 9,792 | | |
| Merge CRSP, Compustat, and I/B/E/S data | | | | |
| Eliminate the 1% of the lowest and highest tails of all variables except for *REC* . | | | | |
| Remaining observations with all data items for estimating equation (6a) | | | 284,655 | 4,946 |

This table describes our sample selection. The first two numeric columns report the number of firm-month (firm-year, in the case of accounting data) observations and firms. The next two columns report the number of firm-month observations and firms remained after each of the data merging and elimination procedures. At the first step, monthly consensus stock recommendations, long-term growth forecasts, and $EPS_1$ are collected from I/B/E/S. The three data items are merged based on the estimation dates of I/B/E/S consensus forecasts (the third Thursday). At the second step, accounting data are collected from COMPUSTAT to estimate the variables in equation (4). Accounting data are merged with I/B/E/S forecasts. At step 3, *ROE* and *SG* are estimated using the last reported earnings per share ($EPS_0$) collected from the detailed actuals file of the I/B/E/S. At step 4, for each observation with I/B/E/S analyst data, the five-year market beta and the annualized three-month stock price volatility are estimated using the CRSP return data. The one-year stock price volatility, its systematic risk component, and idiosyncratic risk are estimated using daily return data twelve months preceding the estimation dates of consensus recommendations. CRSP data are merged with I/B/E/S and COMPUSTAT data. To mitigate the potential influence of outliers, we trim the 1% of the lowest and highest tails of all variables except for stock recommendations.

Table 2
Descriptive statistics and correlation analysis

Panel A: Descriptive Statistics

| Variable | Mean | Std Dev | Min | Q1 | Median | Q3 | Max | N |
|---|---|---|---|---|---|---|---|---|
| REC | 3.782 | 0.617 | 1.000 | 3.350 | 3.800 | 4.200 | 5.000 | 744,323 |
| LTG | 0.170 | 0.098 | 0.010 | 0.100 | 0.150 | 0.200 | 0.600 | 730,230 |
| SG | 0.192 | 0.703 | −2.713 | −0.021 | 0.129 | 0.295 | 6.136 | 582,168 |
| ROE | 0.086 | 0.155 | −1.222 | 0.045 | 0.093 | 0.147 | 0.681 | 520,543 |
| DFE | −0.002 | 0.070 | −0.134 | −0.049 | −0.010 | 0.032 | 0.300 | 405,172 |
| NDFE | −0.027 | 0.034 | −0.134 | −0.049 | −0.010 | 0.000 | 0.000 | 409,313 |
| PDFE | 0.025 | 0.047 | 0.000 | 0.000 | 0.000 | 0.032 | 0.300 | 409,299 |
| Beta | 1.085 | 0.677 | −0.127 | 0.592 | 0.973 | 1.454 | 3.537 | 435,305 |
| Volatility | 0.476 | 0.263 | 0.128 | 0.286 | 0.409 | 0.594 | 1.620 | 595,425 |
| LogMV | 6.741 | 1.720 | 3.074 | 5.475 | 6.605 | 7.865 | 11.379 | 551,248 |
| BM | 0.535 | 0.355 | 0.044 | 0.283 | 0.460 | 0.693 | 2.374 | 538,406 |
| R&D | 0.042 | 0.090 | 0.000 | 0.000 | 0.000 | 0.040 | 0.794 | 567,196 |
| LEVERAGE | 0.538 | 0.245 | 0.066 | 0.344 | 0.540 | 0.717 | 1.189 | 563,717 |
| DD | 0.462 | 0.499 | 0.000 | 0.000 | 0.000 | 1.000 | 1.000 | 573,631 |
| PAYOUT | 0.240 | 0.422 | 0.000 | 0.000 | 0.047 | 0.339 | 4.013 | 463,221 |
| Forecast Error | 0.227 | 0.820 | −1.167 | −0.057 | 0.000 | 0.167 | 8.000 | 687,327 |

Table 2 (continued)

Panel B: Pearson Correlation (significance levels are in parentheses)

| | REC | LTG | SG | ROE | DFE | Beta | Volatility | LogMV | BM | R&D | LEVERAGE | DD | PAYOUT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| REC | - | 0.296 | 0.155 | 0.030 | −0.038 | 0.069 | 0.051 | −0.091 | −0.174 | 0.032 | −0.120 | −0.167 | −0.178 |
| | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| LTG | | - | 0.158 | −0.221 | −0.111 | 0.303 | 0.416 | −0.221 | −0.269 | 0.369 | −0.384 | −0.449 | −0.306 |
| | | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| SG | | | - | −0.193 | −0.243 | 0.039 | −0.022 | −0.027 | −0.066 | 0.038 | −0.025 | −0.066 | 0.021 |
| | | | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| ROE | | | | - | 0.878 | −0.151 | −0.253 | 0.265 | −0.205 | −0.253 | 0.110 | 0.207 | 0.004 |
| | | | | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.007) |
| DFE | | | | | - | 0.037 | 0.060 | −0.012 | 0.036 | 0.017 | −0.028 | −0.010 | −0.013 |
| | | | | | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Beta | | | | | | - | 0.332 | −0.036 | −0.009 | 0.311 | −0.228 | −0.347 | −0.233 |
| | | | | | | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Volatility | | | | | | | - | −0.323 | 0.029 | 0.272 | −0.218 | −0.38 | −0.201 |
| | | | | | | | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| LogMV | | | | | | | | - | −0.277 | −0.081 | 0.159 | 0.373 | 0.170 |
| | | | | | | | | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| BM | | | | | | | | | - | −0.171 | 0.134 | 0.041 | 0.057 |
| | | | | | | | | | | (0.001) | (0.001) | (0.001) | (0.001) |
| R&D | | | | | | | | | | - | −0.36 | −0.304 | −0.163 |
| | | | | | | | | | | | (0.001) | (0.001) | (0.001) |
| LEVERAGE | | | | | | | | | | | - | 0.344 | 0.218 |
| | | | | | | | | | | | | (0.001) | (0.001) |
| DD | | | | | | | | | | | | - | 0.545 |
| | | | | | | | | | | | | | (0.001) |
| PAYOUT | | | | | | | | | | | | | - |

Panel A of the table describes the main variables used in empirical analysis. Panel B of the table presents Pearson correlation analysis of the main variables used in empirical analysis.

Variable Definitions:

*REC* = monthly analysts' consensus (mean) stock recommendation from the I/B/E/S database;
*LTG* = monthly analysts' consensus (median) long-term growth forecast from I/B/E/S;
SG = analyst forecast of short-term earnings growth rate, measured as the difference between analyst consensus one-year-ahead earnings per share forecast and the last reported earnings per share (both from I/B/E/S) divided by the last reported earnings per share, i.e., $(EPS_1\text{-}EPS_0)/EPS_0$, when $EPS_0>0$;
*ROE* = return on equity as of the prior fiscal year, measured as the last reported earnings per share before extraordinary items divided by book value per share;
*DFE* = deviation of return on equity from its mean, measured as the difference between return on equity as of the prior fiscal year (ROE) and its expected value, E(ROE), the fitted value from a cross-sectional regression;
*NDFE* = negative deviations of ROE from its mean, equal to DFE when DFE is negative and 0 otherwise;
*PDFE* = positive deviations of ROE from its mean, equal to DFE when DFE is positive and 0 otherwise;
*Beta* = five-year market beta, estimated using CRSP monthly firm and market returns over a 5-year period based on the CAPM, i.e. $ret_i = \alpha + \beta MKTret + \varepsilon$;
*Volatility* = three-month stock price volatility, estimated as annualized three-month standard deviation of daily stock returns from CRSP;
*BM* = book-to-market ratio as of the prior fiscal year, measured as book value divided by market value;
*LogMV* = natural logarithm of market value, which is estimated as the number of shares outstanding multiplied by stock price at the end of the fiscal year;
*DD* = indicator variable taking the value of 1 if the firm issues common dividends in year t, and 0 otherwise;
*PAYOUT* = dividend payout ratio, measured as total common dividends divided by earnings before extraordinary items if earnings before extraordinary items >0 or measured as total common dividends divided by (0.08*common equity) if earnings before extraordinary items<0;
*R&D* = research and development expense divided by net sales;
*LEVERAGE* = total liabilities divided by total assets; and
*Forecast Error* = signed analyst $EPS_1$ forecast error, measured as the difference between $EPS_1$ and the actual earnings per share ($EPS_a$) scaled by the absolute value of $EPS_a$.

Table 3
Relationship between analyst long-term growth forecast and profitability

Panel A: Regression to explain the level of ROE

$$ROE = d_0 + d_1 BM + d_2 DD + d_3 PAYOUT + d_4 LogMV + d_5 RD + d_6 LEVERAGE + \varepsilon \quad (4)$$

| Model | Predicted sign | 1 |
|---|---|---|
| Intercept | ? | 0.122 |
| | | (0.001) |
| BM | − | −0.106 |
| | | (0.001) |
| DD | + | 0.002 |
| | | (0.001) |
| PAYOUT | − | −0.009 |
| | | (0.001) |
| LogMV | + | 0.005 |
| | | (0.001) |
| R&D | +/− | −0.063 |
| | | (0.001) |
| LEVERAGE | + | 0.052 |
| | | (0.001) |
| n | | 401,451 |
| Adj $R^2$ | | 0.172 |

Panel B: Relationship between LTG and profitability mean reversion variables

$$LTG = \alpha + b_1 DFE + b_2 NDFE + b_3 SNDFE + b_4 SPDFE + \varepsilon \quad (5)$$

| Model | Predicted sign | 1 | 2 | 3 |
|---|---|---|---|---|
| Intercept | ? | 0.155 | 0.144 | 0.176 |
| | | (0.001) | (0.001) | (0.001) |
| DFE | − | −0.128 | 0.065 | |
| | | (0.001) | (0.001) | |
| NDFE | − | | −0.228 | |
| | | | (0.001) | |
| SNDFE | + | | 2.720 | |
| | | | (0.001) | |
| SPDFE | − | | −0.147 | |
| | | | (0.001) | |
| ROE | − | | | −0.132 |
| | | | | (0.001) |
| n | | 401,451 | 401,451 | 512,837 |
| Adj $R^2$ | | 0.012 | 0.030 | 0.049 |

Panel A of the table reports the coefficient estimates and *p*-values (in parentheses) of the regression explaining the level of return on equity. Panel B of the table reports the results of regression tests that analyze the associations between *LTG* and measures of the mean reversion of profitability. The dependent variable, *LTG*, represents monthly (median) long-term growth forecasts. We adjust the standard errors of the regression slopes in the regression tests for the possible dependence in residuals by clustering standard errors on firm and month dimensions. *SNDFE*, the square of *DFE* when *DFE* is negative and 0 otherwise; *SPDFE*, the square of *DFE* when *DFE* is positive and 0 otherwise. See also Table 2 for variable definitions.

Table 4
Relationships between stock recommendations and analysts' earnings growth forecasts and risk measures

Panel A:

$$REC = \alpha_0 + \beta_1 SG + \beta_2 LTG + \beta_3 LTG^2 + \beta_4 NDFE + \beta_5 PDFE + \beta_6 SNDFE + \beta_7 SPDFE + \beta_8 Forecast\,Error + \gamma_1 Beta + \gamma_2 LTG \times Beta + \gamma_3 Volatility + \gamma_4 LTG \times Volatility + \gamma_5 LogMV + \gamma_6 BM + \sum_{j=1}^{9} \delta_j Industry\ Dummy + \sum_{i=1995}^{2012} \theta_i Yr\ Dummy + \varepsilon \quad (6a)$$

| Dependent variable | | OLS Estimates (consensus stock recommendation) | | | | | | | | | | Ordered Multinomial Logit Regression Estimates (LTG quintile ranking) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
| | Pred. sign | | | | | | | | | | | Estimate | Odds Ratio |
| Intercept | + | 3.756 | 3.469 | 3.207 | 3.177 | 3.732 | 3.721 | 3.141 | 3.113 | 3.373 | 3.320 | | |
| | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | | |
| SG | + | 0.131 | | | 0.091 | | 0.153 | 0.117 | 0.105 | 0.101 | 0.103 | 0.379 | 1.461 |
| | | (0.001) | | | (0.001) | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | |
| LTG | + | | 1.848 | 4.766 | 5.158 | | | 5.571 | 5.730 | 5.413 | 5.638 | 2.003 | 7.411 |
| | | | (0.001) | (0.001) | (0.001) | | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | |
| $LTG^2$ | − | | | −6.073 | −6.934 | | | −7.816 | −8.241 | −7.147 | −7.139 | −0.521 | 0.594 |
| | | | | (0.001) | (0.001) | | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | |
| NDFE | + | | | | | −0.109 | 0.439 | 0.634 | 0.471 | 0.560 | 0.252 | 1.238 | 3.449 |
| | | | | | | (0.248) | (0.001) | (0.001) | (0.001) | (0.001) | (0.01) | (0.001) | |
| PDFE | + | | | | | 1.061 | 1.293 | 1.055 | 0.977 | 1.008 | 0.656 | 3.999 | 54.544 |
| | | | | | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | |
| SNDFE | + | | | | | 15.584 | 14.564 | 7.941 | 7.186 | 8.257 | 1.970 | 31.918 | 7.E+13 |
| | | | | | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.035) | (0.001) | |
| SPDFE | − | | | | | −4.129 | −4.929 | −4.034 | −4.217 | −4.661 | −3.376 | −18.555 | 0.000 |
| | | | | | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | |

Panel A: (continued)

| Dependent variable | | OLS Estimates (consensus stock recommendation) | | | | | | | | | | Ordered Multinomial Logit Regression Estimates (LTG quintile ranking) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
| | Pred. sign | | | | | | | | | | | Estimate | Odds Ratio |
| Forecast Error | − | | | | | | | | −0.049 | −0.049 | −0.050 | −0.169 | 0.845 |
| | | | | | | | | | (0.001) | (0.001) | (0.001) | (0.001) | |
| Beta | ? | | | | | | | | 0.006 | 0.114 | 0.132 | 0.335 | 1.398 |
| | | | | | | | | | (0.001) | (0.001) | (0.001) | (0.001) | |
| LTG × Beta | − | | | | | | | | | −0.681 | −0.645 | −1.945 | 0.143 |
| | | | | | | | | | | (0.001) | (0.001) | (0.001) | |
| Volatility | − | | | | | | | | −0.017 | −0.171 | −0.251 | −1.142 | 0.319 |
| | | | | | | | | | (0.002) | (0.001) | (0.001) | (0.001) | |
| LTG × Volatility | ? | | | | | | | | | 0.972 | 0.388 | 7.665 | 2.E+03 |
| | | | | | | | | | | (0.001) | (0.001) | (0.001) | |
| LogMV | + | | | | | | | | −0.025 | −0.026 | −0.027 | −0.087 | 0.917 |
| | | | | | | | | | (0.001) | (0.001) | (0.001) | (0.001) | |
| BM | − | | | | | | | | −0.098 | −0.104 | −0.128 | −0.385 | 0.680 |
| | | | | | | | | | (0.001) | (0.001) | (0.001) | (0.001) | |
| Industry effects | | No | No | No | No | No | No | No | No | No | Yes | Yes | |
| Year effects | | No | No | No | No | No | No | No | No | No | Yes | Yes | |
| n | | 582,168 | 730,230 | 730,230 | 575,727 | 405,160 | 396,934 | 370,801 | 284,655 | 284,655 | 284,655 | 282,063 | |
| Adj $R^2$ / Pseudo $R^2$ | | 0.018 | 0.088 | 0.110 | 0.136 | 0.012 | 0.033 | 0.146 | 0.152 | 0.154 | 0.196 | 0.019 | |

Table 4 (continued)

Panel B:

$$REC = \alpha_0 + \beta_1 SG + \beta_2 LTG + \beta_3 LTG\_Q^1 + \beta_4 LTG \times LTG\_Q^1 + \beta_5 LTG\_Q^4 + \beta_6 LTG \times LTG\_Q^4 + \beta_7 NDFE + \beta_8 PDFE + \beta_9 SNDFE + \beta_{10} SPDFE + \beta_{11} Forecast\ Error + \gamma_1 Beta + \gamma_2 LTG \times Beta + \gamma_3 Volatility + \gamma_4 LTG \times Volatility + \gamma_5 LogMV + \gamma_6 BM + \sum_{j=1}^{9} \delta_j Industry\ Dummy + \sum_{i=1995}^{2012} \theta_i Yr\ Dummy + \varepsilon \quad (6b)$$

Dependent variable: Consensus stock recommendation

| | | Full Sample Period: 1995-2012 | | | | | Period: 1995-2006 | | Period: 2007-2012 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model | Pred. sign | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Intercept | + | 3.319 | 3.497 | 3.319 | 3.289 | 3.587 | 3.166 | 3.426 | 3.335 | 3.459 |
| | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| SG | + | 0.091 | 0.106 | 0.092 | 0.118 | 0.107 | 0.104 | 0.101 | 0.109 | 0.117 |
| | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| LTG | + | 3.217 | 3.420 | 3.216 | 3.447 | 3.134 | 4.246 | 4.254 | 2.850 | 2.941 |
| | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| $LTG\_Q^1$ | − | −0.023 | −0.042 | −0.136 | −0.110 | −0.230 | −0.083 | −0.068 | 0.081 | 0.092 |
| | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| LTG_Q1 × POSTY06 | ? | | | 0.261 | 0.254 | 0.306 | | | | |
| | | | | (0.001) | (0.001) | (0.001) | | | | |
| $LTG \times LTG\_Q^1$ | + | −0.496 | −0.291 | 0.668 | 0.360 | 1.169 | 0.976 | 0.819 | −1.838 | −1.726 |
| | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| $LTG \times LTG\_Q^1 \times$ POSTY06 | ? | | | −2.706 | −2.669 | −2.081 | | | | |
| | | | | (0.001) | (0.001) | (0.001) | | | | |
| $LTG\_Q^4$ | + | 0.614 | 0.595 | 0.614 | 0.699 | 0.565 | 0.663 | 0.580 | 0.521 | 0.452 |
| | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| $LTG \times LTG\_Q^4$ | − | −2.848 | −2.811 | −2.848 | −3.258 | −2.618 | −3.565 | −3.159 | −2.810 | −2.434 |
| | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |

Panel B: (continued)

| | | Full Sample Period: 1995-2012 | | | | | Period: 1995-2006 | | Period: 2007-2012 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model | Pred. sign | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| NDFE | + | | 0.241 | | 0.588 | 0.439 | | −0.316 | | 2.037 |
| | | | (0.001) | | (0.001) | (0.001) | | (0.009) | | (0.001) |
| PDFE | + | | 0.703 | | 1.018 | 0.752 | | 1.289 | | 0.472 |
| | | | (0.001) | | (0.001) | (0.001) | | (0.001) | | (0.001) |
| SNDFE | + | | 1.959 | | 7.718 | 3.050 | | 2.225 | | 10.284 |
| | | | (0.001) | | (0.001) | (0.001) | | (0.001) | | (0.001) |
| SPDFE | − | | −3.525 | | −3.960 | −3.567 | | −5.775 | | −2.926 |
| | | | (0.001) | | (0.001) | (0.001) | | (0.001) | | (0.001) |
| Forecast Error | − | | −0.003 | | −0.045 | −0.053 | | −0.054 | | −0.041 |
| | | | (0.001) | | (0.001) | (0.001) | | (0.001) | | (0.001) |
| Beta | ? | | 0.110 | | | 0.113 | | 0.049 | | 0.139 |
| | | | (0.001) | | | (0.001) | | (0.001) | | (0.001) |
| LTG × Beta | − | | −0.555 | | | −0.543 | | −0.431 | | −0.627 |
| | | | (0.001) | | | (0.001) | | (0.001) | | (0.001) |
| Volatility | − | | −0.292 | | | −0.278 | | −0.007 | | −0.230 |
| | | | (0.001) | | | (0.001) | | (0.001) | | (0.001) |
| LTG × Volatility | ? | | 0.552 | | | 0.680 | | 0.226 | | 1.178 |
| | | | (0.001) | | | (0.001) | | (0.001) | | (0.001) |
| LogMV | + | | −0.026 | | | −0.025 | | −0.030 | | −0.013 |
| | | | (0.001) | | | (0.001) | | (0.001) | | (0.001) |
| BM | ? | | −0.136 | | | −0.104 | | −0.139 | | −0.048 |
| | | | (0.001) | | | (0.001) | | (0.001) | | (0.001) |
| Industry effects | | No | Yes | No | No | Yes | | No | | No |
| Year effects | | No | Yes | No | No | Yes | | No | | No |
| n | | 575,727 | 291,834 | 575,727 | 370,909 | 284,655 | 188,677 | 186,482 | 96,687 | 95,581 |
| Adj $R^2$ | | 0.137 | 0.194 | 0.138 | 0.156 | 0.197 | 0.168 | 0.179 | 0.097 | 0.116 |

Panel A of the table presents the coefficient estimates and *p*-values (in parentheses) of equation (6a). The sample period is January 1995-December 2012. Models 1-10 of the panel report the results of the OLS regression tests that employ monthly consensus stock recommendation as the dependent variable. *REC* can be any value between 1 and 5, with the favourableness increasing from “strong sell” to “strong buy”. Model 11 reports the estimates of the Ordered Multinomial regression analysis that employs the quintile ranking of consensus stock recommendation as the dependent variable. Panel B of the table presents the coefficient estimates and *p*-values (in parentheses) of equation (6b). Following Petersen (2009), we adjust the standard errors of the regression slopes in the regression tests of the table for the possible dependence in residuals by clustering standard errors on firm and month dimensions. $LTG^2$, square value of *LTG*; *SNDFE*, the square of *DFE* when *DFE* is negative and 0 otherwise; *SPDFE*, the square of *DFE* when *DFE* is positive and 0 otherwise; $LTG\_Q^1$, indicator variable taking the value of 1 when the LTG forecast falls into the 1st (low) quartile of LTG, and 0 otherwise; $LTG\_Q^4$, indicator variable taking the value of 1 when the LTG forecast falls into the 4th (high) quartile of LTG, and 0 otherwise; $LTG \times LTG\_Q^1$, interaction variable between *LTG* and the indicator variable $LTG\_Q^1$; $LTG \times LTG\_Q^4$, interaction variable between *LTG* and the indicator variable $LTG\_Q^4$; *Industry effects*, vector of industry indicator variables based on the GICS level-1 classification; *Year effects*, vector of calendar year indicator variables. POSTY06, indicator variable taking the value of 1 when the consensus recommendation is estimated after December 2006, and 0 otherwise. $LTG \times LTG\_Q^1 \times POSTY06$, interaction variable between $LTG \times LTG\_Q^1$ and *POSTY06*. See also Table 2 for variable definitions.

Table 5
Relationship between stock recommendation profitability and analyst incorporation of the really long-term growth and risk

Panel A: *RLTG* and stock recommendation profitability

$$CAR_{(t,t+s)} = \alpha + \beta_1 ANYST\_RLTG + \beta_2 LogBSize + \beta_3 N\_FIRM + \beta_4 N\_IND + \beta_5 FREQ^{EPS} + \beta_6 ACCUR + \beta_7 FIRM\_EXP + \beta_8 N\_ANYST + \beta_9 LOSS + \beta_{10} BM + \beta_{11} LogMV + Industry\ effects + Year\ effects + \varepsilon \quad (9a)$$

| Dependent variable | Size-Adj. Abnormal Returns | | | Std Deviation-Adj. Abnormal Returns | | |
|---|---|---|---|---|---|---|
| Model | 1 | 2 | 3 | 4 | 5 | 6 |
| | 3-day | 1-month | 12-month | 3-day | 1-month | 12-month |
| Intercept | 0.033 | 0.049 | 0.129 | 0.040 | 0.054 | 0.043 |
| | (<.001) | (<.001) | (<.001) | (<.001) | (<.001) | (0.015) |
| ANYST_RLTG | 0.002 | 0.002 | 0.007 | 0.002 | 0.003 | 0.006 |
| | (0.001) | (0.004) | (0.078) | (0.001) | (0.006) | (0.100) |
| LogBSIZE | 0.000 | 0.000 | −0.005 | 0.000 | 0.000 | 0.002 |
| | (0.161) | (0.542) | (0.001) | (0.099) | (0.386) | (0.319) |
| N_FIRM | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (0.014) | (0.865) | (0.820) | (0.034) | (0.833) | (0.141) |
| N_IND | −0.001 | −0.001 | −0.002 | −0.001 | −0.001 | −0.003 |
| | (<.001) | (0.001) | (0.072) | (<.001) | (<.001) | (0.001) |
| $FREQ^{EPS}$ | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.002 |
| | (<.001) | (<.001) | (0.079) | (<.001) | (<.001) | (0.001) |
| ACCUR | 0.003 | 0.004 | −0.016 | 0.007 | 0.005 | 0.008 |
| | (<.001) | (0.004) | (0.029) | (<.001) | (0.001) | (0.221) |
| FIRM_EXP | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.001 |
| | (<.001) | (<.001) | (<.001) | (0.006) | (<.001) | (<.001) |
| N_ANYST | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 |
| | (0.129) | (0.578) | (0.322) | (0.006) | (0.492) | (0.026) |
| LOSS | 0.001 | 0.003 | −0.022 | 0.002 | 0.004 | −0.003 |
| | (0.106) | (0.003) | (0.002) | (0.004) | (0.002) | (0.666) |
| BM | 0.000 | 0.002 | 0.017 | −0.001 | 0.003 | 0.039 |
| | (0.748) | (0.124) | (0.011) | (0.279) | (0.059) | (<.001) |
| LOGMV | −0.004 | −0.006 | −0.013 | −0.005 | −0.006 | −0.011 |
| | (<.001) | (<.001) | (<.001) | (<.001) | (<.001) | (<.001) |
| Year effects | yes | yes | yes | yes | yes | yes |
| Industry effects | yes | yes | yes | yes | yes | yes |
| n | 141,473 | 146,984 | 147,540 | 149,569 | 151,116 | 149,350 |
| Adj $R^2$ | 0.0230 | 0.011 | 0.005 | 0.020 | 0.010 | 0.005 |

Table 5 (continued)
Panel B: *RLTG*, risk, and stock recommendation profitability

$$CAR_{(t,t+s)} = \alpha + \beta_1 ANYST\_RLTGVOL + \beta_2 LogBSize + \beta_3 N\_FIRM + \beta_4 N\_IND + \beta_5 FREQ^{EPS} + \beta_6 ACCUR + \beta_7 FIRM\_EXP + \beta_8 N\_ANYST + \beta_9 LOSS + \beta_{10} BM + \beta_{11} LogMV + Industry\ effects + Year\ effects + \varepsilon \quad (9b)$$

| Dependent variable | Size-Adj. Abnormal Returns | | | Std Deviation-Adj. Abnormal Returns | | |
|---|---|---|---|---|---|---|
| Model | 1 | 2 | 3 | 4 | 5 | 6 |
| | 3-day | 1-month | 12-month | 3-day | 1-month | 12-month |
| Intercept | 0.034 | 0.050 | 0.112 | 0.043 | 0.050 | 0.044 |
| | (<.001) | (<.001) | (<.001) | (<.001) | (<.001) | (0.012) |
| ANYST_RLTGVOL | 0.001 | 0.001 | 0.002 | 0.001 | 0.001 | 0.007 |
| | (0.071) | (0.146) | (0.545) | (0.078) | (0.103) | (0.044) |
| LogBSIZE | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.002 |
| | (0.103) | (0.423) | (0.886) | (0.091) | (0.175) | (0.280) |
| N_FIRM | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (0.009) | (0.900) | (0.421) | (0.032) | (0.863) | (0.122) |
| N_IND | −0.001 | −0.001 | −0.002 | −0.001 | −0.001 | −0.003 |
| | (<.001) | (0.001) | (0.024) | (<.001) | (<.001) | (0.001) |
| $FREQ^{EPS}$ | 0.001 | 0.001 | 0.002 | 0.001 | 0.001 | 0.002 |
| | (<.001) | (<.001) | (<.001) | (<.001) | (<.001) | (0.001) |
| ACCUR | 0.003 | 0.000 | 0.001 | 0.000 | 0.000 | 0.008 |
| | (<.001) | (0.646) | (0.093) | (0.194) | (0.412) | (0.222) |
| FIRM_EXP | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.001 |
| | (<.001) | (<.001) | (<.001) | (0.017) | (<.001) | (<.001) |
| N_ANYST | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.001 |
| | (0.143) | (0.577) | (0.001) | (0.006) | (0.303) | (0.026) |
| LOSS | 0.001 | 0.004 | 0.005 | 0.003 | 0.005 | −0.003 |
| | (0.101) | (0.004) | (0.204) | (0.003) | (<.001) | (0.667) |
| BM | 0.000 | 0.002 | 0.022 | −0.001 | 0.002 | 0.039 |
| | (0.739) | (0.114) | (<.001) | (0.560) | (0.077) | (<.001) |
| LOGMV | −0.004 | −0.006 | −0.015 | −0.005 | −0.006 | −0.011 |
| | (<.001) | (<.001) | (<.001) | (<.001) | (<.001) | (<.001) |
| Year effects | yes | yes | yes | yes | yes | yes |
| Industry effects | yes | yes | yes | yes | yes | yes |
| n | 141,473 | 148,193 | 144,856 | 150,850 | 149,775 | 149,350 |
| Adj $R^2$ | 0.0230 | 0.011 | 0.007 | 0.019 | 0.011 | 0.006 |

This table reports the regression results of the relationships between the profitability of recommendations and analyst incorporation of *RLTG* and risk. Panel A reports the results of estimating Equation (9a). Panel B reports the results of estimating Equation (9b). *ANYST_RLTG*, 1 if the estimate of DFE in Equation (8) for an analyst is negative, and 0 otherwise; *ANYST_RLTGVOL*, 1 if the estimates of DFE and *Volatility* in Equation (9) for an analyst are both negative, and 0 otherwise; $REC^{individual}$, stock recommendations issued by individual analysts on the I/B/E/S database; $CAR_{t-1,t+1}^{Size-Adj}$, size-adjusted cumulative abnormal stock return over the three trading days beginning on the day prior to the stock recommendation announcement day *t*. We calculate the size-adjusted returns by subtracting the appropriate CRSP market capitalization decile returns from the stock's raw returns; $CAR_{t,t+30}^{Size-Adj}$, size-adjusted cumulative abnormal stock return over the 30 days following the stock recommendation announcement day *t*; $CAR_{t,t+365}^{Size-Adj}$, size-adjusted cumulative abnormal stock return over the 12 months following the recommendation announcement day *t*; $CAR_{t-1,t+1}^{Std-Adj}$, standard deviation decile-adjusted cumulative abnormal stock return over the three days beginning on the trading day prior to the stock recommendation announcement day *t*. We calculate the standard deviation decile-adjusted abnormal returns by subtracting the appropriate CRSP standard deviation decile returns from the stock's raw returns; $CAR_{t,t+30}^{Std-Adj}$, standard deviation decile-adjusted cumulative abnormal stock return over the 30 days following the stock recommendation announcement day *t*; $CAR_{t,t+365}^{Std-Adj}$, standard deviation decile-adjusted cumulative abnormal stock return over the 12 months following the stock recommendation announcement day *t*; *N_FIRM*, number of firms covered by an analyst in a given year; *N_IND*, number of industries covered by an analyst in a given year; *LogBSIZE*, nature log of the number of analysts employed by a brokerage firm in a given year; *BM*, book-to-market ratio; *LogMV*, nature log of the market capitalization of the last fiscal year; *LOSS*, 1 if the firm's earnings before extraordinary items is negative in the previous year, and 0 otherwise; *N_ANYST*, number of analysts following a specific firm in a given year; *FIRM_EXP*, number of years the analyst issues stock recommendation for a specific firm; $FREQ^{EPS}$, number of one-year-ahead earnings per share forecasts issued by an analyst for a given firm in a given year; *ACCUR*, accuracy of the analyst's earnings forecast, measured as the absolute value of the difference between the actual earnings and the analyst's last earnings forecast, deflated by the absolute value of the actual earnings.

# SURVEY OF PROFESSIONAL FORECASTERS

**Release Date: February 12, 2016**

***FIRST QUARTER 2016***

***Forecasters Predict Lower Growth over the Next Three Years***

The economy looks weaker now than it did three months ago, according to 40 forecasters surveyed by the Federal Reserve Bank of Philadelphia. The forecasters predict real GDP will grow at an annual rate of 2.0 percent this quarter and 2.5 percent next quarter. On an annual-average over annual-average basis, real GDP will grow 2.1 percent in 2016, down 0.5 percentage point from the previous estimate. The forecasters predict real GDP will grow 2.4 percent in 2017 and 2.7 percent in 2018, both down 0.1 percentage point from the estimates of three months ago. For 2019, real GDP is estimated to grow at 2.3 percent.

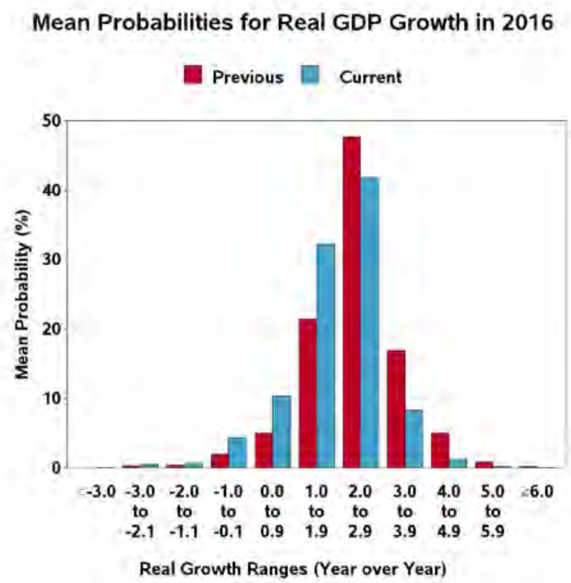
A slightly positive outlook for the labor market accompanies the outlook for weaker output growth. The forecasters predict that the unemployment rate will average 4.8 percent in 2016, before falling to 4.6 percent in 2017, 4.6 percent in 2018, and 4.7 percent in 2019. The projections for 2017 and 2018 are slightly below those of the last survey.

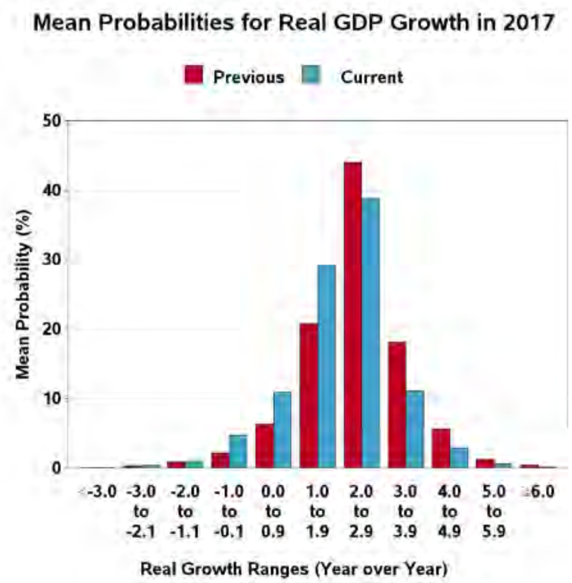
The panelists also predict a small improvement on the employment front. They have revised upward their estimates for job gains in 2016. The forecasters see nonfarm payroll employment growing at a rate of 195,000 jobs per month this quarter, 183,200 jobs per month next quarter, 195,900 jobs per month in the third quarter of 2016, and 152,600 jobs per month in the fourth quarter of 2016. The forecasters' projections for the annual-average level of nonfarm payroll employment suggest job gains at a monthly rate of 204,300 in 2016 and 165,000 in 2017, as the table below shows. (These annual-average estimates are computed as the year-to-year change in the annual-average level of nonfarm payroll employment, converted to a monthly rate.)

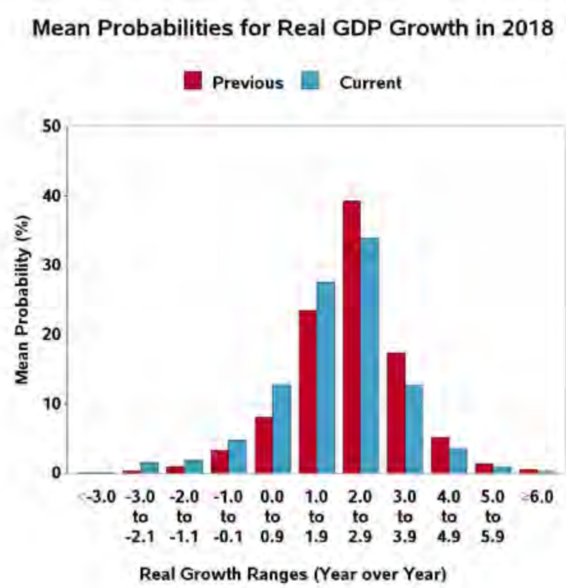
*Median Forecasts for Selected Variables in the Current and Previous Surveys*

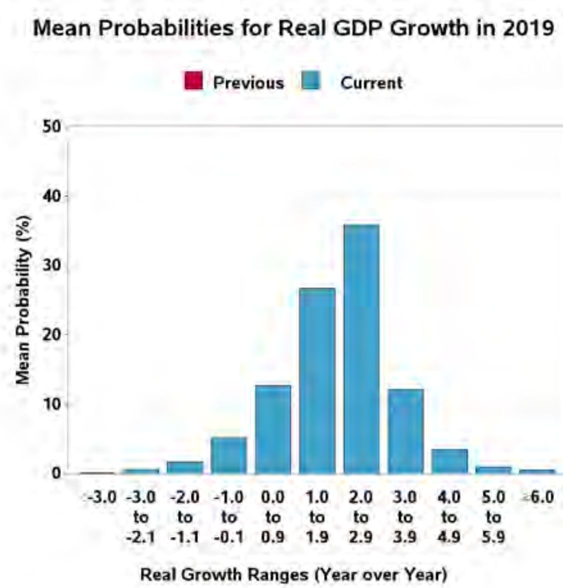
| | Real GDP (%) | | Unemployment Rate (%) | | Payrolls (000s/month) | |
|---|---|---|---|---|---|---|
| | Previous | New | Previous | New | Previous | New |
| Quarterly data: | | | | | | |
| 2016:Q1 | 2.5 | 2.0 | 4.9 | 4.9 | 188.2 | 195.0 |
| 2016:Q2 | 2.6 | 2.5 | 4.8 | 4.8 | 193.5 | 183.2 |
| 2016:Q3 | 2.9 | 2.3 | 4.8 | 4.7 | 192.0 | 195.9 |
| 2016:Q4 | 2.4 | 2.5 | 4.7 | 4.6 | 181.2 | 152.6 |
| 2017:Q1 | N.A. | 2.4 | N.A. | 4.6 | N.A. | 177.1 |
| Annual data (projections are based on annual-average levels): | | | | | | |
| 2016 | 2.6 | 2.1 | 4.8 | 4.8 | 197.0 | 204.3 |
| 2017 | 2.5 | 2.4 | 4.7 | 4.6 | N.A. | 165.0 |
| 2018 | 2.8 | 2.7 | 4.7 | 4.6 | N.A. | N.A. |
| 2019 | N.A. | 2.3 | N.A. | 4.7 | N.A. | N.A. |

The charts below provide some insight into the degree of uncertainty the forecasters have about their projections for the rate of growth in the annual-average level of real GDP. Each chart (except the one for 2019) presents the forecasters' previous and current estimates of the probability that growth will fall into each of 11 ranges. The charts show the forecasters have revised upward their estimates of the probability that real GDP growth will fall below 2.0 percent in 2016, 2017, and 2018.

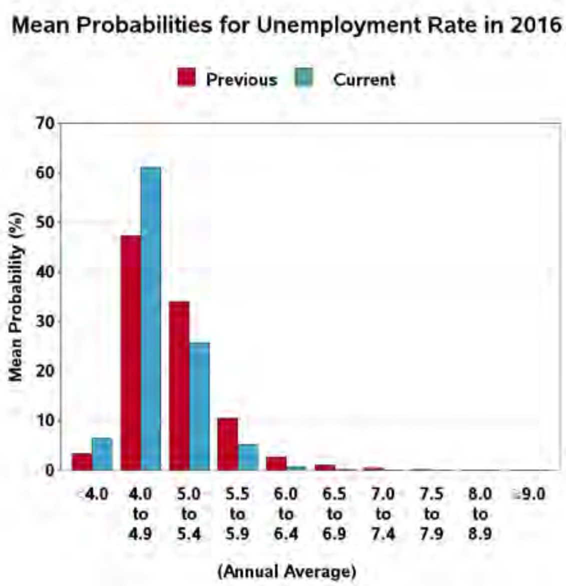


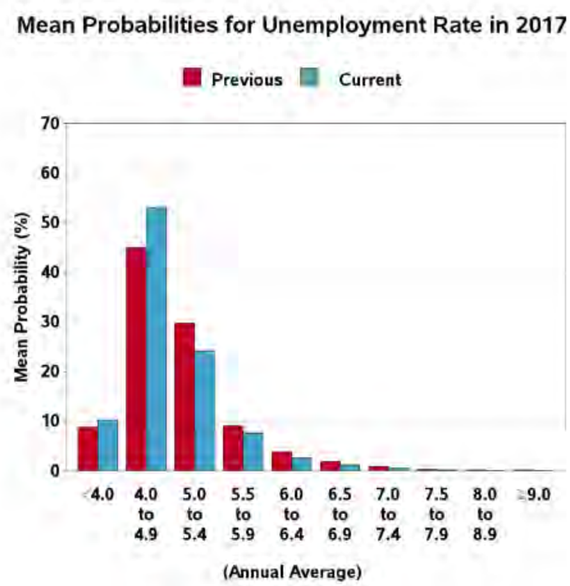



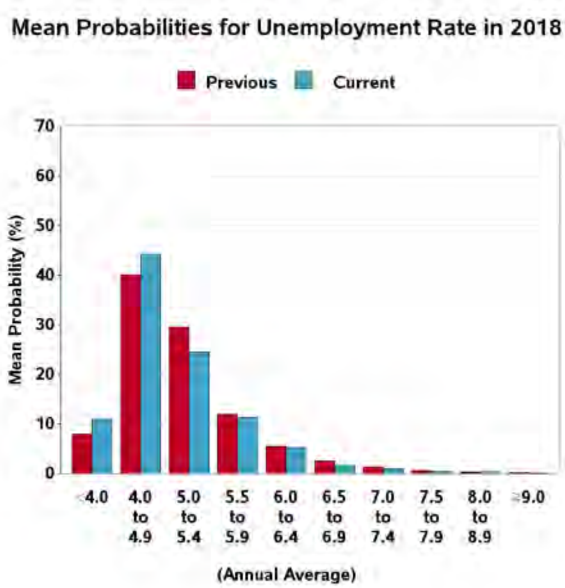



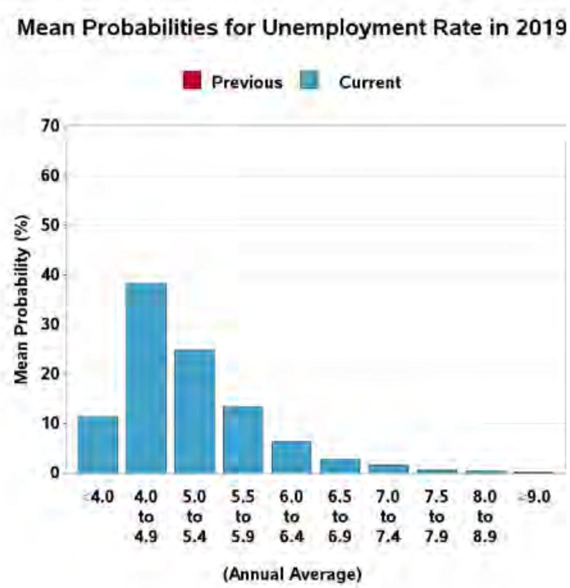



The forecasters' density projections for unemployment, shown below, shed light on uncertainty about the labor market over the next four years. Each chart presents the forecasters' current estimates of the probability that unemployment will fall into each of 10 ranges. The charts show the panelists are raising their density estimates over the next three years at the lower levels of unemployment outcomes.



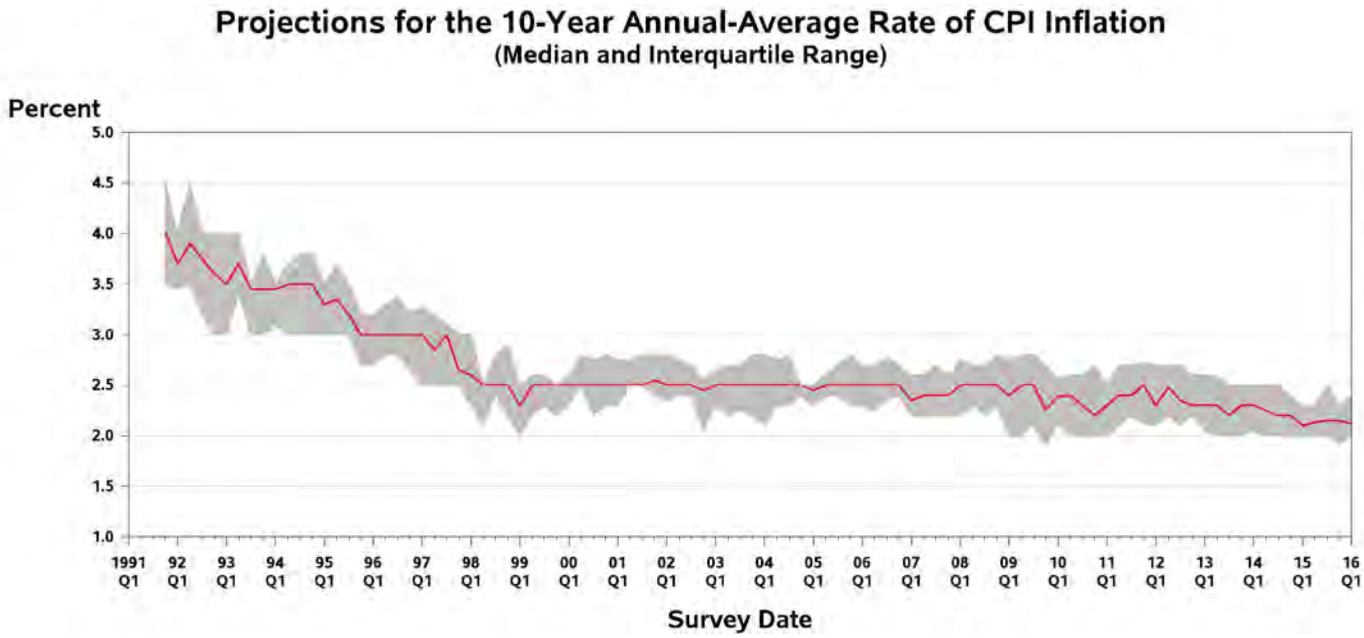
***Forecasters Predict Lower Headline Inflation over the Next Two Years***
The forecasters expect lower headline CPI inflation in 2016 and 2017 than they predicted three months ago. Measured on a fourth-quarter over fourth-quarter basis, headline CPI inflation is expected to average 1.5 percent in 2016 and 2.2 percent in 2017, down from 2.0 percent and 2.3 percent, respectively, in the last survey. The forecasters have also revised downward their projections for headline PCE inflation in 2016 to 1.3 percent, down from 1.8 percent in the survey of three months ago.

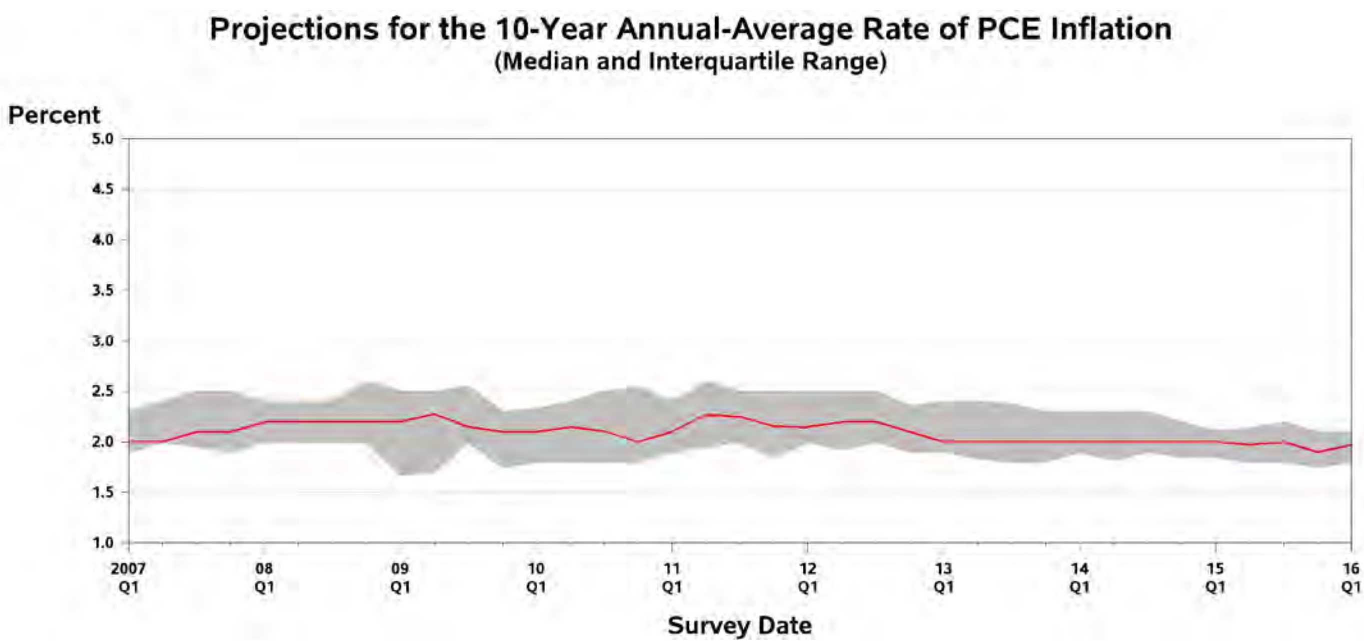
Over the next 10 years, 2016 to 2025, the forecasters expect headline CPI inflation to average 2.12 percent at an annual rate. The corresponding estimate for 10-year annual-average PCE inflation is 1.97 percent.

*Median Short-Run and Long-Run Projections for Inflation (Annualized Percentage Points)*

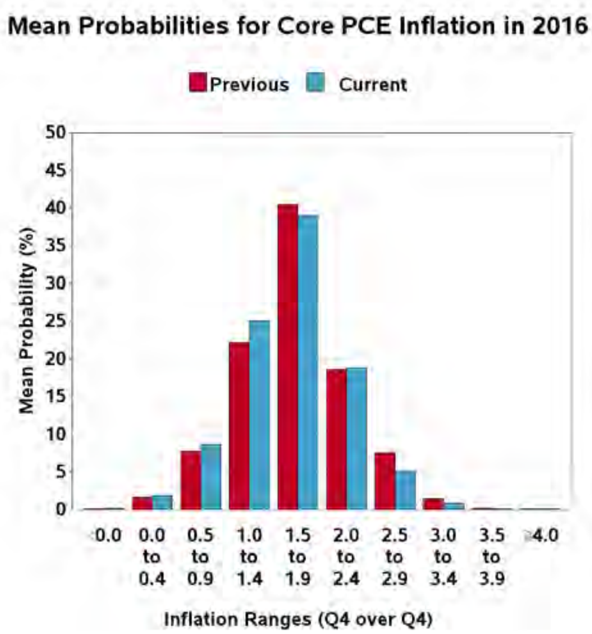
| | Headline CPI | | Core CPI | | Headline PCE | | Core PCE | |
|---|---|---|---|---|---|---|---|---|
| | Previous | Current | Previous | Current | Previous | Current | Previous | Current |
| Quarterly | | | | | | | | |
| 2016:Q1 | 1.8 | 0.4 | 1.9 | 1.8 | 1.6 | 0.4 | 1.5 | 1.4 |
| 2016:Q2 | 2.1 | 1.6 | 2.0 | 2.0 | 1.8 | 1.6 | 1.6 | 1.5 |
| 2016:Q3 | 2.1 | 2.1 | 2.0 | 2.0 | 1.8 | 1.8 | 1.7 | 1.7 |
| 2016:Q4 | 2.2 | 2.1 | 2.0 | 2.0 | 1.9 | 1.8 | 1.7 | 1.7 |
| 2017:Q1 | N.A. | 2.1 | N.A. | 2.0 | N.A. | 1.8 | N.A. | 1.7 |
| Q4/Q4 Annual Averages | | | | | | | | |
| 2016 | 2.0 | 1.5 | 2.0 | 2.0 | 1.8 | 1.3 | 1.6 | 1.6 |
| 2017 | 2.3 | 2.2 | 2.1 | 2.1 | 1.9 | 1.9 | 1.8 | 1.8 |
| 2018 | N.A. | 2.3 | N.A. | 2.1 | N.A. | 2.0 | N.A. | 1.9 |
| Long-Term Annual Averages | | | | | | | | |
| 2015-2019 | 1.90 | N.A. | N.A. | N.A. | 1.65 | N.A. | N.A. | N.A. |
| 2016-2020 | N.A. | 2.08 | N.A. | N.A. | N.A. | 1.88 | N.A. | N.A. |
| 2015-2024 | 2.15 | N.A. | N.A. | N.A. | 1.90 | N.A. | N.A. | N.A. |
| 2016-2025 | N.A. | 2.12 | N.A. | N.A. | N.A. | 1.97 | N.A. | N.A. |

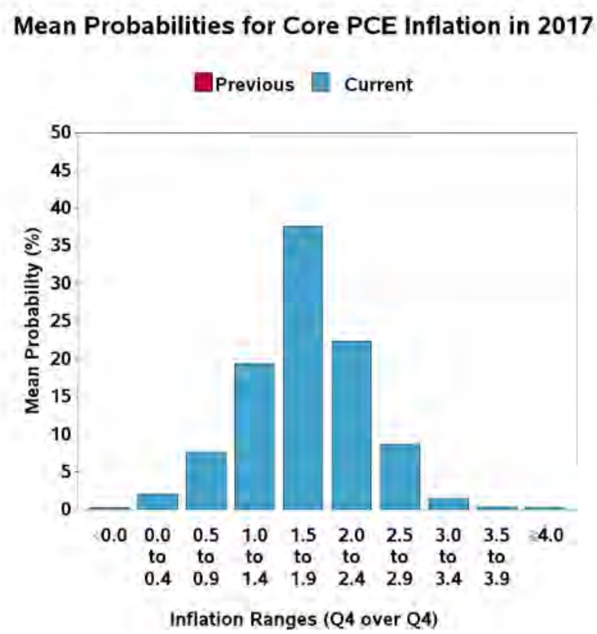
The charts below show the median projections (the red line) and the associated interquartile ranges (the gray areas around the red line) for the projections for 10-year annual-average CPI and PCE inflation. The top panel shows a slightly lower level of the long-term projection for CPI inflation, at 2.12 percent. The bottom panel shows the slightly higher 10-year forecast for PCE inflation, at 1.97 percent.



The figures below show the probabilities that the forecasters are assigning to the possibility that fourth-quarter over fourth-quarter core PCE inflation in 2016 and 2017 will fall into each of 10 ranges. For 2016, the forecasters have increased the probability that core PCE inflation will be below 1.5 percent, compared with their estimates in the survey of three months ago.




***Higher Risk of a Negative Quarter***

For the current quarter, the forecasters predict a 14.4 percent chance of negative growth in real GDP. As the table below shows, the forecasters have also increased their risk estimates for a downturn in the following quarters, compared with their previous estimates.

*Risk of a Negative Quarter (%)*
*Survey Means*

| Quarterly data: | Previous | New |
|---|---|---|
| 2016:Q1 | 13.0 | 14.4 |
| 2016:Q2 | 12.6 | 14.7 |
| 2016:Q3 | 13.7 | 15.8 |
| 2016:Q4 | 14.7 | 17.0 |
| 2017:Q1 | N.A. | 18.8 |

***Forecasters State Their Views on Home Price Growth over the Next Two Years***

In this survey, a special question asked panelists to provide their forecasts for fourth-quarter over fourth-quarter growth in house prices, as measured by a number of alternative indices. The panelists were allowed to choose their measure from a list of indices or to write in their own index. For each index of their choosing, the panelists provided forecasts for growth in 2016 and 2017.

Eighteen panelists answered the special question. Some panelists provided projections for more than one index. The table below provides a summary of the forecasters' responses. The number of responses (N) is low for each index. The median estimates for the seven house-price indices listed in the table below range from 2.9 percent to 5.0 percent in 2016 and from 2.5 percent to 4.4 percent in 2017.

*Projections for Growth in Various Indices of House Prices*
*Q4/Q4, Percentage Points*

| Index | 2016 (Q4/Q4 Percent Change) | | | 2017 (Q4/Q4 Percent Change) | | |
|---|---|---|---|---|---|---|
| | N | Mean | Median | N | Mean | Median |
| S&P/Case-Shiller: U.S. National | 2 | 4.6 | 4.6 | 2 | 4.0 | 4.0 |
| S&P/Case-Shiller: Composite 10 | 1 | 4.5 | 4.5 | 1 | 4.4 | 4.4 |
| S&P/Case-Shiller: Composite 20 | 4 | 2.7 | 2.9 | 4 | 2.4 | 2.5 |
| FHFA: U.S. Total | 3 | 4.9 | 5.0 | 3 | 3.9 | 4.0 |
| FHFA: Purchase Only | 6 | 4.3 | 4.7 | 6 | 3.5 | 3.8 |
| CoreLogic: National HPI, incl. Distressed Sales (Single Family Combined) | 3 | 4.9 | 4.9 | 2 | 3.7 | 3.7 |
| NAR Median: Total Existing | 2 | 3.4 | 3.4 | 2 | 3.2 | 3.2 |

***Forecasters Predict Lower Long-Run Growth in Output and Productivity and in Returns to Financial Assets***

In our first-quarter surveys, the forecasters provide their long-run projections for an expanded set of variables, including growth in output and productivity, as well as returns on financial assets.

As the table below shows, the forecasters have reduced their estimates for the annual-average rate of growth in real GDP over the next 10 years. Currently, the forecasters expect real GDP to grow at an annual-average rate of 2.28 percent over the next 10 years, down from their projection of 2.50 percent in the first-quarter survey of 2015. Productivity growth is now expected to average 1.40 percent, down from 1.70 percent.

Downward revisions to the return on the financial assets accompany the current outlook. The forecasters see the S&P 500 returning an annual-average 5.37 percent per year over the next 10 years, down slightly from 5.45 percent in last year's first-quarter survey. The forecasters expect the rate on 10-year Treasuries to average 3.39 percent over the next 10 years, down from 3.98 percent in last year's first-quarter survey. Three-month Treasury bills will return an annual-average 2.50 percent per year over the next 10 years, down from 2.67 percent.

*Median Long-Term (10-Year) Forecasts (%)*

| | *First Quarter 2015* | *Current Survey* |
|---|---|---|
| *Real GDP Growth* | 2.50 | 2.28 |
| *Productivity Growth* | 1.70 | 1.40 |
| *Stock Returns (S&P 500)* | 5.45 | 5.37 |
| *Rate on 10-Year Treasury Bonds* | 3.98 | 3.39 |
| *Bill Returns (3-Month)* | 2.67 | 2.50 |

The Federal Reserve Bank of Philadelphia thanks the following forecasters for their participation in recent surveys:

**Lewis Alexander**, Nomura Securities; **Scott Anderson**, Bank of the West (BNP Paribas Group); **Robert J. Barbera**, Johns Hopkins University Center for Financial Economics; **Peter Bernstein**, RCF Economic and Financial Consulting, Inc.; **Christine Chmura**, **Ph.D.**, and **Xiaobing Shuai**, **Ph.D.**, Chmura Economics & Analytics; **Gary Ciminero**, **CFA**, GLC Financial Economics; **Nathaniel Curtis**, Navigant Consulting; **Gregory Daco**, Oxford Economics USA, Inc.; **Rajeev Dhawan**, Georgia State University; **Michael R. Englund**, Action Economics, LLC; **Michael Gapen**, Barclays Capital; **James Glassman**, JPMorgan Chase & Co.; **Matthew Hall**, **Daniil Manaenkov**, and **Ben Meiselman**, RSQE, University of Michigan; **Jan Hatzius**, Goldman Sachs; **Keith Hembre**, Nuveen Asset Management; **Peter Hooper**, Deutsche Bank Securities, Inc.; **IHS Global Insight**; **Fred Joutz**, Benchmark Forecasts and Research Program on Forecasting, George Washington University; **Sam Kahan**, Kahan Consulting Ltd. (ACT Research LLC); **N. Karp**, BBVA Research USA; **Walter Kemmsies**, Moffatt & Nichol; **Jack Kleinhenz**, Kleinhenz & Associates, Inc.; **Thomas Lam**, RHB Securities Singapore Pte. Ltd.; **L. Douglas Lee**, Economics from Washington; **John Lonski**, Moody's Capital Markets Group; **Macroeconomic Advisers**, **LLC**; **R. Anthony Metz**, Pareto Optimal Economics; **Michael Moran**, Daiwa Capital Markets America; **Joel L. Naroff**, Naroff Economic Advisors; **Mark Nielson, Ph.D.**, MacroEcon Global Advisors; **Luca Noto**, Anima Sgr; **Brendon Ogmundson**, BC Real Estate Association; **Tom Porcelli**, RBC Capital Markets; **Arun Raha** and **Maira Trimble**, Eaton Corporation; **Martin A. Regalia**, U.S. Chamber of Commerce; **Philip Rothman**, East Carolina University; **Chris Rupkey**, Bank of Tokyo-Mitsubishi UFJ; **John Silvia**, Wells Fargo; **Allen Sinai**, Decision Economics, Inc.; **Sean M. Snaith**, **Ph.D.**, University of Central Florida; **Constantine G. Soras, Ph.D.**, CGS Economic Consulting; **Stephen Stanley**, Amherst Pierpont Securities; **Charles Steindel**, Ramapo College of New Jersey; **Susan M. Sterne**, Economic Analysis Associates, Inc.; **James Sweeney**, Credit Suisse; **Thomas Kevin Swift**, American Chemistry Council; **Richard Yamarone**, Bloomberg, LP; **Mark Zandi**, Moody's Analytics; **Ellen Zentner**, Morgan Stanley.

This is a partial list of participants. We also thank those who wish to remain anonymous.

SUMMARY TABLE
SURVEY OF PROFESSIONAL FORECASTERS
MAJOR MACROECONOMIC INDICATORS

| | 2016 Q1 | 2016 Q2 | 2016 Q3 | 2016 Q4 | 2017 Q1 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (YEAR-OVER-YEAR) | | | |
| PERCENT GROWTH AT ANNUAL RATES | | | | | | | | | |
| 1. REAL GDP (BILLIONS, CHAIN WEIGHTED) | 2.0 | 2.5 | 2.3 | 2.5 | 2.4 | 2.1 | 2.4 | 2.7 | 2.3 |
| 2. GDP PRICE INDEX (PERCENT CHANGE) | 1.1 | 1.6 | 1.8 | 1.9 | 1.9 | 1.4 | 1.9 | N.A. | N.A. |
| 3. NOMINAL GDP ($ BILLIONS) | 3.2 | 4.0 | 4.1 | 4.5 | 4.2 | 3.4 | 4.4 | N.A. | N.A. |
| 4. NONFARM PAYROLL EMPLOYMENT | | | | | | | | | |
| (PERCENT CHANGE) | 1.6 | 1.5 | 1.6 | 1.3 | 1.5 | 1.7 | 1.4 | N.A. | N.A. |
| (AVG MONTHLY CHANGE) | 195.0 | 183.2 | 195.9 | 152.6 | 177.1 | 204.3 | 165.0 | N.A. | N.A. |
| VARIABLES IN LEVELS | | | | | | | | | |
| 5. UNEMPLOYMENT RATE (PERCENT) | 4.9 | 4.8 | 4.7 | 4.6 | 4.6 | 4.8 | 4.6 | 4.6 | 4.7 |
| 6. 3-MONTH TREASURY BILL (PERCENT) | 0.3 | 0.4 | 0.7 | 0.8 | 1.0 | 0.6 | 1.4 | 2.2 | 2.7 |
| 7. 10-YEAR TREASURY BOND (PERCENT) | 2.1 | 2.3 | 2.4 | 2.5 | 2.7 | 2.4 | 2.8 | 3.2 | 3.5 |

| | 2016 Q1 | 2016 Q2 | 2016 Q3 | 2016 Q4 | 2017 Q1 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|
| | | | | | | (Q4-OVER-Q4) | | |
| INFLATION INDICATORS | | | | | | | | |
| 8. CPI (ANNUAL RATE) | 0.4 | 1.6 | 2.1 | 2.1 | 2.1 | 1.5 | 2.2 | 2.3 |
| 9. CORE CPI (ANNUAL RATE) | 1.8 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 |
| 10. PCE (ANNUAL RATE) | 0.4 | 1.6 | 1.8 | 1.8 | 1.8 | 1.3 | 1.9 | 2.0 |
| 11. CORE PCE (ANNUAL RATE) | 1.4 | 1.5 | 1.7 | 1.7 | 1.7 | 1.6 | 1.8 | 1.9 |

THE FIGURES ON EACH LINE ARE MEDIANS OF 40 INDIVIDUAL FORECASTERS.

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2016.

**SURVEY OF PROFESSIONAL FORECASTERS**

**First Quarter 2016**

**Tables**

Note: Data in these tables listed as "actual" are the data that were available to the forecasters when they were sent the survey questionnaire on January 29, 2016; the tables do not reflect subsequent revisions to the data. All forecasts were received on or before February 9, 2016.

TABLE ONE
MAJOR MACROECONOMIC INDICATORS
MEDIANS OF FORECASTER PREDICTIONS

| | NUMBER OF FORECASTERS | ACTUAL 2015 Q4 | FORECAST 2016 Q1 | 2016 Q2 | 2016 Q3 | 2016 Q4 | 2017 Q1 | ACTUAL 2015 ANNUAL | FORECAST 2016 ANNUAL | 2017 ANNUAL | 2018 ANNUAL | 2019 ANNUAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. GROSS DOMESTIC PRODUCT (GDP) ($ BILLIONS) | 38 | 18128 | 18271 | 18449 | 18637 | 18846 | 19039 | 17938 | 18550 | 19373 | N.A. | N.A. |
| 2. GDP PRICE INDEX (2009=100) | 38 | 110.26 | 110.56 | 111.00 | 111.51 | 112.02 | 112.56 | 109.78 | 111.26 | 113.40 | N.A. | N.A. |
| 3. CORPORATE PROFITS AFTER TAXES ($ BILLIONS) | 16 | N.A. | 1513.0 | 1535.0 | 1545.7 | 1577.0 | 1598.6 | N.A. | 1539.4 | 1622.0 | N.A. | N.A. |
| 4. UNEMPLOYMENT RATE (PERCENT) | 38 | 5.0 | 4.9 | 4.8 | 4.7 | 4.6 | 4.6 | 5.3 | 4.8 | 4.6 | 4.6 | 4.7 |
| 5. NONFARM PAYROLL EMPLOYMENT (THOUSANDS) | 33 | 142963 | 143548 | 144098 | 144685 | 145143 | 145674 | 141959 | 144411 | 146391 | N.A. | N.A. |
| 6. INDUSTRIAL PRODUCTION (2012=100) | 34 | 106.6 | 106.8 | 107.3 | 107.9 | 108.6 | 109.3 | 107.1 | 107.7 | 110.0 | N.A. | N.A. |
| 7. NEW PRIVATE HOUSING STARTS (ANNUAL RATE, MILLIONS) | 36 | 1.13 | 1.18 | 1.21 | 1.24 | 1.28 | 1.30 | 1.11 | 1.23 | 1.33 | N.A. | N.A. |
| 8. 3-MONTH TREASURY BILL RATE (PERCENT) | 37 | 0.12 | 0.29 | 0.44 | 0.65 | 0.79 | 1.00 | 0.05 | 0.58 | 1.35 | 2.15 | 2.69 |
| 9. AAA CORPORATE BOND YIELD (PERCENT) | 28 | 3.99 | 4.05 | 4.16 | 4.25 | 4.31 | 4.50 | 3.89 | 4.19 | 4.55 | N.A. | N.A. |
| 10. BAA CORPORATE BOND YIELD (PERCENT) | 27 | 5.42 | 5.47 | 5.58 | 5.65 | 5.70 | 5.75 | 5.00 | 5.60 | 5.87 | N.A. | N.A. |
| 11. 10-YEAR TREASURY BOND YIELD (PERCENT) | 39 | 2.19 | 2.11 | 2.29 | 2.40 | 2.50 | 2.70 | 2.14 | 2.36 | 2.82 | 3.25 | 3.50 |
| 12. REAL GDP (BILLIONS, CHAIN WEIGHTED) | 39 | 16442 | 16525 | 16626 | 16719 | 16824 | 16923 | 16342 | 16682 | 17083 | 17537 | 17936 |
| 13. TOTAL CONSUMPTION EXPENDITURE (BILLIONS, CHAIN WEIGHTED) | 36 | 11322.5 | 11396.4 | 11473.4 | 11544.2 | 11617.6 | 11693.1 | 11211.3 | 11505.6 | 11795.6 | N.A. | N.A. |
| 14. NONRESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED) | 36 | 2214.7 | 2229.2 | 2249.3 | 2272.6 | 2298.9 | 2321.5 | 2209.7 | 2262.7 | 2359.0 | N.A. | N.A. |
| 15. RESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED) | 35 | 545.0 | 554.3 | 565.6 | 576.7 | 585.2 | 595.6 | 529.0 | 570.7 | 608.1 | N.A. | N.A. |
| 16. FEDERAL GOVERNMENT C & I (BILLIONS, CHAIN WEIGHTED) | 35 | 1119.4 | 1122.2 | 1125.0 | 1128.3 | 1132.8 | 1133.9 | 1113.5 | 1126.9 | 1137.5 | N.A. | N.A. |
| 17. STATE AND LOCAL GOVT C & I (BILLIONS, CHAIN WEIGHTED) | 34 | 1753.6 | 1759.5 | 1764.8 | 1769.0 | 1775.1 | 1780.8 | 1745.0 | 1767.0 | 1788.5 | N.A. | N.A. |
| 18. CHANGE IN PRIVATE INVENTORIES (BILLIONS, CHAIN WEIGHTED) | 34 | 68.6 | 55.2 | 56.5 | 57.8 | 59.2 | 56.0 | 95.1 | 57.7 | 57.7 | N.A. | N.A. |
| 19. NET EXPORTS (BILLIONS, CHAIN WEIGHTED) | 36 | -566.5 | -579.9 | -597.3 | -610.3 | -629.3 | -642.6 | -547.1 | -604.0 | -657.3 | N.A. | N.A. |

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA. SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2016.

TABLE TWO
MAJOR MACROECONOMIC INDICATORS
PERCENTAGE CHANGES AT ANNUAL RATES

| | NUMBER OF FORECASTERS | Q4 2015 TO Q1 2016 | Q1 2016 TO Q2 2016 | Q2 2016 TO Q3 2016 | Q3 2016 TO Q4 2016 | Q4 2016 TO Q1 2017 | 2015 TO 2016 | 2016 TO 2017 | 2017 TO 2018 | 2018 TO 2019 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. GROSS DOMESTIC PRODUCT (GDP) ($ BILLIONS) | 38 | 3.2 | 4.0 | 4.1 | 4.5 | 4.2 | 3.4 | 4.4 | N.A. | N.A. |
| 2. GDP PRICE INDEX (2009=100) | 38 | 1.1 | 1.6 | 1.8 | 1.9 | 1.9 | 1.4 | 1.9 | N.A. | N.A. |
| 3. CORPORATE PROFITS AFTER TAXES ($ BILLIONS) | 16 | 1.0 | 5.9 | 2.8 | 8.3 | 5.6 | 2.0 | 5.4 | N.A. | N.A. |
| 4. UNEMPLOYMENT RATE (PERCENT) | 38 | -0.1 | -0.1 | -0.1 | -0.1 | -0.0 | -0.5 | -0.2 | 0.1 | 0.1 |
| 5. NONFARM PAYROLL EMPLOYMENT | | | | | | | | | | |
| (PERCENT CHANGE) | 33 | 1.6 | 1.5 | 1.6 | 1.3 | 1.5 | 1.7 | 1.4 | N.A. | N.A. |
| (AVG MONTHLY CHANGE) | 33 | 195.0 | 183.2 | 195.9 | 152.6 | 177.1 | 204.3 | 165.0 | N.A. | N.A. |
| 6. INDUSTRIAL PRODUCTION (2012=100) | 34 | 0.8 | 2.0 | 2.3 | 2.5 | 2.4 | 0.6 | 2.2 | N.A. | N.A. |
| 7. NEW PRIVATE HOUSING STARTS (ANNUAL RATE, MILLIONS) | 36 | 16.0 | 11.7 | 10.7 | 13.5 | 6.4 | 10.7 | 8.3 | N.A. | N.A. |
| 8. 3-MONTH TREASURY BILL RATE (PERCENT) | 37 | 0.17 | 0.15 | 0.21 | 0.13 | 0.22 | 0.53 | 0.78 | 0.80 | 0.53 |
| 9. AAA CORPORATE BOND YIELD (PERCENT) | 28 | 0.06 | 0.11 | 0.09 | 0.06 | 0.20 | 0.30 | 0.36 | N.A. | N.A. |
| 10. BAA CORPORATE BOND YIELD (PERCENT) | 27 | 0.05 | 0.11 | 0.07 | 0.05 | 0.05 | 0.60 | 0.27 | N.A. | N.A. |
| 11. 10-YEAR TREASURY BOND YIELD (PERCENT) | 39 | -0.08 | 0.18 | 0.11 | 0.10 | 0.20 | 0.22 | 0.46 | 0.43 | 0.25 |
| 12. REAL GDP (BILLIONS, CHAIN WEIGHTED) | 39 | 2.0 | 2.5 | 2.3 | 2.5 | 2.4 | 2.1 | 2.4 | 2.7 | 2.3 |
| 13. TOTAL CONSUMPTION EXPENDITURE (BILLIONS, CHAIN WEIGHTED) | 36 | 2.6 | 2.7 | 2.5 | 2.6 | 2.6 | 2.6 | 2.5 | N.A. | N.A. |
| 14. NONRESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED) | 36 | 2.7 | 3.7 | 4.2 | 4.7 | 4.0 | 2.4 | 4.3 | N.A. | N.A. |
| 15. RESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED) | 35 | 7.0 | 8.4 | 8.1 | 6.0 | 7.3 | 7.9 | 6.6 | N.A. | N.A. |
| 16. FEDERAL GOVERNMENT C & I (BILLIONS, CHAIN WEIGHTED) | 35 | 1.0 | 1.0 | 1.2 | 1.6 | 0.4 | 1.2 | 0.9 | N.A. | N.A. |
| 17. STATE AND LOCAL GOVT C & I (BILLIONS, CHAIN WEIGHTED) | 34 | 1.4 | 1.2 | 1.0 | 1.4 | 1.3 | 1.3 | 1.2 | N.A. | N.A. |
| 18. CHANGE IN PRIVATE INVENTORIES (BILLIONS, CHAIN WEIGHTED) | 34 | -13.4 | 1.3 | 1.3 | 1.4 | -3.2 | -37.4 | 0.0 | N.A. | N.A. |
| 19. NET EXPORTS (BILLIONS, CHAIN WEIGHTED) | 36 | -13.4 | -17.4 | -13.0 | -19.0 | -13.4 | -56.9 | -53.3 | N.A. | N.A. |

NOTE: FIGURES FOR UNEMPLOYMENT RATE, TREASURY BILL RATE, AAA CORPORATE BOND YIELD, BAA CORPORATE BOND YIELD, AND 10-YEAR TREASURY BOND YIELD ARE CHANGES IN THESE RATES, IN PERCENTAGE POINTS.
FIGURES FOR CHANGE IN PRIVATE INVENTORIES AND NET EXPORTS ARE CHANGES IN BILLIONS OF CHAIN-WEIGHTED DOLLARS.
ALL OTHERS ARE PERCENTAGE CHANGES AT ANNUAL RATES.

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA. SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2016.

TABLE THREE
MAJOR PRICE INDICATORS
MEDIANS OF FORECASTER PREDICTIONS

| | NUMBER OF FORECASTERS | ACTUAL | FORECAST(Q/Q) | | | | | ACTUAL | FORECAST(Q4/Q4) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2015 Q4 | 2016 Q1 | 2016 Q2 | 2016 Q3 | 2016 Q4 | 2017 Q1 | 2015 ANNUAL | 2016 ANNUAL | 2017 ANNUAL | 2018 ANNUAL |
| 1. CONSUMER PRICE INDEX (ANNUAL RATE) | 39 | 0.2 | 0.4 | 1.6 | 2.1 | 2.1 | 2.1 | 0.4 | 1.5 | 2.2 | 2.3 |
| 2. CORE CONSUMER PRICE INDEX (ANNUAL RATE) | 37 | 2.1 | 1.8 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 |
| 3. PCE PRICE INDEX (ANNUAL RATE) | 36 | 0.1 | 0.4 | 1.6 | 1.8 | 1.8 | 1.8 | 0.4 | 1.3 | 1.9 | 2.0 |
| 4. CORE PCE PRICE INDEX (ANNUAL RATE) | 35 | 1.2 | 1.4 | 1.5 | 1.7 | 1.7 | 1.7 | 1.4 | 1.6 | 1.8 | 1.9 |

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA. SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2016.

TABLE FOUR
ESTIMATED PROBABILITY OF DECLINE IN REAL GDP

| ESTIMATED PROBABILITY (CHANCES IN 100) | Q4 2015 TO Q1 2016 | Q1 2016 TO Q2 2016 | Q2 2016 TO Q3 2016 | Q3 2016 TO Q4 2016 | Q4 2016 TO Q1 2017 |
|---|---|---|---|---|---|
| | NUMBER OF FORECASTERS | | | | |
| 10 OR LESS | 17 | 17 | 13 | 12 | 9 |
| 11 TO 20 | 14 | 14 | 17 | 16 | 14 |
| 21 TO 30 | 5 | 5 | 6 | 7 | 11 |
| 31 TO 40 | 1 | 1 | 1 | 2 | 2 |
| 41 TO 50 | 0 | 0 | 0 | 0 | 1 |
| 51 TO 60 | 0 | 0 | 0 | 0 | 0 |
| 61 TO 70 | 0 | 0 | 0 | 0 | 0 |
| 71 TO 80 | 0 | 0 | 0 | 0 | 0 |
| 81 TO 90 | 0 | 0 | 0 | 0 | 0 |
| 91 AND OVER | 0 | 0 | 0 | 0 | 0 |
| NOT REPORTING | 3 | 3 | 3 | 3 | 3 |
| MEAN AND MEDIAN | | | | | |
| MEDIAN PROBABILITY | 12.00 | 12.00 | 15.00 | 15.00 | 16.00 |
| MEAN PROBABILITY | 14.38 | 14.69 | 15.79 | 17.04 | 18.76 |

NOTE: TOTAL NUMBER OF FORECASTERS REPORTING IS 37.
SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2016.

TABLE FIVE
MEAN PROBABILITIES

MEAN PROBABILITY ATTACHED TO POSSIBLE
CIVILIAN UNEMPLOYMENT RATES:
(ANNUAL AVERAGE)

| | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|
| 9.0 PERCENT OR MORE | 0.06 | 0.06 | 0.11 | 0.17 |
| 8.0 TO 8.9 PERCENT | 0.09 | 0.14 | 0.39 | 0.52 |
| 7.5 TO 7.9 PERCENT | 0.11 | 0.17 | 0.48 | 0.63 |
| 7.0 TO 7.4 PERCENT | 0.12 | 0.55 | 1.00 | 1.61 |
| 6.5 TO 6.9 PERCENT | 0.21 | 1.17 | 1.71 | 2.80 |
| 6.0 TO 6.4 PERCENT | 0.68 | 2.57 | 5.27 | 6.44 |
| 5.5 TO 5.9 PERCENT | 5.22 | 7.66 | 11.27 | 13.37 |
| 5.0 TO 5.4 PERCENT | 25.74 | 24.17 | 24.56 | 24.88 |
| 4.0 TO 4.9 PERCENT | 61.17 | 53.16 | 44.19 | 38.22 |
| LESS THAN 4.0 PERCENT | 6.60 | 10.34 | 11.02 | 11.37 |

MEAN PROBABILITY ATTACHED TO POSSIBLE
PERCENT CHANGES IN REAL GDP:
(ANNUAL-AVERAGE OVER ANNUAL-AVERAGE)

| | 2015-2016 | 2016-2017 | 2017-2018 | 2018-2019 |
|---|---|---|---|---|
| 6.0 OR MORE | 0.06 | 0.16 | 0.31 | 0.47 |
| 5.0 TO 5.9 | 0.23 | 0.55 | 0.94 | 0.99 |
| 4.0 TO 4.9 | 1.30 | 2.85 | 3.53 | 3.45 |
| 3.0 TO 3.9 | 8.36 | 11.09 | 12.76 | 12.19 |
| 2.0 TO 2.9 | 41.88 | 38.95 | 33.94 | 35.86 |
| 1.0 TO 1.9 | 32.21 | 29.19 | 27.50 | 26.71 |
| 0.0 TO 0.9 | 10.35 | 10.95 | 12.82 | 12.69 |
| -1.0 TO -0.1 | 4.38 | 4.78 | 4.74 | 5.20 |
| -2.0 TO -1.1 | 0.66 | 1.03 | 1.85 | 1.73 |
| -3.0 TO -2.1 | 0.51 | 0.40 | 1.53 | 0.60 |
| LESS THAN -3.0 | 0.05 | 0.06 | 0.08 | 0.13 |

MEAN PROBABILITY ATTACHED TO POSSIBLE
PERCENT CHANGES IN GDP PRICE INDEX:
(ANNUAL-AVERAGE OVER ANNUAL-AVERAGE)

| | 2015-2016 | 2016-2017 |
|---|---|---|
| 4.0 OR MORE | 0.07 | 0.13 |
| 3.5 TO 3.9 | 0.30 | 0.81 |
| 3.0 TO 3.4 | 0.92 | 2.34 |
| 2.5 TO 2.9 | 3.62 | 8.98 |
| 2.0 TO 2.4 | 16.82 | 23.92 |
| 1.5 TO 1.9 | 32.75 | 34.65 |
| 1.0 TO 1.4 | 31.42 | 19.07 |
| 0.5 TO 0.9 | 10.85 | 6.95 |
| 0.0 TO 0.4 | 2.84 | 2.44 |
| WILL DECLINE | 0.42 | 0.71 |

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2016.

TABLE SIX
MEAN PROBABILITY OF CORE CPI AND CORE PCE INFLATION (Q4/Q4)

MEAN PROBABILITY ATTACHED TO CORE CPI INFLATION:

| | 15Q4 TO 16Q4 | 16Q4 TO 17Q4 |
|---|---|---|
| 4 PERCENT OR MORE | 0.14 | 0.50 |
| 3.5 TO 3.9 PERCENT | 0.38 | 0.59 |
| 3.0 TO 3.4 PERCENT | 1.40 | 3.40 |
| 2.5 TO 2.9 PERCENT | 11.27 | 13.67 |
| 2.0 TO 2.4 PERCENT | 31.45 | 32.92 |
| 1.5 TO 1.9 PERCENT | 36.13 | 32.46 |
| 1.0 TO 1.4 PERCENT | 13.77 | 11.67 |
| 0.5 TO 0.9 PERCENT | 4.10 | 3.40 |
| 0.0 TO 0.4 PERCENT | 1.14 | 1.09 |
| WILL DECLINE | 0.22 | 0.31 |

MEAN PROBABILITY ATTACHED TO CORE PCE INFLATION:

| | 15Q4 TO 16Q4 | 16Q4 TO 17Q4 |
|---|---|---|
| 4 PERCENT OR MORE | 0.14 | 0.30 |
| 3.5 TO 3.9 PERCENT | 0.13 | 0.36 |
| 3.0 TO 3.4 PERCENT | 0.85 | 1.49 |
| 2.5 TO 2.9 PERCENT | 5.17 | 8.70 |
| 2.0 TO 2.4 PERCENT | 18.89 | 22.32 |
| 1.5 TO 1.9 PERCENT | 39.02 | 37.58 |
| 1.0 TO 1.4 PERCENT | 25.03 | 19.34 |
| 0.5 TO 0.9 PERCENT | 8.69 | 7.58 |
| 0.0 TO 0.4 PERCENT | 1.88 | 2.05 |
| WILL DECLINE | 0.20 | 0.27 |

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2016.

TABLE SEVEN
LONG-TERM (5-YEAR AND 10-YEAR) FORECASTS

ANNUAL AVERAGE OVER THE NEXT 5 YEARS: 2016-2020

| CPI INFLATION RATE | | PCE INFLATION RATE | |
|---|---|---|---|
| MINIMUM | 1.49 | MINIMUM | 1.40 |
| LOWER QUARTILE | 1.92 | LOWER QUARTILE | 1.70 |
| MEDIAN | 2.08 | MEDIAN | 1.88 |
| UPPER QUARTILE | 2.30 | UPPER QUARTILE | 2.00 |
| MAXIMUM | 2.90 | MAXIMUM | 2.60 |
| MEAN | 2.09 | MEAN | 1.87 |
| STD. DEVIATION | 0.32 | STD. DEVIATION | 0.27 |
| N | 36 | N | 35 |
| MISSING | 4 | MISSING | 5 |

ANNUAL AVERAGE OVER THE NEXT 10 YEARS: 2016-2025

| CPI INFLATION RATE | | PCE INFLATION RATE | |
|---|---|---|---|
| MINIMUM | 1.59 | MINIMUM | 1.60 |
| LOWER QUARTILE | 2.00 | LOWER QUARTILE | 1.80 |
| MEDIAN | 2.12 | MEDIAN | 1.97 |
| UPPER QUARTILE | 2.40 | UPPER QUARTILE | 2.10 |
| MAXIMUM | 3.10 | MAXIMUM | 2.50 |
| MEAN | 2.21 | MEAN | 2.00 |
| STD. DEVIATION | 0.31 | STD. DEVIATION | 0.25 |
| N | 35 | N | 34 |
| MISSING | 5 | MISSING | 6 |

| REAL GDP GROWTH RATE | | PRODUCTIVITY GROWTH RATE | |
|---|---|---|---|
| MINIMUM | 1.53 | MINIMUM | 0.50 |
| LOWER QUARTILE | 2.00 | LOWER QUARTILE | 1.00 |
| MEDIAN | 2.28 | MEDIAN | 1.40 |
| UPPER QUARTILE | 2.40 | UPPER QUARTILE | 1.70 |
| MAXIMUM | 3.00 | MAXIMUM | 2.33 |
| MEAN | 2.23 | MEAN | 1.37 |
| STD. DEVIATION | 0.31 | STD. DEVIATION | 0.49 |
| N | 28 | N | 25 |
| MISSING | 12 | MISSING | 15 |

| STOCK RETURNS (S&P 500) | | BOND RATE (10-YEAR) | | BILL RETURNS (3-MONTH) | |
|---|---|---|---|---|---|
| MINIMUM | 3.00 | MINIMUM | 2.00 | MINIMUM | 1.00 |
| LOWER QUARTILE | 4.50 | LOWER QUARTILE | 3.00 | LOWER QUARTILE | 1.80 |
| MEDIAN | 5.37 | MEDIAN | 3.39 | MEDIAN | 2.50 |
| UPPER QUARTILE | 6.00 | UPPER QUARTILE | 4.00 | UPPER QUARTILE | 2.75 |
| MAXIMUM | 7.50 | MAXIMUM | 4.80 | MAXIMUM | 3.80 |
| MEAN | 5.34 | MEAN | 3.44 | MEAN | 2.44 |
| STD. DEVIATION | 1.34 | STD. DEVIATION | 0.76 | STD. DEVIATION | 0.81 |
| N | 18 | N | 26 | N | 24 |
| MISSING | 22 | MISSING | 14 | MISSING | 16 |

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2016.

Survey of Professional Forecasters

**Release Date: February 13, 2015**

***FIRST QUARTER 2015***

***Unchanged Outlook for Growth, but Brighter Outlook for Labor Markets***

The outlook for growth in the U.S. economy over the next three years has changed little from the survey of three months ago, according to 39 forecasters surveyed by the Federal Reserve Bank of Philadelphia. The forecasters predict real GDP will grow at an annual rate of 2.7 percent this quarter and 3.0 percent next quarter. On an annual-average over annual-average basis, real GDP will grow 3.2 percent in 2015, up 0.2 percentage point from the previous estimate. The forecasters predict real GDP will grow 2.9 percent in 2016, 2.7 percent in 2017, and 2.7 percent in 2018.

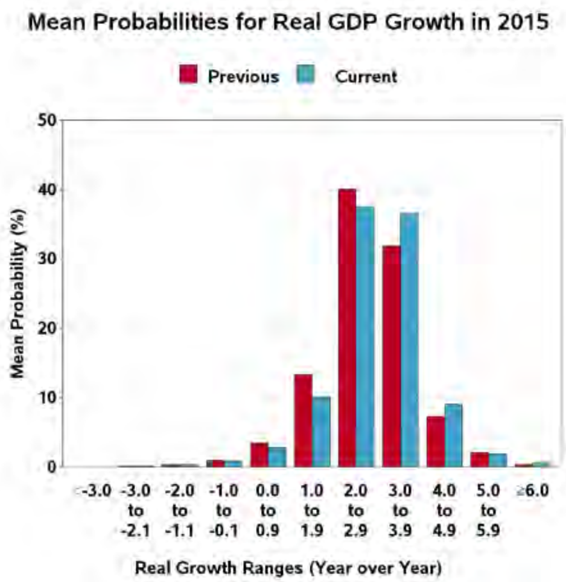
A brighter outlook for the labor market accompanies the nearly stable outlook for growth. The forecasters predict that the unemployment rate will be an annual average of 5.4 percent in 2015, before falling to 5.1 percent in 2016, 5.0 percent in 2017, and 4.9 percent in 2018. The projections for 2015, 2016, and 2017 are below those of the last survey.

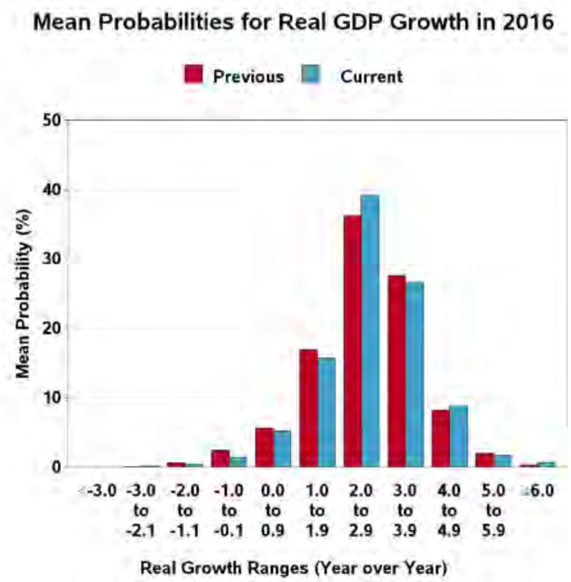
The panelists also predict an improved outlook on the employment front. They have revised upward their estimates for job gains in the next four quarters. The forecasters see nonfarm payroll employment growing at a rate of 269,300 jobs per month this quarter, 233,800 jobs per month next quarter, 222,000 jobs per month in the third quarter of 2015, and 229,400 jobs per month in the fourth quarter of 2015. The forecasters' projections for the annual-average level of nonfarm payroll employment suggest job gains at a monthly rate of 252,500 in 2015 and 213,600 in 2016, as the table below shows. (These annual-average estimates are computed as the year-to-year change in the annual-average level of nonfarm payroll employment, converted to a monthly rate.)

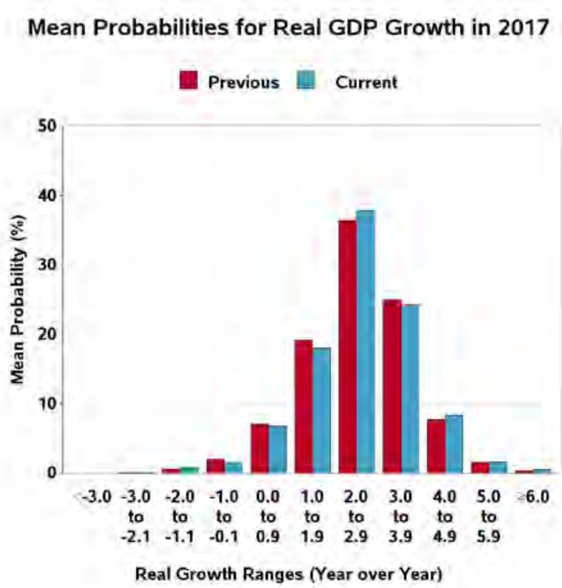
*Median Forecasts for Selected Variables in the Current and Previous Surveys*

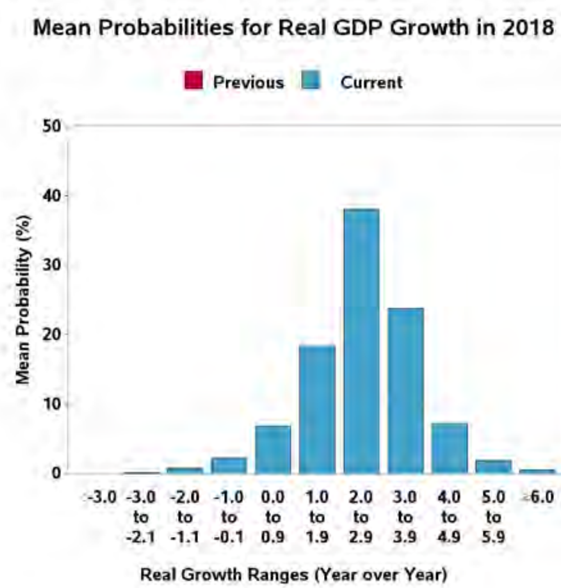
| | Real GDP (%) | | Unemployment Rate (%) | | Payrolls (000s/month) | |
|---|---|---|---|---|---|---|
| | Previous | New | Previous | New | Previous | New |
| Quarterly data: | | | | | | |
| 2015:Q1 | 2.8 | 2.7 | 5.8 | 5.6 | 211.2 | 269.3 |
| 2015:Q2 | 3.1 | 3.0 | 5.7 | 5.5 | 195.4 | 233.8 |
| 2015:Q3 | 2.8 | 2.8 | 5.6 | 5.4 | 208.0 | 222.0 |
| 2015:Q4 | 3.0 | 2.8 | 5.5 | 5.2 | 201.3 | 229.4 |
| 2016:Q1 | N.A. | 2.9 | N.A. | 5.2 | N.A. | 213.8 |
| Annual data (projections are based on annual-average levels): | | | | | | |
| 2015 | 3.0 | 3.2 | 5.6 | 5.4 | 212.3 | 252.5 |
| 2016 | 2.9 | 2.9 | 5.4 | 5.1 | N.A. | 213.6 |
| 2017 | 2.7 | 2.7 | 5.2 | 5.0 | N.A. | N.A. |
| 2018 | N.A. | 2.7 | N.A. | 4.9 | N.A. | N.A. |

The charts below provide some insight into the degree of uncertainty the forecasters have about their projections for the rate of growth in the annual-average level of real GDP. Each chart (except the one for 2018) presents the forecasters' previous and current estimates of the probability that growth will fall into each of 11 ranges. The probability estimates for growth in 2015, 2016, and 2017 are about the same now as they were in the previous survey.

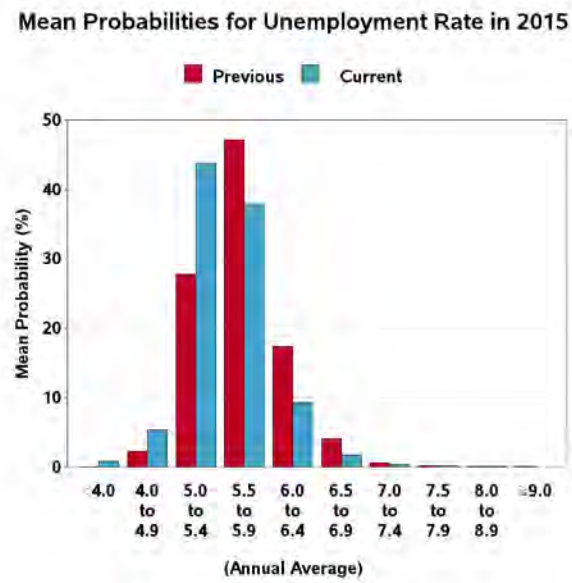


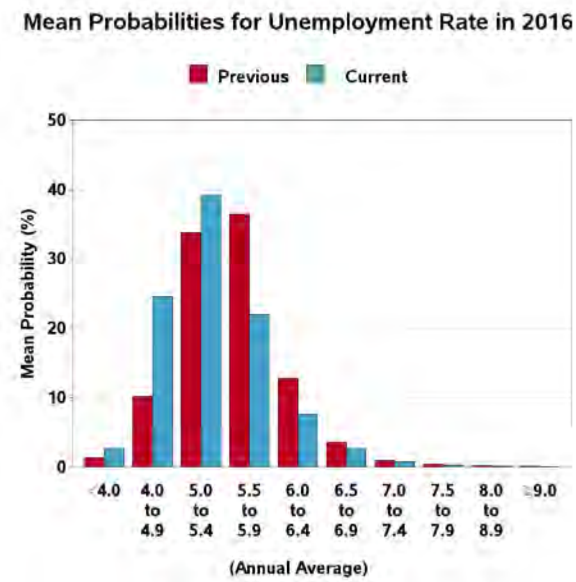



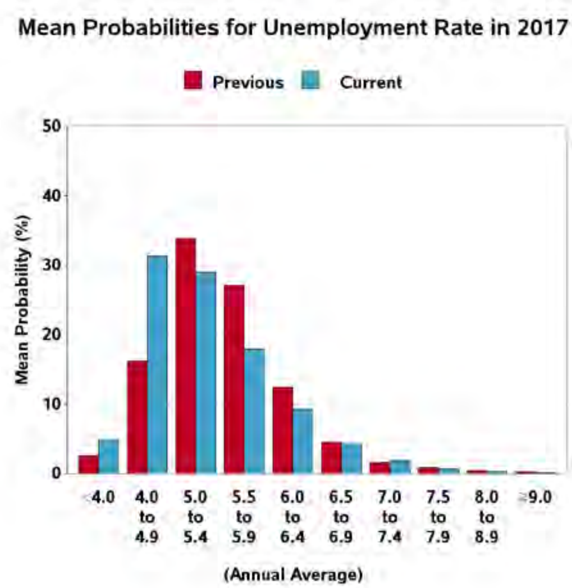



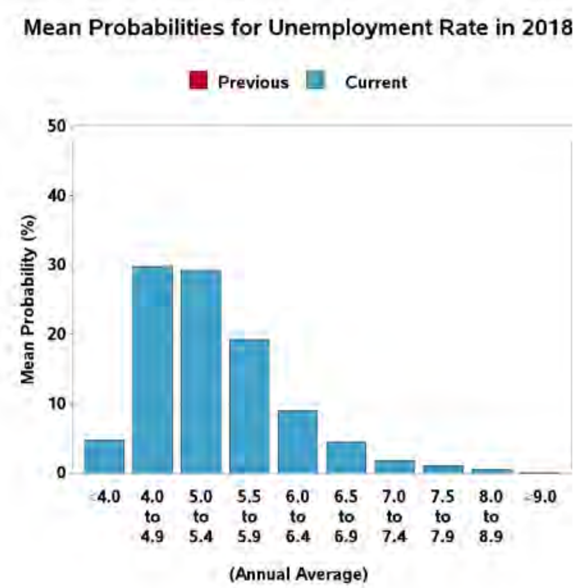



The forecasters' density projections for unemployment, shown below, shed light on uncertainty about the labor market over the next four years. Each chart for unemployment presents the forecasters' current estimates of the probability that unemployment will fall into each of 10 ranges. The charts show the forecasters are raising their density estimates over the next three years at the lower levels of unemployment outcomes, suggesting they are more confident about lower unemployment than they were in the last survey.



***Forecasters Predict Lower Inflation in 2015***

The forecasters expect current-quarter headline CPI inflation to average -1.4 percent, lower than the last survey's estimate of 1.8 percent. The forecasters predict current-quarter headline PCE inflation of -0.6 percent, lower than the prediction of 1.7 percent from the survey of three months ago.

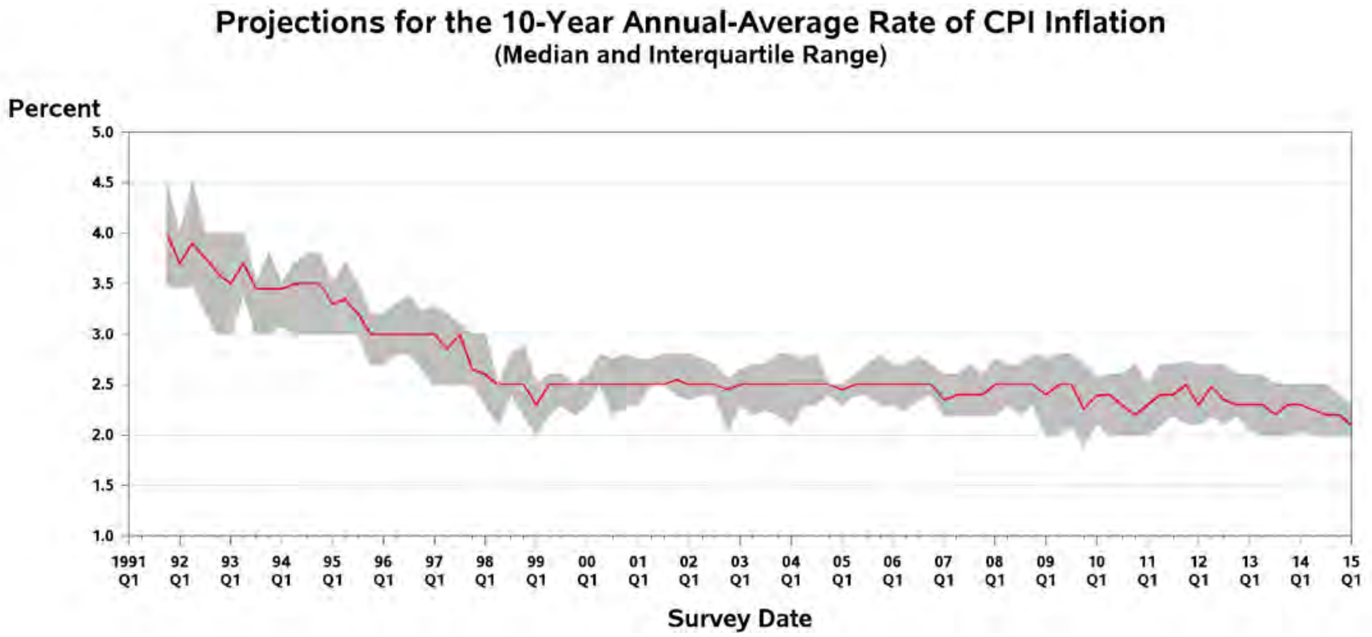
The forecasters also see lower headline and core measures of CPI and PCE inflation in 2015. Measured on a fourth-quarter over fourth-quarter basis, headline CPI inflation is expected to average 1.1 percent in 2015, down from 1.9 percent in the last survey. Forecasters expect fourth-quarter over fourth-quarter headline PCE inflation to also average 1.1 percent in 2015, down from 1.8 percent in the last survey.

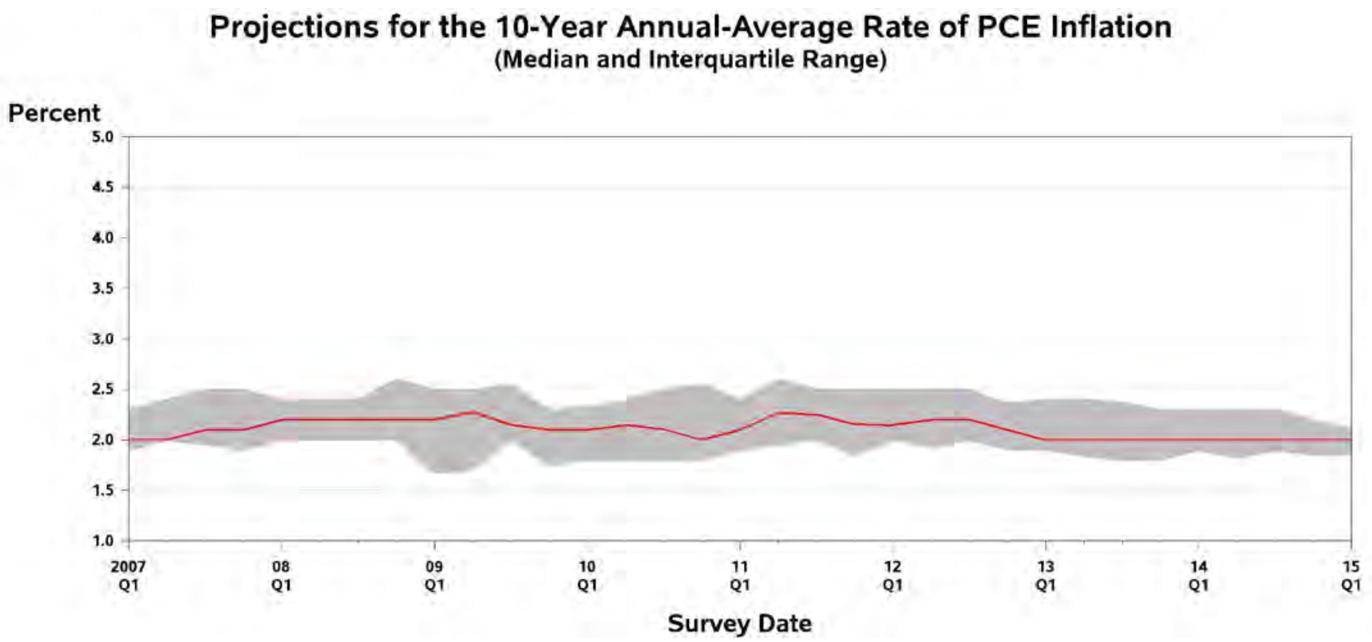
Over the next 10 years, 2015 to 2024, the forecasters expect headline CPI inflation to average 2.1 percent at an annual rate. The corresponding estimate for 10-year annual-average PCE inflation is 2.0 percent.

*Median Short-Run and Long-Run Projections for Inflation (Annualized Percentage Points)*

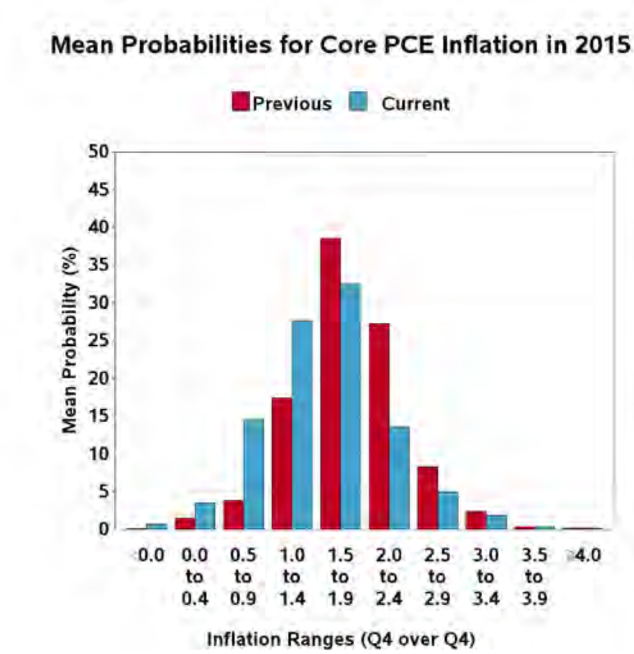
| | Headline CPI | | Core CPI | | Headline PCE | | Core PCE | |
|---|---|---|---|---|---|---|---|---|
| | Previous | Current | Previous | Current | Previous | Current | Previous | Current |
| Quarterly | | | | | | | | |
| 2015:Q1 | 1.8 | -1.4 | 1.9 | 1.3 | 1.7 | -0.6 | 1.7 | 1.2 |
| 2015:Q2 | 1.9 | 1.6 | 1.9 | 1.7 | 1.8 | 1.4 | 1.7 | 1.4 |
| 2015:Q3 | 2.0 | 1.9 | 1.9 | 1.8 | 1.8 | 1.9 | 1.8 | 1.5 |
| 2015:Q4 | 2.0 | 2.0 | 2.0 | 1.8 | 1.9 | 1.8 | 1.8 | 1.7 |
| 2016:Q1 | N.A. | 2.1 | N.A. | 1.9 | N.A. | 1.8 | N.A. | 1.6 |
| Q4/Q4 Annual Averages | | | | | | | | |
| 2015 | 1.9 | 1.1 | 2.0 | 1.7 | 1.8 | 1.1 | 1.8 | 1.4 |
| 2016 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.8 | 1.7 |
| 2017 | N.A. | 2.3 | N.A. | 2.1 | N.A. | 2.1 | N.A. | 1.9 |
| Long-Term Annual Averages | | | | | | | | |
| 2014-2018 | 2.09 | N.A. | N.A. | N.A. | 1.90 | N.A. | N.A. | N.A. |
| 2015-2019 | N.A. | 2.00 | N.A. | N.A. | N.A. | 1.80 | N.A. | N.A. |
| 2014-2023 | 2.20 | N.A. | N.A. | N.A. | 2.00 | N.A. | N.A. | N.A. |
| 2015-2024 | N.A. | 2.10 | N.A. | N.A. | N.A. | 2.00 | N.A. | N.A. |

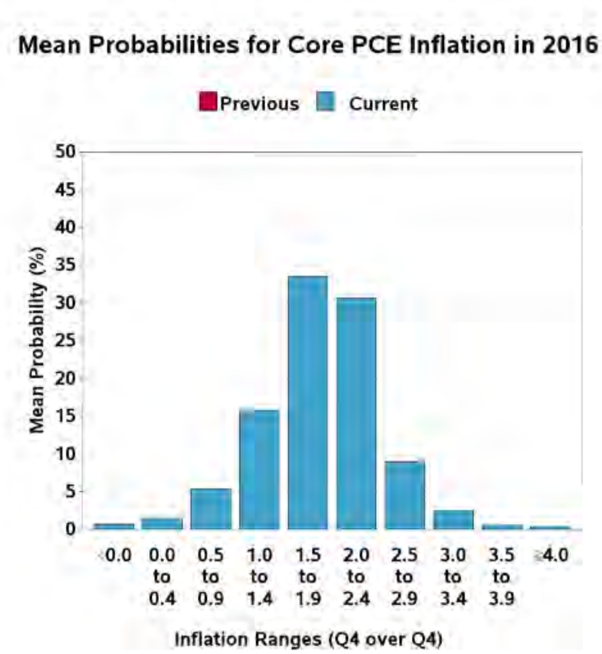
The charts below show the median projections (the red line) and the associated interquartile ranges (the gray area around the red line) for 10-year annual-average CPI and PCE inflation. The top panel shows a slightly lower level of the long-term projection for CPI inflation, at 2.1 percent. The bottom panel highlights the unchanged 10-year forecast for PCE inflation, at 2.0 percent.



The figures below show the probabilities that the forecasters are assigning to the possibility that fourth-quarter over fourth-quarter core PCE inflation in 2015 and 2016 will fall into each of 10 ranges. For 2015, the forecasters assign a higher chance than previously predicted that core PCE inflation will be below 1.5 percent (and a lower probability that inflation will be above 1.5 percent).




***Lower Risk of a Negative Quarter***

For the current quarter, the forecasters predict a 7.9 percent chance of negative growth. As the table below shows, the forecasters have also reduced their risk estimates for a downturn in the following quarters, compared with their previous estimates.

*Risk of a Negative Quarter (%)*
*Survey Means*

| Quarterly data: | Previous | New |
|---|---|---|
| 2015:Q1 | 10.3 | 7.9 |
| 2015:Q2 | 11.4 | 9.3 |
| 2015:Q3 | 12.6 | 11.1 |
| 2015:Q4 | 13.5 | 11.9 |
| 2016:Q1 | N.A. | 13.2 |

***Forecasters State Their Views on House Prices***

In this survey, a special question asked panelists to provide their forecasts for fourth-quarter over fourth-quarter growth in house prices, as measured by a number of alternative indices. The panelists were allowed to choose their measure from a list of indices or to write in their own index. For each index of their choosing, the panelists provided forecasts for growth in 2015 and 2016.

Twenty-two panelists answered the special question. Some panelists provided projections for more than one index. The table below provides a summary of the forecasters' responses. The number of responses (N) is low for each index. The median estimates for the seven house-price indices listed in the table below range from 3.7 percent to 5.9 percent in 2015 and from 3.0 percent to 5.0 percent in 2016.

*Projections for Growth in Various Indices of House Prices*
*Q4/Q4, Percentage Points*

| Index | 2015 (Q4/Q4 Percent Change) | | | 2016 (Q4/Q4 Percent Change) | | |
|---|---|---|---|---|---|---|
| | N | Mean | Median | N | Mean | Median |
| S&P/Case-Shiller: U.S. National | 7 | 4.4 | 4.5 | 7 | 5.0 | 4.0 |
| S&P/Case-Shiller: Composite 10 | 2 | 4.0 | 4.0 | 2 | 3.5 | 3.5 |
| S&P/Case-Shiller: Composite 20 | 5 | 3.7 | 4.0 | 5 | 2.9 | 3.5 |
| FHFA: U.S. Total | 5 | 4.9 | 5.6 | 5 | 4.8 | 5.0 |
| FHFA: Purchase Only | 8 | 3.5 | 3.7 | 8 | 3.0 | 3.0 |
| CoreLogic: National HPI, incl. Distressed Sales (Single Family Combined) | 4 | 5.1 | 5.3 | 4 | 4.4 | 4.5 |
| NAR Median: Total Existing | 2 | 5.9 | 5.9 | 2 | 3.7 | 3.7 |

***Forecasters See Slightly Lower Long-Run Growth in Output and Productivity and in Returns to Financial Assets***

In the first-quarter surveys, the forecasters provide their long-run projections for an expanded set of variables, including growth in output and productivity, as well as returns on financial assets.

As the table below shows, the forecasters have reduced their estimates for the annual-average rate of growth in real GDP over the next 10 years. Currently, the forecasters expect real GDP to grow at an annual-average rate of 2.50 percent over the next 10 years, down from 2.60 percent in the first-quarter survey of 2014.

Similarly, productivity growth is now expected to average 1.70 percent, down from 1.80 percent. Downward revisions to the return on two of the financial assets accompany the current outlook. The forecasters see the S&P 500 returning an annual-average 5.45 percent per year over the next 10 years, down from 6.00 percent. The forecasters expect the rate on 10-year Treasuries to average 3.98 percent over the next 10 years, down from 4.35 percent in last year's first-quarter survey. Three-month Treasury bills will return 2.67 percent, up from 2.50 percent.

*Median Long-Term (10-Year) Forecasts (%)*

| | *First Quarter 2014* | *Current Survey* |
|---|---|---|
| *Real GDP Growth* | 2.60 | 2.50 |
| *Productivity Growth* | 1.80 | 1.70 |
| *Stock Returns (S&P 500)* | 6.00 | 5.45 |
| *Rate on 10-Year Treasury Bonds* | 4.35 | 3.98 |
| *Bill Returns (3-Month)* | 2.50 | 2.67 |

The Federal Reserve Bank of Philadelphia thanks the following forecasters for their participation in recent surveys:

**Lewis Alexander**, Nomura Securities; **Scott Anderson**, Bank of the West (BNP Paribas Group); **Robert J. Barbera**, Johns Hopkins University Center for Financial Economics; **Peter Bernstein**, RCF Economic and Financial Consulting, Inc.; **Christine Chmura, Ph.D.** and **Xiaobing Shuai, Ph.D.**, Chmura Economics & Analytics; **Gary Ciminero, CFA**, GLC Financial Economics; **David Crowe**, National Association of Home Builders; **Nathaniel Curtis**, Navigant Consulting; **Gregory Daco**, Oxford Economics USA, Inc.; **Rajeev Dhawan**, Georgia State University; **Michael R. Englund**, Action Economics, LLC; **Michael Gapen**, Barclays Capital; **James Glassman**, JPMorgan Chase & Co.; **Matthew Hall** and **Daniil Manaenkov**, RSQE, University of Michigan; **Jan Hatzius**, Goldman Sachs; **Keith Hembre**, Nuveen Asset Management; **Peter Hooper**, Deutsche Bank Securities, Inc.; **IHS Global Insight**; **Fred Joutz**, Benchmark Forecasts and Research Program on Forecasting, George Washington University; **Sam Kahan**, Kahan Consulting Ltd. (ACT Research LLC); **N. Karp**, BBVA Compass; **Jack Kleinhenz**, Kleinhenz & Associates, Inc.; **Thomas Lam**, OSK-DMG/RHB; **L. Douglas Lee**, Economics from Washington; **John Lonski**, Moody's Capital Markets Group; **Macroeconomic Advisers, LLC**; **R. Anthony Metz**, Pareto Optimal Economics; **Michael Moran**, Daiwa Capital Markets America; **Joel L. Naroff**, Naroff Economic Advisors; **Luca Noto**, Anima Sgr; **Brendon Ogmundson**, BC Real Estate Association; **Tom Porcelli**, RBC Capital Markets; **Arun Raha**, Eaton Corporation; **Martin A. Regalia**, U.S. Chamber of Commerce; **Vincent Reinhart**, Morgan Stanley; **Philip Rothman**, East Carolina University; **Chris Rupkey**, Bank of Tokyo-Mitsubishi UFJ; **John Silvia**, Wells Fargo; **Allen Sinai**, Decision Economics, Inc.; **Sean M. Snaith, Ph.D.**, University of Central Florida; **Neal Soss**, Credit Suisse; **Stephen Stanley**, Amherst Pierpont Securities; **Charles Steindel**, Ramapo College of New Jersey; **Susan M. Sterne**, Economic Analysis Associates, Inc.; **Thomas Kevin Swift,** American Chemistry Council; **Richard Yamarone**, Bloomberg, LP; **Mark Zandi**, Moody's Analytics.

This is a partial list of participants. We also thank those who wish to remain anonymous.

SUMMARY TABLE
SURVEY OF PROFESSIONAL FORECASTERS
MAJOR MACROECONOMIC INDICATORS

| | 2015 Q1 | 2015 Q2 | 2015 Q3 | 2015 Q4 | 2016 Q1 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (YEAR-OVER-YEAR) | | | |
| PERCENT GROWTH AT ANNUAL RATES | | | | | | | | | |
| 1. REAL GDP (BILLIONS, CHAIN WEIGHTED) | 2.7 | 3.0 | 2.8 | 2.8 | 2.9 | 3.2 | 2.9 | 2.7 | 2.7 |
| 2. GDP PRICE INDEX (PERCENT CHANGE) | 0.6 | 1.6 | 1.9 | 1.6 | 2.0 | 1.1 | 1.8 | N.A. | N.A. |
| 3. NOMINAL GDP ($ BILLIONS) | 3.5 | 4.2 | 4.5 | 4.5 | 4.5 | 4.2 | 4.8 | N.A. | N.A. |
| 4. NONFARM PAYROLL EMPLOYMENT | | | | | | | | | |
| (PERCENT CHANGE) | 2.3 | 2.0 | 1.9 | 1.9 | 1.8 | 2.2 | 1.8 | N.A. | N.A. |
| (AVG MONTHLY CHANGE) | 269.3 | 233.8 | 222.0 | 229.4 | 213.8 | 252.5 | 213.6 | N.A. | N.A. |
| VARIABLES IN LEVELS | | | | | | | | | |
| 5. UNEMPLOYMENT RATE (PERCENT) | 5.6 | 5.5 | 5.4 | 5.2 | 5.2 | 5.4 | 5.1 | 5.0 | 4.9 |
| 6. 3-MONTH TREASURY BILL (PERCENT) | 0.0 | 0.1 | 0.3 | 0.6 | 0.8 | 0.3 | 1.2 | 2.7 | 3.0 |
| 7. 10-YEAR TREASURY BOND (PERCENT) | 2.0 | 2.2 | 2.4 | 2.5 | 2.7 | 2.3 | 3.1 | 3.9 | 4.1 |

| | 2015 Q1 | 2015 Q2 | 2015 Q3 | 2015 Q4 | 2016 Q1 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|
| | | | | | | (Q4-OVER-Q4) | | |
| INFLATION INDICATORS | | | | | | | | |
| 8. CPI (ANNUAL RATE) | -1.4 | 1.6 | 1.9 | 2.0 | 2.1 | 1.1 | 2.1 | 2.3 |
| 9. CORE CPI (ANNUAL RATE) | 1.3 | 1.7 | 1.8 | 1.8 | 1.9 | 1.7 | 1.9 | 2.1 |
| 10. PCE (ANNUAL RATE) | -0.6 | 1.4 | 1.9 | 1.8 | 1.8 | 1.1 | 1.9 | 2.1 |
| 11. CORE PCE (ANNUAL RATE) | 1.2 | 1.4 | 1.5 | 1.7 | 1.6 | 1.4 | 1.7 | 1.9 |

THE FIGURES ON EACH LINE ARE MEDIANS OF 39 INDIVIDUAL FORECASTERS.

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2015.

**SURVEY OF PROFESSIONAL FORECASTERS**

**First Quarter 2015**

**Tables**

Note: Data in these tables listed as "actual" are the data that were available to the forecasters when they were sent the survey questionnaire on January 30; the tables do not reflect subsequent revisions to the data. All forecasts were received on or before February 10, 2015.

TABLE ONE
MAJOR MACROECONOMIC INDICATORS
MEDIANS OF FORECASTER PREDICTIONS

| | NUMBER OF FORECASTERS | ACTUAL | FORECAST | | | | | ACTUAL | FORECAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2014 Q4 | 2015 Q1 | 2015 Q2 | 2015 Q3 | 2015 Q4 | 2016 Q1 | 2014 ANNUAL | 2015 ANNUAL | 2016 ANNUAL | 2017 ANNUAL | 2018 ANNUAL |
| 1. GROSS DOMESTIC PRODUCT (GDP) ($ BILLIONS) | 38 | 17711 | 17864 | 18048 | 18249 | 18449 | 18652 | 17421 | 18156 | 19022 | N.A. | N.A. |
| 2. GDP PRICE INDEX (2009=100) | 38 | 108.64 | 108.81 | 109.25 | 109.76 | 110.19 | 110.74 | 108.31 | 109.53 | 111.47 | N.A. | N.A. |
| 3. CORPORATE PROFITS AFTER TAXES ($ BILLIONS) | 17 | N.A. | 1629.2 | 1659.1 | 1682.9 | 1705.2 | 1717.2 | N.A. | 1652.6 | 1752.9 | N.A. | N.A. |
| 4. UNEMPLOYMENT RATE (PERCENT) | 39 | 5.7 | 5.6 | 5.5 | 5.4 | 5.2 | 5.2 | 6.1 | 5.4 | 5.1 | 5.0 | 4.9 |
| 5. NONFARM PAYROLL EMPLOYMENT (THOUSANDS) | 31 | 140061 | 140869 | 141570 | 142236 | 142925 | 143566 | 138890 | 141920 | 144484 | N.A. | N.A. |
| 6. INDUSTRIAL PRODUCTION (2007=100) | 33 | 106.1 | 107.1 | 108.0 | 108.8 | 109.7 | 110.4 | 104.2 | 108.4 | 111.5 | N.A. | N.A. |
| 7. NEW PRIVATE HOUSING STARTS (ANNUAL RATE, MILLIONS) | 36 | 1.07 | 1.09 | 1.13 | 1.18 | 1.22 | 1.25 | 1.00 | 1.15 | 1.30 | N.A. | N.A. |
| 8. 3-MONTH TREASURY BILL RATE (PERCENT) | 36 | 0.02 | 0.05 | 0.10 | 0.30 | 0.56 | 0.84 | 0.03 | 0.26 | 1.21 | 2.66 | 3.00 |
| 9. AAA CORPORATE BOND YIELD (PERCENT) | 27 | 3.88 | 3.65 | 3.80 | 4.00 | 4.13 | 4.30 | 4.16 | 3.87 | 4.50 | N.A. | N.A. |
| 10. BAA CORPORATE BOND YIELD (PERCENT) | 26 | 4.74 | 4.53 | 4.70 | 4.83 | 4.96 | 5.09 | 4.85 | 4.78 | 5.28 | N.A. | N.A. |
| 11. 10-YEAR TREASURY BOND YIELD (PERCENT) | 38 | 2.28 | 1.97 | 2.22 | 2.43 | 2.52 | 2.75 | 2.54 | 2.30 | 3.11 | 3.86 | 4.09 |
| 12. REAL GDP (BILLIONS, CHAIN WEIGHTED) | 37 | 16312 | 16419 | 16542 | 16657 | 16771 | 16893 | 16090 | 16598 | 17074 | 17536 | 18003 |
| 13. TOTAL CONSUMPTION EXPENDITURE (BILLIONS, CHAIN WEIGHTED) | 35 | 11114.9 | 11206.2 | 11293.2 | 11377.0 | 11467.0 | 11540.8 | 10967.8 | 11329.7 | 11662.5 | N.A. | N.A. |
| 14. NONRESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED) | 34 | 2154.8 | 2178.9 | 2206.5 | 2239.0 | 2266.9 | 2290.2 | 2112.7 | 2223.2 | 2331.3 | N.A. | N.A. |
| 15. RESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED) | 33 | 504.6 | 513.3 | 524.4 | 537.6 | 551.2 | 564.5 | 496.3 | 532.1 | 581.1 | N.A. | N.A. |
| 16. FEDERAL GOVERNMENT C & I (BILLIONS, CHAIN WEIGHTED) | 34 | 1119.7 | 1122.0 | 1123.9 | 1127.1 | 1128.6 | 1130.2 | 1123.4 | 1125.3 | 1132.0 | N.A. | N.A. |
| 17. STATE AND LOCAL GOVT C & I (BILLIONS, CHAIN WEIGHTED) | 33 | 1775.2 | 1780.8 | 1787.1 | 1794.2 | 1801.0 | 1806.0 | 1764.9 | 1791.0 | 1812.3 | N.A. | N.A. |
| 18. CHANGE IN PRIVATE INVENTORIES (BILLIONS, CHAIN WEIGHTED) | 33 | 113.1 | 84.0 | 75.0 | 73.0 | 68.0 | 62.4 | 78.8 | 75.2 | 61.4 | N.A. | N.A. |
| 19. NET EXPORTS (BILLIONS, CHAIN WEIGHTED) | 34 | -471.5 | -477.9 | -489.7 | -500.9 | -509.8 | -520.5 | -452.6 | -493.5 | -532.6 | N.A. | N.A. |

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA. SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2015.

TABLE TWO
MAJOR MACROECONOMIC INDICATORS
PERCENTAGE CHANGES AT ANNUAL RATES

| | NUMBER OF FORECASTERS | Q4 2014 TO Q1 2015 | Q1 2015 TO Q2 2015 | Q2 2015 TO Q3 2015 | Q3 2015 TO Q4 2015 | Q4 2015 TO Q1 2016 | 2014 TO 2015 | 2015 TO 2016 | 2016 TO 2017 | 2017 TO 2018 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. GROSS DOMESTIC PRODUCT (GDP) ($ BILLIONS) | 38 | 3.5 | 4.2 | 4.5 | 4.5 | 4.5 | 4.2 | 4.8 | N.A. | N.A. |
| 2. GDP PRICE INDEX (2009=100) | 38 | 0.6 | 1.6 | 1.9 | 1.6 | 2.0 | 1.1 | 1.8 | N.A. | N.A. |
| 3. CORPORATE PROFITS AFTER TAXES ($ BILLIONS) | 17 | 7.5 | 7.5 | 5.9 | 5.4 | 2.8 | 9.3 | 6.1 | N.A. | N.A. |
| 4. UNEMPLOYMENT RATE (PERCENT) | 39 | -0.1 | -0.1 | -0.1 | -0.2 | -0.0 | -0.7 | -0.3 | -0.1 | -0.0 |
| 5. NONFARM PAYROLL EMPLOYMENT | | | | | | | | | | |
| (PERCENT CHANGE) | 31 | 2.3 | 2.0 | 1.9 | 1.9 | 1.8 | 2.2 | 1.8 | N.A. | N.A. |
| (AVG MONTHLY CHANGE) | 31 | 269.3 | 233.8 | 222.0 | 229.4 | 213.8 | 252.5 | 213.6 | N.A. | N.A. |
| 6. INDUSTRIAL PRODUCTION (2007=100) | 33 | 3.8 | 3.4 | 3.1 | 3.2 | 2.7 | 4.0 | 2.8 | N.A. | N.A. |
| 7. NEW PRIVATE HOUSING STARTS (ANNUAL RATE, MILLIONS) | 36 | 6.6 | 14.1 | 19.4 | 12.8 | 9.8 | 14.7 | 12.8 | N.A. | N.A. |
| 8. 3-MONTH TREASURY BILL RATE (PERCENT) | 36 | 0.03 | 0.05 | 0.20 | 0.26 | 0.28 | 0.23 | 0.94 | 1.46 | 0.34 |
| 9. AAA CORPORATE BOND YIELD (PERCENT) | 27 | -0.23 | 0.15 | 0.20 | 0.13 | 0.17 | -0.29 | 0.63 | N.A. | N.A. |
| 10. BAA CORPORATE BOND YIELD (PERCENT) | 26 | -0.21 | 0.17 | 0.13 | 0.13 | 0.13 | -0.07 | 0.50 | N.A. | N.A. |
| 11. 10-YEAR TREASURY BOND YIELD (PERCENT) | 38 | -0.31 | 0.25 | 0.21 | 0.08 | 0.23 | -0.24 | 0.81 | 0.75 | 0.22 |
| 12. REAL GDP (BILLIONS, CHAIN WEIGHTED) | 37 | 2.7 | 3.0 | 2.8 | 2.8 | 2.9 | 3.2 | 2.9 | 2.7 | 2.7 |
| 13. TOTAL CONSUMPTION EXPENDITURE (BILLIONS, CHAIN WEIGHTED) | 35 | 3.3 | 3.1 | 3.0 | 3.2 | 2.6 | 3.3 | 2.9 | N.A. | N.A. |
| 14. NONRESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED) | 34 | 4.6 | 5.1 | 6.0 | 5.1 | 4.2 | 5.2 | 4.9 | N.A. | N.A. |
| 15. RESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED) | 33 | 7.1 | 8.9 | 10.5 | 10.5 | 10.0 | 7.2 | 9.2 | N.A. | N.A. |
| 16. FEDERAL GOVERNMENT C & I (BILLIONS, CHAIN WEIGHTED) | 34 | 0.8 | 0.7 | 1.1 | 0.5 | 0.6 | 0.2 | 0.6 | N.A. | N.A. |
| 17. STATE AND LOCAL GOVT C & I (BILLIONS, CHAIN WEIGHTED) | 33 | 1.3 | 1.4 | 1.6 | 1.5 | 1.1 | 1.5 | 1.2 | N.A. | N.A. |
| 18. CHANGE IN PRIVATE INVENTORIES (BILLIONS, CHAIN WEIGHTED) | 33 | -29.1 | -9.0 | -2.0 | -5.0 | -5.6 | -3.6 | -13.8 | N.A. | N.A. |
| 19. NET EXPORTS (BILLIONS, CHAIN WEIGHTED) | 34 | -6.4 | -11.8 | -11.2 | -8.8 | -10.8 | -40.9 | -39.1 | N.A. | N.A. |

NOTE: FIGURES FOR UNEMPLOYMENT RATE, TREASURY BILL RATE, AAA CORPORATE BOND YIELD, BAA CORPORATE BOND YIELD, AND 10-YEAR TREASURY BOND YIELD ARE CHANGES IN THESE RATES, IN PERCENTAGE POINTS.
FIGURES FOR CHANGE IN PRIVATE INVENTORIES AND NET EXPORTS ARE CHANGES IN BILLIONS OF CHAIN-WEIGHTED DOLLARS.
ALL OTHERS ARE PERCENTAGE CHANGES AT ANNUAL RATES.

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA. SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2015.

TABLE THREE
MAJOR PRICE INDICATORS
MEDIANS OF FORECASTER PREDICTIONS

| | NUMBER OF FORECASTERS | ACTUAL | FORECAST(Q/Q) | | | | | ACTUAL | FORECAST(Q4/Q4) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2014 Q4 | 2015 Q1 | 2015 Q2 | 2015 Q3 | 2015 Q4 | 2016 Q1 | 2014 ANNUAL | 2015 ANNUAL | 2016 ANNUAL | 2017 ANNUAL |
| 1. CONSUMER PRICE INDEX (ANNUAL RATE) | 37 | -1.2 | -1.4 | 1.6 | 1.9 | 2.0 | 2.1 | 1.2 | 1.1 | 2.1 | 2.3 |
| 2. CORE CONSUMER PRICE INDEX (ANNUAL RATE) | 35 | 1.4 | 1.3 | 1.7 | 1.8 | 1.8 | 1.9 | 1.7 | 1.7 | 1.9 | 2.1 |
| 3. PCE PRICE INDEX (ANNUAL RATE) | 32 | -0.5 | -0.6 | 1.4 | 1.9 | 1.8 | 1.8 | 1.1 | 1.1 | 1.9 | 2.1 |
| 4. CORE PCE PRICE INDEX (ANNUAL RATE) | 34 | 1.1 | 1.2 | 1.4 | 1.5 | 1.7 | 1.6 | 1.4 | 1.4 | 1.7 | 1.9 |

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA. SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2015.

TABLE FOUR
ESTIMATED PROBABILITY OF DECLINE IN REAL GDP

| ESTIMATED PROBABILITY (CHANCES IN 100) | Q4 2014 TO Q1 2015 | Q1 2015 TO Q2 2015 | Q2 2015 TO Q3 2015 | Q3 2015 TO Q4 2015 | Q4 2015 TO Q1 2016 |
|---|---|---|---|---|---|
| | NUMBER OF FORECASTERS | | | | |
| 10 OR LESS | 27 | 27 | 18 | 17 | 16 |
| 11 TO 20 | 6 | 5 | 14 | 15 | 15 |
| 21 TO 30 | 0 | 1 | 1 | 1 | 1 |
| 31 TO 40 | 0 | 0 | 0 | 0 | 1 |
| 41 TO 50 | 0 | 0 | 0 | 0 | 0 |
| 51 TO 60 | 0 | 0 | 0 | 0 | 0 |
| 61 TO 70 | 0 | 0 | 0 | 0 | 0 |
| 71 TO 80 | 0 | 0 | 0 | 0 | 0 |
| 81 TO 90 | 0 | 0 | 0 | 0 | 0 |
| 91 AND OVER | 0 | 0 | 0 | 0 | 0 |
| NOT REPORTING | 6 | 6 | 6 | 6 | 6 |
| MEAN AND MEDIAN | | | | | |
| MEDIAN PROBABILITY | 6.00 | 10.00 | 10.00 | 10.00 | 12.00 |
| MEAN PROBABILITY | 7.90 | 9.30 | 11.14 | 11.85 | 13.20 |

NOTE: TOTAL NUMBER OF FORECASTERS REPORTING IS 33.
SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2015.

TABLE FIVE
MEAN PROBABILITIES

MEAN PROBABILITY ATTACHED TO POSSIBLE
CIVILIAN UNEMPLOYMENT RATES:
(ANNUAL AVERAGE)

| | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|
| 9.0 PERCENT OR MORE | 0.00 | 0.09 | 0.14 | 0.07 |
| 8.0 TO 8.9 PERCENT | 0.12 | 0.14 | 0.37 | 0.52 |
| 7.5 TO 7.9 PERCENT | 0.18 | 0.27 | 0.69 | 1.09 |
| 7.0 TO 7.4 PERCENT | 0.45 | 0.80 | 1.88 | 1.81 |
| 6.5 TO 6.9 PERCENT | 1.83 | 2.68 | 4.32 | 4.49 |
| 6.0 TO 6.4 PERCENT | 9.36 | 7.63 | 9.27 | 8.98 |
| 5.5 TO 5.9 PERCENT | 38.01 | 22.00 | 17.96 | 19.24 |
| 5.0 TO 5.4 PERCENT | 43.82 | 39.18 | 29.07 | 29.29 |
| 4.0 TO 4.9 PERCENT | 5.38 | 24.57 | 31.38 | 29.74 |
| LESS THAN 4.0 PERCENT | 0.85 | 2.64 | 4.90 | 4.77 |

MEAN PROBABILITY ATTACHED TO POSSIBLE
PERCENT CHANGES IN REAL GDP:
(ANNUAL-AVERAGE OVER ANNUAL-AVERAGE)

| | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 |
|---|---|---|---|---|
| 6.0 OR MORE | 0.64 | 0.72 | 0.53 | 0.50 |
| 5.0 TO 5.9 | 1.84 | 1.70 | 1.69 | 1.86 |
| 4.0 TO 4.9 | 9.05 | 8.84 | 8.33 | 7.18 |
| 3.0 TO 3.9 | 36.63 | 26.63 | 24.38 | 23.80 |
| 2.0 TO 2.9 | 37.53 | 39.22 | 37.90 | 38.07 |
| 1.0 TO 1.9 | 10.09 | 15.69 | 18.02 | 18.39 |
| 0.0 TO 0.9 | 2.83 | 5.21 | 6.79 | 6.91 |
| -1.0 TO -0.1 | 0.87 | 1.46 | 1.56 | 2.32 |
| -2.0 TO -1.1 | 0.36 | 0.42 | 0.77 | 0.80 |
| -3.0 TO -2.1 | 0.16 | 0.11 | 0.09 | 0.15 |
| LESS THAN -3.0 | 0.00 | 0.00 | 0.02 | 0.02 |

MEAN PROBABILITY ATTACHED TO POSSIBLE
PERCENT CHANGES IN GDP PRICE INDEX:
(ANNUAL-AVERAGE OVER ANNUAL-AVERAGE)

| | 2014-2015 | 2015-2016 |
|---|---|---|
| 4.0 OR MORE | 0.08 | 0.12 |
| 3.5 TO 3.9 | 0.08 | 0.68 |
| 3.0 TO 3.4 | 0.78 | 2.34 |
| 2.5 TO 2.9 | 4.63 | 9.62 |
| 2.0 TO 2.4 | 11.78 | 26.27 |
| 1.5 TO 1.9 | 22.48 | 32.78 |
| 1.0 TO 1.4 | 33.64 | 17.99 |
| 0.5 TO 0.9 | 20.21 | 7.00 |
| 0.0 TO 0.4 | 5.57 | 2.52 |
| WILL DECLINE | 0.75 | 0.69 |

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2015.

TABLE SIX
MEAN PROBABILITY OF CORE CPI AND CORE PCE INFLATION (Q4/Q4)

MEAN PROBABILITY ATTACHED TO CORE CPI INFLATION:

| | 14Q4 TO 15Q4 | 15Q4 TO 16Q4 |
|---|---|---|
| 4 PERCENT OR MORE | 0.40 | 0.83 |
| 3.5 TO 3.9 PERCENT | 0.65 | 0.90 |
| 3.0 TO 3.4 PERCENT | 1.94 | 3.37 |
| 2.5 TO 2.9 PERCENT | 6.56 | 11.60 |
| 2.0 TO 2.4 PERCENT | 17.42 | 29.91 |
| 1.5 TO 1.9 PERCENT | 36.34 | 33.83 |
| 1.0 TO 1.4 PERCENT | 25.48 | 13.31 |
| 0.5 TO 0.9 PERCENT | 8.18 | 3.86 |
| 0.0 TO 0.4 PERCENT | 2.45 | 1.74 |
| WILL DECLINE | 0.76 | 0.66 |

MEAN PROBABILITY ATTACHED TO CORE PCE INFLATION:

| | 14Q4 TO 15Q4 | 15Q4 TO 16Q4 |
|---|---|---|
| 4 PERCENT OR MORE | 0.16 | 0.40 |
| 3.5 TO 3.9 PERCENT | 0.37 | 0.58 |
| 3.0 TO 3.4 PERCENT | 1.88 | 2.49 |
| 2.5 TO 2.9 PERCENT | 4.94 | 9.01 |
| 2.0 TO 2.4 PERCENT | 13.60 | 30.64 |
| 1.5 TO 1.9 PERCENT | 32.56 | 33.53 |
| 1.0 TO 1.4 PERCENT | 27.72 | 15.82 |
| 0.5 TO 0.9 PERCENT | 14.59 | 5.36 |
| 0.0 TO 0.4 PERCENT | 3.47 | 1.49 |
| WILL DECLINE | 0.73 | 0.68 |

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2015.

TABLE SEVEN
LONG-TERM (5-YEAR AND 10-YEAR) FORECASTS

ANNUAL AVERAGE OVER THE NEXT 5 YEARS: 2015-2019

| CPI INFLATION RATE | | PCE INFLATION RATE | |
|---|---|---|---|
| MINIMUM | 1.10 | MINIMUM | 0.90 |
| LOWER QUARTILE | 1.90 | LOWER QUARTILE | 1.70 |
| MEDIAN | 2.00 | MEDIAN | 1.80 |
| UPPER QUARTILE | 2.20 | UPPER QUARTILE | 2.00 |
| MAXIMUM | 2.60 | MAXIMUM | 2.40 |
| MEAN | 2.03 | MEAN | 1.83 |
| STD. DEVIATION | 0.33 | STD. DEVIATION | 0.30 |
| N | 35 | N | 33 |
| MISSING | 4 | MISSING | 6 |

ANNUAL AVERAGE OVER THE NEXT 10 YEARS: 2015-2024

| CPI INFLATION RATE | | PCE INFLATION RATE | |
|---|---|---|---|
| MINIMUM | 1.40 | MINIMUM | 1.30 |
| LOWER QUARTILE | 2.00 | LOWER QUARTILE | 1.85 |
| MEDIAN | 2.10 | MEDIAN | 2.00 |
| UPPER QUARTILE | 2.30 | UPPER QUARTILE | 2.11 |
| MAXIMUM | 3.10 | MAXIMUM | 2.50 |
| MEAN | 2.14 | MEAN | 1.94 |
| STD. DEVIATION | 0.31 | STD. DEVIATION | 0.26 |
| N | 33 | N | 31 |
| MISSING | 6 | MISSING | 8 |

| REAL GDP GROWTH RATE | | PRODUCTIVITY GROWTH RATE | |
|---|---|---|---|
| MINIMUM | 1.80 | MINIMUM | 0.10 |
| LOWER QUARTILE | 2.30 | LOWER QUARTILE | 1.50 |
| MEDIAN | 2.50 | MEDIAN | 1.70 |
| UPPER QUARTILE | 2.68 | UPPER QUARTILE | 2.00 |
| MAXIMUM | 3.07 | MAXIMUM | 2.40 |
| MEAN | 2.51 | MEAN | 1.63 |
| STD. DEVIATION | 0.28 | STD. DEVIATION | 0.55 |
| N | 28 | N | 21 |
| MISSING | 11 | MISSING | 18 |

| STOCK RETURNS (S&P 500) | | BOND RETURNS (10-YEAR) | | BILL RETURNS (3-MONTH) | |
|---|---|---|---|---|---|
| MINIMUM | 1.70 | MINIMUM | 2.44 | MINIMUM | 0.30 |
| LOWER QUARTILE | 5.00 | LOWER QUARTILE | 3.75 | LOWER QUARTILE | 2.21 |
| MEDIAN | 5.45 | MEDIAN | 3.98 | MEDIAN | 2.67 |
| UPPER QUARTILE | 7.00 | UPPER QUARTILE | 4.50 | UPPER QUARTILE | 3.00 |
| MAXIMUM | 8.10 | MAXIMUM | 5.00 | MAXIMUM | 3.90 |
| MEAN | 5.79 | MEAN | 3.91 | MEAN | 2.55 |
| STD. DEVIATION | 1.38 | STD. DEVIATION | 0.70 | STD. DEVIATION | 0.74 |
| N | 20 | N | 25 | N | 24 |
| MISSING | 19 | MISSING | 14 | MISSING | 15 |

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2015.

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# The financial analyst forecasting literature: A taxonomy with suggestions for further research

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**Abstract**

This paper develops a taxonomy of research examining the role of financial analysts in capital markets. The paper builds on the perspectives provided by Schipper [Schipper, K. (1991). Analysts' forecasts. *Accounting Horizons*, 5, 105–131] and Brown [Brown, L. (1993). Earnings forecasting research: Its implications for capital markets research. *International Journal of Forecasting*, 9, 295–320]. We categorize papers published since 1992, describe the research questions addressed, and suggest avenues for further research in seven broad areas: (1) analysts' decision processes; (2) the nature of analyst expertise and the distributions of earnings forecasts; (3) the information content of analyst research; (4) analyst and market efficiency; (5) analysts' incentives and behavioral biases; (6) the effects of the institutional and regulatory environment (including cross-country comparisons); and (7) research design issues.


*Keywords:* Earnings forecasting; Financial analysts; Financial markets; Stock price forecasts; Analyst stock recommendations; Analyst research reports; Analyst decision processes; Analysts' incentives; Analyst expertise; Analyst inefficiency; Forecast bias; Financial analyst literature review

## 1. Introduction

This paper provides a taxonomy of research examining the roles financial analysts play in the allocation of economic resources. Two important papers published in the early 1990s provide perspectives on the literature: one appears in *Accounting Horizons* (Schipper, 1991) and the other appears in the *International Journal of Forecasting* (Brown, 1993). Our paper begins by summarizing the perspectives and directions for future research suggested by Schipper (1991) and Brown (1993).[3] We then develop a taxonomy of the research that has appeared since 1992.

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[3] Also see Givoly and Lakonishok (1984) for a review of analyst forecasting research prior to 1984.

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Our goal is to provide an organized look at the literature, paying particular attention to the questions remaining for further research.[4]

Since 1992, approximately 250 papers related to financial analysts have appeared in the eleven major research journals that we use to develop our taxonomy.[5] In our review of papers published since 1992, we have found much progress in some of the areas identified by Schipper (1991) and Brown (1993), and less progress in others. In particular, the research has evolved from descriptions of the statistical properties of analysts' forecasts to investigations of the incentives and decision processes that give rise to these properties. However, in spite of this broader focus, much of the analysts' decision processes and the market's mechanism of drawing a useful consensus from the combination of individual analysts' decisions remains hidden in a black box. Furthermore, we still have much to learn about relevant valuation metrics and mechanisms by which analysts and investors translate forecasts into equity values. For example, with the renewed popularity of the earnings-based valuation model in the early 1990s, the research turned toward investigating the model's role in the market's conversion of analysts' earnings forecasts into stock prices. Given the unexpected result that this model does a relatively poor job of explaining the variation in market prices and analysts' price forecasts and recommendations, researchers have turned their attention to examining heuristics that might better explain analyst and market decisions about firm value. We still have much to learn about the heuristics relied upon by analysts and the market.

The rest of this paper draws attention to these issues, as well as other issues that have arisen since 1992. The next section provides a summary of the questions identified in Schipper (1991) and Brown (1993) and the directions for future research suggested by those authors, as well as those suggested by the authors of the four papers commenting on Brown (1993). Section 3 describes our taxonomy, categorizes the papers published since Brown (1993), and identifies new research questions that emerge from our reading of the literature. Section 4 provides concluding comments, highlighting the areas that we consider most promising for future research.

## 2. Perspectives from Schipper (1991) and Brown (1993)

Katherine Schipper's (1991) commentary makes two major points. First, she suggests that the research regarding analysts' earnings forecasts focuses too narrowly on the statistical properties of the forecasts, without considering the full decision context and economic incentives affecting these properties. She takes the point of view that the analyst's job is to provide buy-sell-hold recommendations, and generate research reports to support those recommendations. Schipper describes analysts' earnings forecasts as one component of their research reports, and a means to an end rather than ends in themselves. She suggests that a more complete description of analysts' economic incentives and the role of earnings forecasts in the full decision context of analysts should lead to richer hypotheses regarding the statistical properties of the earnings forecasts. The second major point is that the research on the statistical properties of analysts' earnings forecasts focuses on outputs from, rather than inputs to, analysts' decision processes. The commentary calls for more research into how analysts actually use accounting information and their own earnings forecasts in making decisions.

From Larry Brown's (1993) review paper, we glean four key points. First, he notes that the models that produce the most accurate forecasts of an earnings variable should also produce the best proxies for the market's expectations, assuming market efficiency and

[4] We focus on the research related to analysts' decision processes and the usefulness of their forecasts and stock recommendations. For broader reviews of archival capital markets research and experimental financial accounting research (including issues related to analysts' forecasts and recommendations), see Kothari (2001) and Libby, Bloomfield, and Nelson (2002), respectively.

[5] Our taxonomy generally excludes papers published before 1993 and after June 2006, and we also generally exclude working papers. However, we believe that our classification scheme is both flexible and broad enough to enable the interested reader to continue categorizing new papers. For an expanded list of papers, we refer the interested reader to the Thomson Financial Research Bibliography (Brown 2007). Our taxonomy focuses only on the papers in that bibliography that were published in the 11 journals we review exhaustively; however, many of the papers in the *I/B/E/S Research Bibliography* were published in other journals, and many remain in working paper form. We also refer the interested reader to the *Financial Analysts' Journal* and the *Journal of Investing* for articles suggesting practical applications of the ideas in the academic articles included in our taxonomy.

assuming that the research design correctly models the valuation implications of the earnings variable. Under these assumptions, "predictive ability and association are two sides of the same coin (p. 296)." Brown notes mixed results on this issue and calls for future research to sort out whether the apparently conflicting results stem from research design problems or market inefficiency. Second, Brown encourages researchers to carefully consider the appropriateness of summary files of I/B/E/S consensus forecasts. Although the date of the I/B/E/S report and the coding of the forecast horizon indicates a timely consensus, the consensus may contain stale forecasts which have not been updated since the information event on which the study intends to condition the forecasts. Brown suggests that using the I/B/E/S Detail files can avoid this problem.[6] Third, Brown calls for research to better understand the role of analysts' forecasts in post-earnings announcement drift. In particular, he calls for research into the reasons for variation in the degree and speed of forecast convergence following earnings announcements (i.e., convergence towards a consensus that fully reflects the information in the prior earnings announcement), and the effect, if any, of forecast convergence on post-earnings announcement drift. Finally, like Schipper (1991), Brown calls for research to better understand the decision processes of analysts and the roles of analysts' earnings forecasts, macroeconomic and industry factors, and other information in formulating stock price forecasts and recommendations.

Both Brown (1993) and Schipper (1991) call for experimental research to play a more prominent role in understanding the uses of accounting and other information in making stock recommendations, within the full context of the analyst's decision environment and economic incentives. In Brown's words, "joint efforts by capital markets researchers and behavioralists to examine these issues more thoroughly would considerably enhance our understanding of the role of analysts in the price formation process (p. 315)."

Four authors commented on Brown (1993), and each provides interesting insights and suggestions for future research. O'Hanlon (1993) calls for investigations of the degree to which financial analysts' earnings forecasts distinguish permanent from temporary earnings changes. Thomas (1993) suggests that the importance of research into how analysts make earnings predictions depends on the answers to several questions, including (1) whether analysts' forecasts influence the marginal investor; (2) whether analysts seek to predict a 'core' earnings number that will persist in the future; and (3) whether their incentives are consistent with producing the most accurate forecasts possible. P. Brown (1993) calls for research into whether some analysts are better forecasters than others, whether the market's earnings expectations reflect these differences, and the degree to which consensus forecasts drawn from analyst tracking services such as I/B/E/S reflect investor expectations. Zmijewski (1993) focuses on the need for investigations of cross-country variation in the properties of earnings forecasts and their roles in price formation in capital markets.

Based on our reading of Schipper (1991), Brown (1993) and the related comment papers, along with an initial look at the research published since 1992, we organize the research into seven broad topic areas: (1) What is the nature of analysts' decision processes, and how do analysts rationalize the forecasts and recommendations contained in their research reports? (2) What is the nature of analyst expertise and what are the distributional characteristics of individual analyst earnings forecasts? (3) How informative are the outputs from analyst research (including earnings forecasts, target price forecasts, stock recommendations, and qualitative contextual analysis)? (4) Do analysts' forecasts and recommendations impound information about future earnings efficiently? Do stock prices impound the information in analysts' forecasts and recommendations efficiently? (5) How do management and analyst incentives, along with behavioral biases, affect the statistical properties of analysts' forecasts? (6) How does variation in the regulatory environment (over time and across countries) affect the behavior of analysts' forecasts and the role of analysts in capital markets? (7) What are some research design and database issues that threaten the validity of inferences from studies of the behavior of analysts and their forecasts and recommendations?

The next section is divided into seven subsections that categorize the research papers addressing these

[6] Most of the studies reviewed by Brown (1993) relied on either the I/B/E/S consensus or the Value Line data. Some studies also used Merrill Lynch's Opinion Alert, Standard and Poors' Earnings Forecaster, and Zacks' Investment Research. Others used Detail files from I/B/E/S and Zacks, which only became readily available at the end of the period.

questions, with a selective focus on papers published since Brown (1993) that stimulate our suggestions of avenues for further research in each category of our taxonomy.

## 3. A taxonomy of research related to the role of financial analysts in capital markets

The questions at the end of Section 2 naturally arise from the analyst reporting environment shown in Fig. 1, and provide the foundation for our taxonomy. The seven subsections below (3.1 through 3.7) and the triangles in Fig. 1 correspond to the seven questions above. As described in Fig. 1, analysts develop expertise (Section 3.2) in obtaining and analyzing information from various sources, including (1) earnings and other information from SEC filings, such as proxy statements and periodic financial reports; (2) industry and macroeconomic conditions; and (3) conference calls and other management communications. From this information, analysts produce earnings forecasts, target price forecasts, and stock recommendations, along with qualitative reports describing firms' prospects (Section 3.1). Investors use these outputs from analyst research to make trading decisions that affect market prices (Section 3.3). If the analyst forecasting process and capital markets are efficient, then market prices and analysts' forecasts immediately reflect all of the information described in Fig. 1. Inefficiencies

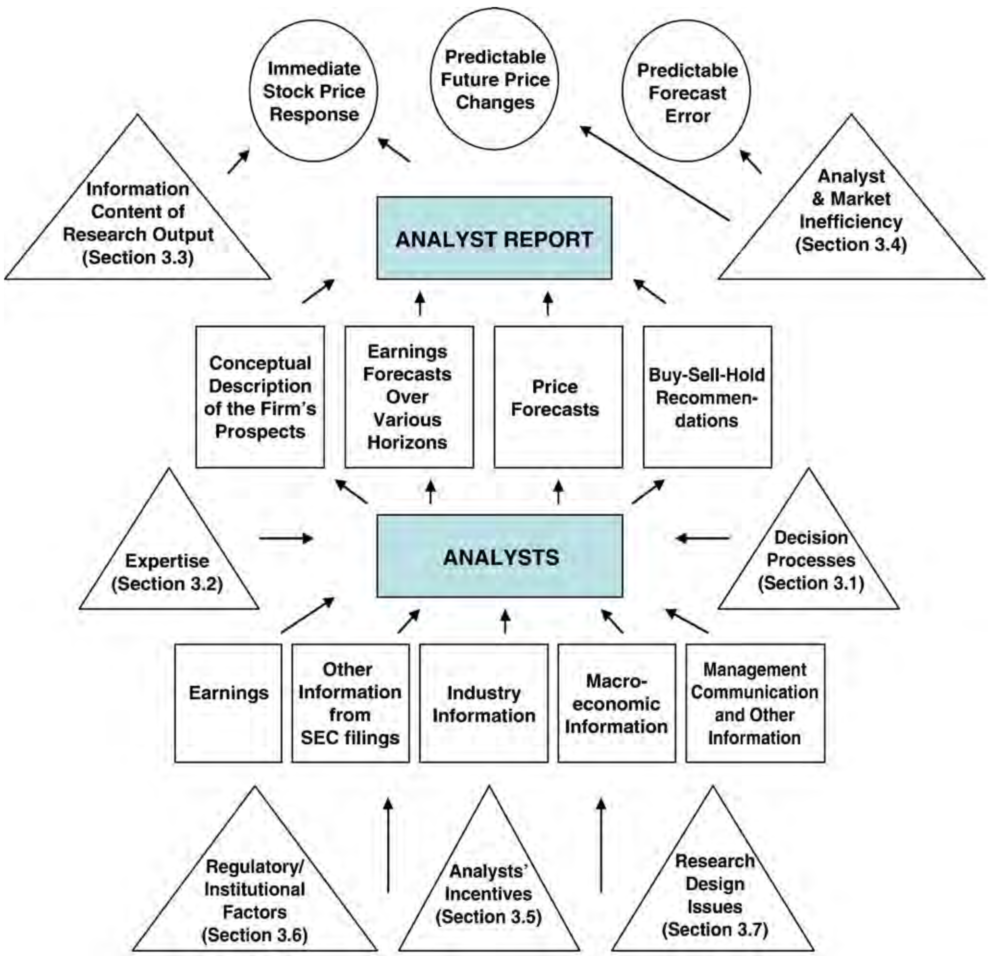


Fig. 1. Analysts' Reporting Environment.

create predictable analyst forecast errors and stock price changes (Section 3.4). The decision processes and analyst research output pictured in Fig. 1 also depend on regulatory and institutional factors that vary over time and across countries (Section 3.6), as well as on analysts' economic incentives and behavioral biases (Section 3.5). Finally, the limitations associated with archival databases, econometric tools, and mathematical models create research design issues that constrain the researcher's ability to observe the forces that ultimately drive market prices (Section 3.7).

We launch our taxonomy by listing and categorizing *all* papers related to analysts and published since 1992 in the following eleven major research journals spanning accounting, finance and forecasting: *The Accounting Review*, *Contemporary Accounting Research*, *International Journal of Forecasting*, *Journal of Accounting and Economics*, *Journal of Accounting Research*, *Journal of Business, Journal of Finance*, *Journal of Financial Economics*, *Journal of Financial and Quantitative Analysis, Review of Accounting Studies*, and *Review of Financial Studies*.[7] Our Tables 3.1 through 3.7 exhaustively categorize and briefly describe each paper related to analysts and appearing in any one of the above journals between January 1993 and June 2006. From that starting point, four areas of subjectivity necessarily enter our paper. First, we infer important sub-questions within each area of our taxonomy. Second, we subjectively select papers to discuss in the text that facilitate our assessment of directions for further research in each area of the seven categories of our taxonomy. Third, we list a paper more than once if it relates to more than one of our sub-questions. Finally, we refer to working papers and papers published in journals other than the eleven listed above when they come to our attention and directly relate to our ideas for further research. Our goal is not to provide exhaustive reviews of (or even references to) all of the papers published since 1992 or currently in process, but rather to selectively identify the aspects of papers that we think capture the pulse of the research and suggest new questions that might be addressed in the foreseeable future.[8]

### 3.1. Analysts' decision processes

#### 3.1.1. Questions addressed since 1992

As shown in Table 1, researchers have investigated a number of questions related to analysts' decision processes since 1992, including:

1. What information affects the development of analysts' earnings forecasts and recommendations? (Panel A);
2. What information affects analyst following and portfolio decisions? (Panel B);
3. What environmental, classification and reporting quality factors affect analysts' forecasts and recommendations? (Panel C);
4. How do analysts transform information into target prices and stock recommendations? (Panel D); and
5. What is the role of earnings components in analysts' decision processes? (Panel E).

Researchers have used surveys to simply ask analysts how they process information (e.g., Block, 1999), content analyses of analysts' research reports to infer the information analysts rely upon in making forecasts and recommendations (e.g., Rogers & Grant, 1997; Bradshaw, 2002), and laboratory experiments to study how analysts use information (e.g., Hopkins, Houston, & Peters, 2000). Archival studies offer more generalizable results, but are limited in their ability to penetrate the black box of analysts' actual decision processes. The challenge is that analysts have a context-specific task that is very difficult to model, and, consistent with suggestions in Brown (1993) and Schipper (1991), in recent years we have seen relatively more studies using experimental and contextual approaches to questions about analysts' decision processes and incentives.

#### 3.1.2. Suggestions for further research related to analysts' decision processes

In addition to the obvious use of earnings-related information, the research summarized in Table 1, Panel

[7] We exclude papers that use analysts' forecasts merely as a control variable or to proxy for an underlying construct. That is, we focus on papers studying the roles of analysts in capital market resource allocation. We also generally exclude discussion comments on published papers.

[8] See Ramnath, Rock, and Shane (2006) for a more detailed review of the research categorized in our taxonomy.

Table 1
Selected Papers Addressing Questions Related to Analysts' Decision Processes (Section 3.1)

| Reference | Method | Key result |
|---|---|---|
| *Panel A. Research Question 3.1.1: What information affects the development of analysts' earnings forecasts and recommendations?* | | |
| Lev and Thiagarajan (1993) | Archival, various analyst commentaries, 1973-1990. | Twelve fundamentals-based earnings persistence indicators, derived from practitioner-oriented analyst literature, collectively enhance the explanatory power of an earnings-returns regression. |
| Denis, Denis, and Sarin (1994) | Archival, I/B/E/S, 1962-1988. | Analyst forecast revisions following dividend changes are consistent with dividend changes providing information about future cash flows rather than about investment opportunities. |
| Previts, Bricker, Robinson, and Young (1994) | Content analysis of Investext reports, 1987-1988, 1990-1992. | Analysts place heavy weights on earnings-related information, disaggregate the information beyond the GAAP-based disaggregation found in annual reports, extract non-recurring items, and rely heavily on management for information beyond annual reports. |
| Bouwman, Frishkoff, and Frishkoff (1995) | Protocol analysis of 12 buy-side analysts. | The nature of the information used by analysts depends on the phase of the decision process. Overall, buy-side analysts want more segment information, longer time series of historical summary information, management-supplied forward-looking information, and sell-side analyst reports. |
| Kasznik and Lev (1995) | Archival, I/B/E/S, 1979-1986. | Analysts' forecast revisions in response to disappointing earnings accompanied by warnings are significantly more negative than the responses to disappointing earnings unaccompanied by warnings, suggesting that warnings occurring before negative earnings surprises have more permanent implications for future earnings. |
| Ely and Mande (1996) | Archival, Value Line, 1977-1986. | Analysts' earnings forecast revisions reflect corroborative information in dividend and earnings announcements, particularly when the earnings information is noisy. |
| Lang and Lundholm (1996) | Archival, Report of the Financial Analysts' Federation (FAF) Corporate Information Committee, 1985-1989. | The dispersion in analysts' forecasts declines with higher quality annual report disclosures and better investor relations, but not with the quality of other corporate communications (e.g., quarterly reports, press releases, etc.). Analysts' forecast accuracy improves with the quality of other corporate communications and investor relations, but not with the quality of annual report disclosures. |
| Williams (1996) | Archival, I/B/E/S, 1979-1986. | Analyst reliance on management earnings forecasts increases with the prior "usefulness" of the forecasts (i.e., the incremental contribution of the prior forecasts to prior forecast accuracy). |
| Maines, McDaniel, and Harris (1997) | Experiments with 56 professional analysts and 60 MBA students. | Analyst confidence in segment reporting quality depends on the consistency with the definitions of segments used by the company for internal decision-making. |
| Rogers and Grant (1997) | Content analysis of One Source reports, 1993-1994. | Analysts use substantial amounts of non-financial information both within and outside of GAAP-based annual reports. |
| Ederington and Goh (1998) | Archival, I/B/E/S, 1984-1990. | Analysts' earnings forecast revisions both lead and lag bond rating downgrades; part of the post-downgrade revision seems to be related to the downgrade itself, as opposed to a change in actual earnings. Bond rating upgrades are followed by upward analyst forecast revisions, although actual earnings are unrelated to upgrades. |
| Barron, Kile, and O'Keefe (1999) | Archival, I/B/E/S, 1987-1989. | Analyst forecast accuracy improves and dispersion in analysts' forecasts declines with increases in the SEC ratings of the quality of firms' communication through MD&A disclosures. The results are driven by forward-looking disclosures about operations and both forward-looking and historical analyses of capital expenditures. |
| Healy et al. (1999) | Archival, AIMR Reports, 1980-1990. | The key factors valued by analysts are segmental reporting quality; quality and candidness in the management discussion and analysis (MD&A) section of annual and quarterly reports; the publication of supplemental disclosures outside of the required periodic reports; and the availability of management to analysts. |
| Bowen, Davis, and Matsumoto (2002) | Archival, Zacks and First Call, 1995-1998. | Prior to Reg FD, the information in conference calls led to improved analyst forecast accuracy and reduced the dispersion in analysts' earnings forecasts, suggesting a form of selective disclosure, since conference calls were generally closed to the general public prior to Reg FD. |
| Conrad, Cornell, Landsman, and Rountree (2006) | Archival, I/B/E/S, 1993-1999. | Analysts are equally likely to upgrade or downgrade recommendations following large stock price increases, but are more likely to downgrade following large stock price declines. The results are consistent with "sticky" downside recommendation revisions. |

*(continued on next page)*

Table 1 (*continued*)

| Reference | Method | Key result |
|---|---|---|
| *Panel B. Research Question 3.1.2: What information affects analyst following and portfolio decisions?* | | |
| Previts et al. (1994) | Content analysis of Investext reports, 1987-1988, 1990-1992. | Analysts prefer to follow firms that smooth earnings. |
| Chung and Jo (1996) | Archival, I/B/E/S, 1984-1987. | Analyst following has a positive impact on firm value, and analysts tend to follow stocks of high quality firms. |
| Lang and Lundholm (1996) | Archival, Report of the Financial Analysts' Federation (FAF) Corporate Information Committee, 1985-1989. | Analysts prefer to follow firms with more forthcoming disclosures, particularly in the context of direct investor relations communications, as opposed to public disclosures in annual and quarterly reports to shareholders. |
| Botosan and Harris (2000) | Archival, Nelson's Directory, I/B/E/S, 1987-1994. | Analyst following increases with firms' decisions to include information on segment activity as part of their quarterly (as opposed to only annual) reports. |
| Barth, Kasznik and McNichols (2001) | Archival, I/B/E/S, 1983-1994. | Relative to industry peers, analyst following increases with R&D and advertising expenditures. |
| *Panel C. Research Question 3.1.3: What environmental, classification and reporting quality factors affect analysts' forecasts and recommendations?* | | |
| Haw et al. (1994) | Archival, I/B/E/S, 1977-1984. | Forecast complexity increases and analyst forecast accuracy deteriorates following mergers, but after four years accuracy levels return to pre-merger levels. |
| Hopkins (1996) | Experiment with 83 buy-side financial analysts. | The classification of hybrid instruments as either a liability or an equity causes analysts to overemphasize the debt (equity) attributes of the instruments in making stock recommendations. |
| Hirst and Hopkins (1998) | Experiment with 96 buy-side analysts. | The clarity of income effects in comprehensive income disclosures affects analysts' ability to detect earnings management and make effective valuation judgments. |
| Hopkins et al. (2000) | Experiment with 113 buy-side equity analysts. | The method of accounting for a business combination affects analysts' stock price judgments unless the income effect of the method is clearly delineated. |
| Duru and Reeb (2002) | Archival, I/B/E/S, 1995-1998. | Forecasting complexity increases and accuracy decreases with corporate international diversification. |
| Plumlee (2003) | Archival, Value Line, 1984-1988. | The effective tax rate effects of the more complex aspects of the 1986 tax act were more difficult for analysts to forecast. |
| Hirst, Hopkins, and Wahlen (2004) | Experiment with 56 buy-side analysts. | Analysts use information about interest rate risk more effectively when gains and losses are measured and reported in financial statements than when they are merely disclosed in financial statements. |
| *Panel D. Research Question 3.1.4: How do analysts transform information into target prices and stock recommendations?* | | |
| Bandyopadhyay, Brown, and Richardson (1995) | Archival study, Research Evaluation Service (RES), Value Line, 1983-1988. | RES next year earnings forecast revisions explain about 30% of the variation in RES 12-month-ahead price forecast revisions; and revisions in Value Line's 3-5 year ahead earnings forecasts explain about 60% of the variation in revisions in Value Line's 3-5 year ahead price forecasts. |
| Block (1999) | Questionnaire survey of members of AIMR. | 46% of respondents said that present value analysis is not part of their normal procedures. Analysts considered earnings and cash flow to be far more important than dividends and book value in security valuation. However, analysts rely more heavily on earnings multiples versus DCF in valuation, and growth potential and earnings quality are the crucial factors in evaluating P/E ratios. |
| Bradshaw (2002) | Content analysis Investext reports, First Call Real-Time Database, 1998-1999. | Analysts tend to justify favorable stock recommendations and target prices with reference to low P/E ratios relative to growth projections, and analysts appear to derive target prices using a PEG-based multiples approach that adjusts P/E ratios for growth prospects. |
| Bradshaw (2004) | Archival, Investext reports, First Call Real-Time Database, 1998-1999. | A simple heuristic based on analysts' consensus long-term growth rate forecasts explains 23% of the variation in analysts' consensus stock recommendations, and this heuristic is negatively correlated with value-to-price ratios based on earnings-based valuation models. |

Table 1 (*continued*)

| Reference | Method | Key result |
|---|---|---|
| *Panel D. Research Question 3.1.4: How do analysts transform information into target prices and stock recommendations?* | | |
| Demirakos, Strong, and Walker (2004) | Content analysis of Investext reports, 1997-2001. | Analysts overwhelmingly refer to simple P/E multiples (as opposed to DCF or earnings-based valuation models) to support their stock recommendations. |
| Loh and Mian (2006) | Archival, I/B/E/S, 1994-2000. | Analysts who issue more accurate forecasts also issue more profitable recommendations, implying that analysts use their earnings forecasts to generate recommendations. |
| *Panel E. Research Question 3.1.5: What is the role of earnings components in analysts' decision processes?* | | |
| Chandra, Procassini, and Waymire (1999) | Archival, Value Line, 1986-1993. | Analysts' firm-specific sales forecast revisions reflect information in industry trade association industry-wide orders-to-sales ratio reports. This information is useful in assessing the persistence of unexpected firm-specific quarterly sales announcements. |
| Mest and Plummer (1999) | Archival, Value Line, 1982-1988. | The proportion of transitory earnings components reflected in earnings forecasts decreases as forecast horizons increase, suggesting that short-term forecasts are directed at GAAP earnings, whereas long-term forecasts reflect expectations about persistent earnings. |
| Brown and Sivakumar (2003) | Archival, I/B/E/S, 1989-1997. | Earnings changes based on actual quarterly earnings reported on the I/B/E/S database exhibit more persistence than earnings changes computed using EPS from operations per Compustat. I/B/E/S-reported actual earnings are also more closely associated with market measures than Compustat's EPS from operations. |
| Gu and Chen (2004) | Archival, First Call, 1990-2003. | Non-recurring items that analysts forecast and include in their actual earnings reports have greater persistence and higher valuation multiples than those excluded. |

A, shows that analysts' earnings forecasts rely heavily on disaggregated and qualitative information. The two most commonly used sources of information, other than reported earnings, are management communications (Previts et al., 1994; Lang & Lundholm, 1996; Bowen et al., 2002) and segment reports (Bouwman et al., 1995; Healy et al., 1999). For example, in an experimental setting, Maines, McDaniel, and Harris (1997) find that analyst confidence in segment reporting quality depends on consistency with the definitions of segments used by the company for internal decision-making. The nature of the disaggregated information that is most important to analysts, and their preferred methods of disaggregation are questions that remain open to further research.

Analysts consistently point to the quality of firm reporting as an important factor in determining the usefulness of financial information (Williams, 1996; Healy et al., 1999). Interestingly, Lang and Lundholm (1996) report that the source of information that increases forecast accuracy often does not reduce analyst disagreement. Future research might help us to better understand the relationship between forecast accuracy and consensus as outcomes of the information used by analysts.

Some research, which is summarized in Table 1, Panel B, examines the firm characteristics that influence analyst decisions to follow firms. Assuming that a greater analyst following leads to more efficient information transmission and lower cost of capital, firms benefit by attracting more analysts. Studies find that the firm disclosure quality is the most important factor that drives the analyst following (Lang & Lundholm, 1996; Botosan & Harris, 2000). Interestingly, Previts et al. (1994) observe that analysts prefer to follow firms with effective earnings management tools "which provide analysts with a low-risk earnings platform for making stock price forecasts and buy/sell/hold recommendations... (p. 63)." Future research might evaluate whether analysts tend to follow firms that manage earnings towards expectations, and if so, whether investors have more or less information about firms that do not or cannot manage earnings.

A number of archival studies, beginning with Brown, Richardson, and Schwager (1987), have suggested that complexity affects analyst forecast accuracy. More recent research, which is summarized in Table 1, Panel C, addresses the question of the effects of complexity on analyst forecasting quality. If providing unambiguous information is the objective of financial reporting, then it is important to understand the potential for the misinterpretation of information by users. Some experimental studies find that analysts' judgments are affected by the accounting method choice, the classification of financial statement items, and whether items are recognized in financial statements or disclosed in footnotes (Hopkins et al., 2000; Hopkins, 1996; Hirst et al., 2004). A number of archival studies also suggest that complexity affects analyst forecast accuracy (Haw et al., 1994; Duru & Reeb, 2002). Plumlee (2003) provides perhaps the most direct test of this proposition, finding that the magnitude of errors in forecasting effective tax rates increases with the complexity of tax law changes. She interprets her results as indicating that greater information complexity reduces analyst use of the information, due to either processing limitations or time constraints. Since the research design did not predict the direction of the forecast errors, an alternative explanation is that analysts obtained and efficiently processed all possible information regarding the effects of the more complex tax law changes, but because those effects were highly uncertain, the forecast errors were large in absolute value for the firms most affected. Further research is needed to distinguish between these explanations.

Questions regarding the algorithms or models analysts use to convert their earnings forecasts into stock recommendations offer fertile ground for further research. A number of studies, which are summarized in Table 1, Panel D, find correlations between accounting variables and analysts' price forecasts and recommendations (e.g., Bandyopadhyay, Brown, & Richardson, 1995). However, the evidence in Bradshaw (2002, 2004) suggests that simple algorithms based on P/E ratios and long-term growth forecasts explain analysts' recommendations better than more sophisticated valuation models.[9] Bradshaw's sample period corresponds to a time when the market was overheating, perhaps due to analysts pushing long-term growth forecasts of growth-oriented firms. It will be interesting to examine whether the heuristics used by analysts to generate recommendations, as well as the stock price effects of these recommendations, change over time. The models analysts use to translate earnings forecasts into valuation and recommendation judgments remains an elusive topic for further research.

Table 1, Panel E, lists some recent research on the role of earnings components in analysts' forecasting decisions. The analyst's challenge is to separate the transitory from the more permanent components of earnings surprise, and evaluate the persistence over short- and longer-term forecast horizons (e.g., Mest & Plummer, 1999). We expect to see more research that assesses analysts' ability to detect and adjust for transitory earnings components. Following Gu and Chen (2004), we also expect to see more research evaluating the degree to which differences between actual earnings, as reported in forecast databases (e.g., I/B/E/S), and the GAAP-based earnings reported in financial statements reflect truly non-recurring items. Finally, we expect researchers to develop approaches to evaluating analyst forecast accuracy with respect to components of earnings not specifically disclosed on I/B/E/S or other analyst databases.

### *3.2. The nature of analyst expertise and the distributional characteristics of analysts' earnings forecasts*

#### *3.2.1. Questions addressed since 1992*

The studies described in Table 2 focus on the following research questions:

1. What is the nature of analyst expertise? (Panel A);
2. What characteristics make forecasts useful? (Panel B);
3. Do analysts herd? (Panel C); and
4. What attributes of analyst and investor information are associated with dispersion in analysts' earnings forecasts? (Panel D).

If accuracy and value relevance are related, then identifying expert forecasters may be a profitable strategy for investors. The research since 1992 suggests that forecast accuracy leads to media recognition, and accuracy increases with employer size (proxying for research resources), the number of forecasts made in a forecasting interval (proxying for effort), and both firm-specific and general experience. Forecast accuracy appears to be negatively related to the number of industries and firms that a given analyst follows (proxying for specialization). Some evidence indicates that superior analysts in the forecasting dimension also exert a greater influence on prices, supporting Brown's (1993)

[9] Also see Demirakos et al., (2004), who use content analysis of Investext reports and find that analysts overwhelmingly refer to simple P/E multiples (as opposed to DCF or earnings-based valuation models) to support their stock recommendations.

Table 2
Selected Papers Addressing Questions Related to the Nature of Analyst Expertise and the Distributional Characteristics of Analysts' Earnings Forecasts ( Section 3.2)

| Reference | Method | Key results |
|---|---|---|
| *Panel A. Research Question 3.2.1: What is the nature of analyst expertise?* | | |
| Maines et al. (1997) | Experiments with 56 professional analysts and 60 MBA students. | Experienced analysts use segment reports more effectively than MBA students. |
| Mikhail et al. (1997) | Archival, Zacks, 1980-1995. | Forecast accuracy increases with firm-specific experience, and market reactions are more closely related to the forecast errors of analysts with firm-specific experience. However, firm-specific experience is not related to abnormal returns following analyst stock recommendation revisions. |
| Clement (1999) | Archival, I/B/E/S, 1983-1994. | Forecast accuracy is positively related to experience and employer size and negatively associated with the number of industries and firms followed, providing evidence about the characteristics of successful analysts. |
| Jacob et al. (1999) | Archival, Zacks, 1981-1992. | Forecast accuracy improves with analyst aptitude (analyst-target alignments), brokerage size, and industry specialization, but not with general experience. Forecast accuracy also improves as a function of the number of forecasts made in a forecasting interval, providing evidence about the characteristics of superior analysts. |
| Dechow et al. (2000) | Archival, I/B/E/S, 1981-1990. | Analyst evaluations are more often based on stock recommendations and the accuracy of annual earnings forecasts than on the accuracy of long-term growth forecasts. |
| Brown (2001b) | Archival, I/B/E/S, 1986-1998. | A simple model using past accuracy to predict current and future accuracy performs as well as a model using current analyst characteristics to identify superior analysts. |
| Hirst et al. (2004) | Experiment with 56 buy-side analysts. | Analysts following less than the sample median number of firms make better decisions than analysts following more than the median number of firms. |
| Clarke, Ferris, Jayaraman, and Lee (2006) | Archival, I/B/E/S, 1993-2001. | Stock recommendations reflect more pessimism for firms that subsequently file for bankruptcy. All-Star analysts downgrade earlier and more strongly than other analysts. Significant differences exist in recommendations between affiliated and unaffiliated analysts. |
| *Panel B. Research Question 3.2.2: What characteristics make forecasts useful?* | | |
| Sinha, Brown, and Das (1997) | Archival, I/B/E/S, 1984-1993. | Controlling for forecast timing, superior analysts maintain forecast accuracy superiority in holdout periods, but inferior analysts do not continue to be inferior in holdout periods. |
| Cooper, Day, and Lewis (2001) | Archival, I/B/E/S, 1993-1995. | Market responses to forecast revisions are higher for forecast timeliness leaders. Performance rankings based on timeliness are more informative than those based on trading volume and accuracy, suggesting that timely forecasts are valued by the market. |
| Gleason and Lee (2003) | Archival, I/B/E/S, 1993-1998. | Pricing of forecast revisions is greater for forecasts that diverge from the consensus. Price adjustment is faster and more complete for celebrity analysts. |
| Mozes (2003) | Archival, First Call, 1990-1994. | Forecast immediacy (proximity to the beginning of a forecast cluster) is negatively related to forecast accuracy, and positively related to forecast dispersion and improved accuracy relative to outstanding forecasts, suggesting that forecast timeliness is important in price discovery. |
| Clement and Tse (2005) | Archival, I/B/E/S, 1989-1998. | Bold forecasts have larger pricing implications because they offer greater improvements in forecast accuracy as compared to herding forecasts, implying that bold forecasts reflect more useful private information. |
| Cheng, Liu, and Qian (2006) | Archival, Thomson Financial/Nelson Information's *Directory of Fund Managers*, 2000-2002. | Fund managers weigh buy-side research more when sell-side reports are biased or when the uncertainty about the bias in sell-side reports is increasing. |
| *Panel C. Research Question 3.2.3: Do analysts herd?* | | |
| Trueman (1994) | Mathematical Model | To enhance investor assessment of their forecasting ability, analysts tend to release forecasts closer to prior expectations than is warranted given their private information, and analysts with less ability are more likely to herd. |
| Graham (1999) | Mathematical Model and Archival, Newsletters, 1981-1992. | Analysts with high reputations or of low ability tend to herd; herding also occurs if strong public information is inconsistent with an analyst's private information, suggesting that analysts are conservative in forecasting. |

(continued on next page)

Table 2 (*continued*)

| Reference | Method | Key results |
|---|---|---|
| *Panel C. Research Question 3.2.3: Do analysts herd?* | | |
| Hong, Kubik, and Solomon (2000a) | Archival, I/B/E/S, 1983-1996. | Inexperienced analysts are more likely to experience negative employment outcomes due to poor forecasting, and, controlling for accuracy, less experienced analysts are more likely to be fired for bold forecasts, providing motivation for inexperienced analysts to herd. |
| Welch (2000) | Archival and Mathematical Model, Zacks, 1989-1994. | While current recommendations influence immediate subsequent recommendations, analysts do not herd to the consensus recommendation when the consensus is a good predictor of subsequent stock returns. This is consistent with analysts herding when there is little information. |
| Bernhardt, Campello, and Kutsoati (2006) | Archival, I/B/E/S, 1989-2001. | The authors find evidence that is consistent with an economically large contrarian bias in analysts' forecasts, but not with systematic analyst herding. |
| Clarke and Subramanian (2006) | Mathematical Model and Archival, I/B/E/S, 1988-2000. | Analysts who are very good or very poor forecasters tend to issue bold forecasts. Forecast boldness is positively related to experience, possibly because experienced analysts are very good or can take risks without fear of employment loss. |
| *Panel D. Research Question 3.2.4: What attributes of analyst and investor information are associated with dispersion in analysts' earnings forecasts?* | | |
| Abarbanell, Lanen, and Verrecchia (1995) | Mathematical Model | Forecast dispersion is not sufficient to proxy for investor uncertainty, because other forecast attributes are related to precision. A model that includes other forecast attributes is useful in interpreting empirical results and designing empirical tests of reactions to announcements. |
| Barron (1995) | Archival, I/B/E/S, 1984-1990. | Belief jumbling across analysts drives trading in securities beyond prior forecast dispersion and changes in dispersion, implying that trading may result when analysts change their relative beliefs, even if the dispersion does not change. |
| Bamber, Barron, and Stober (1997) | Archival, I/B/E/S, 1984-1994. | The factors noted in Barron (1995) (dispersion in prior forecasts, changes in forecast dispersion, and belief jumbling) each explain the trading volume around earnings announcements beyond contemporaneous price changes. |
| Barron, Kim, Lim, and Stevens (1998) | Mathematical Model | Analysts' total uncertainty and consensus can be estimated using the mean forecast error, forecast dispersion, and number of forecasts. Forecast dispersion measures analysts' idiosyncratic uncertainty but does not capture total earnings uncertainty; thus, decreases in dispersion do not necessarily signal a decrease in overall uncertainty. |
| Bamber, Barron, and Stober (1999) | Archival, I/B/E/S, 1984-1994. | Even with minimal price changes, trading volume increases with differential analyst interpretations of the information in quarterly earnings announcements. The differential interpretation of news leads to more informed trading when the abnormal trading volume is high around earnings announcements, consistent with informed traders camouflaging their trades amongst liquidity trades. |
| Barron, Byard, Kile, and Riedl (2002a) | Archival, I/B/E/S, 1986-1998. | Consensus, measured as the correlation between individual analyst forecast errors, is negatively related to firms' levels of intangible assets, suggesting that analysts rely more on gathering their own private information when the disclosure quality is relatively low. |
| Barron, Byard, and Kim (2002b) | Archival, I/B/E/S, 1986-1997. | Consensus among analysts decreases following earnings announcements, implying that analysts embed more private information in forecast revisions and their forecasts become more useful following earnings announcements. Idiosyncratic information in earnings forecast revisions increases with the number of analysts providing forecasts. |
| Diether, Malloy, and Scherbina (2002) | Archival, I/B/E/S, 1983-2000. | Securities with high (low) forecast dispersions subsequently earn negative (positive) returns, implying that dispersion does not proxy for ex ante risk. These results are consistent with stock prices reflecting the most optimistic valuations, possibly due to short-selling constraints. |
| Byard and Shaw (2003) | Archival, I/B/E/S and AIMR, 1986-1996. | Analyst forecast distributions for firms with a reputation for providing higher quality disclosures reflect greater precision in both analysts' common and idiosyncratic (private) information. |
| Gu (2004) | Mathematical Model and Archival, First Call, 1998-2002. | This paper relaxes the Barron et al. (1998) assumption of constant precision of private information across analysts, and provides generalized measures of analysts' common and private information (based on observable forecasts). |

Table 2 (*continued*)

| Reference | Method | Key results |
|---|---|---|
| *Panel D. Research Question 3.2.4: What attributes of analyst and investor information are associated with dispersion in analysts' earnings forecasts?* | | |
| Johnson (2004) | Mathematical Model and Archival, I/B/E/S, 1983-2001. | The negative relationship between forecast dispersion and future returns relates to firms with risky debts, suggesting that for levered firms, adding uncertainty increases the option value of equity. |
| Barron, Harris, and Stanford (2005) | Archival, I/B/E/S, 1984-1996. | Earnings announcements that increase analysts' private information are related to increased trading volume, consistent with investors' acquisition of private information. Announcements that decrease the consensus also relate to increased trading volume. |
| Park (2005) | Archival, I/B/E/S, 1982-2001. | Dispersion in S&P 500 earnings forecasts predicts future returns, similar to Diether et al. (2002), but at the aggregate market level. The results are likewise attributed to stock prices reflecting the most optimistic valuations (in this case due to reluctance to engage in short-selling). |
| Doukas, Kim, and Pantzalis (2006) | Archival, IBES, 1983-2002. | The results in Diether et al. (2002) do not hold when the Barron et al. (1998) measure of investor disagreement is used. This result is inconsistent with Miller's (1977) prediction that divergence of opinion results in overvaluation, but is consistent with the divergence of opinion proxying for risk. |
| Garfinkel and Sokobin (2006) | Archival, I/B/E/S, 1985-1998. | The results in Diether et al. (2002) suffer from a selection bias problem related to analyst following. If a trading volume measure of opinion divergence is used, instead of analysts' forecasts, the divergence of beliefs is positively related to future returns. |

conjecture that forecast accuracy and the association with stock prices should be two sides of the same coin.

#### *3.2.2. Suggestions for further research related to analyst expertise and the distributional properties of analysts' earnings forecasts*

Clement (1999) and Jacob, Lys, and Neale (1999) develop models of characteristics that explain analyst expertise (e.g., frequency of forecasting, firm-specific experience, resources of larger brokerage houses, and focus on fewer firms and industries). These papers, along with others listed in Table 2, Panel A, provide an important starting point in understanding the characteristics associated with analyst expertise. However, much still remains to be explained, as is evidenced by Brown (2001b), who finds that a simple model using analyst past accuracy as a predictor of future accuracy does as well as the more sophisticated models presented by Clement (1999) and Jacob et al. (1999).

This research can be extended to examine whether analysts who are more accurate for some companies but less accurate for others are retained, but reassigned from companies for which they are relatively inaccurate.[10] Another open question is why certain employers assign their analysts to cover more companies and industries, when decreased breadth is related to improved forecast accuracy. While a convenient explanation is that such employers are most likely smaller brokerage houses employing fewer analysts, what is the role of these overworked/inferior analysts when other, presumably superior, analysts cover the same company for larger brokerage houses? Mikhail, Walther, and Willis (1997) find an association between firm-specific experience and both forecast accuracy and the degree to which earnings forecasts proxy for market expectations; however, they find no such relationship between experience and abnormal returns following analyst recommendations. The reason why firm-specific experience leads to more accurate forecasts but not better recommendations remains an important issue for further research.[11]

Future research might also investigate the analyst and firm characteristics associated with the accuracy of analysts' long-term earnings growth forecasts. Accurate long-term forecasts are important for firm valuation, because most terminal value estimates depend

[10] Hong and Kubik (2003) (described in Table 5, Panel B) provide some preliminary evidence on this issue.

[11] Assessing quality in the context of recommendations is tenuous, because there is no corresponding, mutually-agreed-upon "actual" similar to what is available in the context of earnings forecasts. The general approach to assessing recommendation accuracy examines the association between the recommendation and stock returns contemporaneous with, or subsequent to, the recommendation date.

on assumptions about long-term growth. Dechow, Hutton, and Sloan (2000, p. 6) note that "analysts are frequently evaluated on the accuracy of their buy-sell recommendations and annual earnings forecasts, but not on their long-term growth forecasts." Thus, both the market and the researchers largely ignore the factors that affect the accuracy of analysts' long-term forecasts. Identifying analysts who consistently provide more accurate long-term growth forecasts should also be appealing to investors, given the research evidence suggesting significant mispricing due to overly optimistic long-term growth forecasts. Future research can examine whether some of the characteristics associated with superior short-term forecasts also apply to long-term forecasts.

Another avenue for further research related to Table 2, Panel A, is to better understand the differences in the decision-making processes of buy-side versus sell-side analysts, and between more experienced and less experienced analysts. For example, Maines et al. (1997) find that, relative to experienced analysts, MBA students are less efficient processors of the segmental disclosures in footnotes to firms' financial statements. The way in which analysts develop this type of decision-making expertise remains a question for future research. Similarly, Bouwman et al. (1995) (described in our Table 1, Panel A) find that buy-side analysts seek to combine their own independent analyses with information from sell-side analyst reports as inputs to portfolio formation decisions. This suggests that buy-side analysts value the research reports of sell-side analysts. Cheng et al. (2006) examine self-reported weights placed by fund managers on buy-side versus sell-side analyst research. Consistent with model predictions, they find that fund managers weight buy-side research more highly when sell-side reports are biased or when the uncertainty about the bias in sell-side reports is increasing. Future research could investigate other contexts in which buy-side analysts rely more or less heavily on sell-side analyst reports. Future research could also examine whether sell-side analysts are indeed more efficient processors of corporate financial information, and whether this superiority relates to analyst characteristics which may differ across the two groups, such as the number of firms and industries followed.

Several recent papers (Table 2, Panel B) consider attributes that make forecasts more useful. In addition to accuracy, research suggests that forecast timing plays an important role in forecast usefulness, as reflected in market responsiveness. Forecasts issued shortly before the target earnings announcement date are generally more accurate, but they are not necessarily more informative than less accurate forecasts issued earlier in the period. Analysts issuing forecasts later in the period may simply herd towards the consensus. Cooper et al. (2001) and Gleason and Lee (2003) find a larger price response to the forecast revisions of lead analysts, defined as analysts who provide timely forecasts, than the price response to follower analysts. Mozes (2003) finds that forecasts with greater "immediacy" (i.e., "the speed with which analysts respond to a significant change in the publicly available information set" (p. 417)) are also more useful, in the sense that they offer a greater improvement in forecast accuracy relative to the prevailing consensus. Thus, studies should jointly consider accuracy and timeliness when evaluating the usefulness of analysts' forecasts, as well as accuracy relative to the prevailing consensus. Sinha et al. (1997), for example, recognize the effect of forecast age on accuracy, and find that forecast accuracy differs across analysts after controlling for the relative ages of the forecasts. In further tests, they find that analysts identified as being superior *ex ante*, at either firm-specific or industry levels, continue to provide more accurate forecasts in subsequent holdout periods; however, curiously, they do not find that inferior analysts continue to provide poorer earnings estimates. Future research could explore whether inferior analysts who do not improve leave the profession, and are therefore absent from the later sample periods.

Given the preliminary evidence suggesting that analyst expertise is associated with more useful forecasts, identifying expert analysts is a potentially profitable strategy for investors. Identifying the characteristics associated with analyst expertise should also interest brokerage houses, which are trying to enhance the quality of their output. Finally, if the quality of analysts' forecasts and recommendations differ systematically based on analyst characteristics, then researchers could also use these characteristics to derive more accurate consensus earnings and target price forecasts.

Related to forecast timing/usefulness, recent research suggests that "bold" forecasts differentially drive prices, and reflect more private information than herding forecasts (e.g., Clement & Tse, 2005). However, if analysts have superior information and bold forecasts are valued more by investors, why do some analysts choose to herd (and not fully convey their private information)?[12] Some of the work listed in Table 2, Panel C, suggests that the answer lies in analysts' self-confidence. Confident analysts are more likely to issue bold forecasts, while analysts who are less confident in their information are more likely to herd. Analysts with less experience are also more likely to herd, suggesting that career concerns may inhibit boldness (Hong et al., 2000a). Further, research suggests that analysts with either relatively good or relatively poor prior performance are most likely to issue bold forecasts (Clarke & Subramanian, 2006). Graham (1999) suggests that analysts herd to reduce the risk of damaging their reputation when, for example, their private information is inconsistent with contemporaneously available public signals. More uncertainty regarding a firm's future performance may also lead to herding among analysts. An interesting question for further research is whether forecasting difficulty is associated with herding behavior. For example, is herding behavior more prevalent for firms with greater earnings volatility? Higher dispersion in analysts' forecasts is inversely related to measures of herding behavior and positively related to the variance of actual earnings. Thus, uncertainty with respect to firms' earnings could be the underlying cause of herding behavior, or it could represent an important correlated omitted variable.

Table 2, Panel D, refers to studies examining the attributes of analyst and investor information associated with forecast dispersion, measured as the standard deviation of analysts' forecasts. Forecast dispersion proxies for investor uncertainty if disagreement among analysts reflects general disagreement among investors. Based on the notion that investor disagreement is one factor that triggers trade, forecast dispersion is used to study trading volume around information events such as earnings announcements. Advances in research since 1992 include a more careful consideration of dispersion and of what drives changes in dispersion. Specifically, Barron (1995) suggests that trading may result even with no change in the level of dispersion, because analysts change their relative positions from one forecast period to the next, referred to as "belief jumbling." Proxies for this notion of changing beliefs are related to the monthly trading volume and to increases in trading volume around information events such as earnings announcements.

The findings from forecast dispersion studies suggest avenues for future research. In their model of analyst uncertainty, Barron et al. (1998) assume constant precision of private information across all analysts. Future work might derive implications for analyst uncertainty and market trading when this restrictive assumption is relaxed.[13] Future research might also extend Barron et al. (2002a) to connect the Barron et al. (1998) uncertainty measures to firms' disclosure practices. For example, Byard and Shaw (2003) find that analyst forecast distributions for firms with a reputation for providing higher quality disclosures reflect a greater precision of both analysts' common and idiosyncratic (private) information. Finally, an interesting research puzzle arising from recent research is why securities with high (low) earnings forecast dispersions earn negative (positive) returns if forecast dispersion is a risk proxy. Conflicting evidence in Diether et al. (2002), Johnson (2004), and Doukas et al. (2006) provides some preliminary insight into this issue, but further research is needed.

### *3.3. The information content of analyst research*

#### *3.3.1. Questions addressed since 1992*

As shown in Table 3, researchers have investigated a number of questions since 1992 related to the information content of analysts' research output, including:

1. How informative are analysts' short-term earnings forecasts? (Panel A);
2. How informative are analysts' annual earnings growth forecasts? (Panel B);
3. Do forecasts of earnings components provide information incremental to forecasts of earnings? (Panel C); and
4. How informative are the various components of analyst research reports? (Panel D).

[12] Analysts may issue similar forecasts (i.e., appear to herd) because they possess the same information. However, in a study of stock recommendations, Welch (2000) finds evidence that herding towards the consensus is not information driven.

[13] Gu (2004) relaxes this assumption and provides generalized measures of analysts' common and private information based on observable forecasts.

Table 3
Selected Papers Addressing Questions Related to the Information Content of Analyst Research (Section 3.3)

| Reference | Method | Key result |
|---|---|---|
| *Panel A. Research Question 3.3.1: How informative are analysts' short-term earnings forecasts?* | | |
| Datta and Dhillon (1993) | Archival, I/B/E/S, 1984-1990. | Like the stock market, bond market reactions are positively related to the unexpected component in quarterly earnings. Bondholders react like stockholders to new information regarding future cash flows. |
| Wiedman (1996) | Archival, I/B/E/S, 1988-1991. | The factors associated with superior accuracy of analysts' earnings forecasts relative to forecasts from seasonal random walk time-series models are similarly associated with the superiority of analysts' forecasts as proxies for the market's earnings expectations. |
| Walther (1997) | Archival, Zacks, 1980-1995. | This study finds no relationship (a strong relationship) between *ex post* forecast accuracy (investor sophistication) and the degree to which the consensus analyst earnings forecast outperforms forecasts from seasonal random walk time-series models as proxies for the market's earnings expectations. |
| Conroy et al. (1998) | Archival, Toyo Keizai, 1985-1993. | Analyst forecast errors are value relevant for Japanese securities, but less so than management forecast revisions from prior consensus forecasts. The value relevance of management forecasts was greater after the Tokyo Exchange bubble of the late 1980s. |
| Park and Stice (2000) | Archival, I/B/E/S, 1988-1994. | During the 30 days prior to a firm's quarterly earnings announcement, the market responds more strongly to forecast revisions by analysts with relatively high firm-specific forecast accuracy track records over the most recent two years. |
| Bonner et al. (2003) | Archival, Zacks, 1991-1999 (Brunswick Lens Model Matching Index). | For firm quarters with more sophisticated investors (i.e., relatively high analyst following, institutional investor interest and trading volume), the market's response to individual analyst forecast revisions better reflects factors affecting individual analyst forecast accuracy. |
| Clement and Tse (2003) | Archival, I/B/E/S, 1994-1998. | The market's response to analysts' earnings forecast revisions depends on factors *inversely* related to forecast accuracy; in particular, days elapsed since the last forecast and forecast timeliness. |
| Battalio and Mendenhall (2005) | Archival, I/B/E/S, 1993-1996. | Large volume traders respond to analyst forecast errors, while small volume traders do not. The results suggest that small volume (less sophisticated) traders drive post earnings announcement drift. |
| Chen et al. (2005) | Archival, Zacks, 1990-2000. | The market's response to analysts' forecast revisions is consistent with investors learning about analysts' forecasting ability in a Bayesian fashion as more observations of past forecast accuracy become available. |
| Cheng et al. (2006) | Archival, Thomson Financial/Nelson's Information *Directory of Fund Managers*, 2000-2002. | Self-reported weights placed by fund managers on buy-side versus sell-side analysts' research increase with sell-side analysts' average earnings forecast errors, where forecast errors are computed with reference to the earliest consensus forecast of current year earnings. |
| Gu and Xue (2006) | Archival, First Call, 1989-2002. | Independent analysts provide forecasts that are relatively better proxies for the market's earnings expectations, particularly in cases of bad news; and independent analysts apparently play a disciplining role, as non-independent analysts produce forecasts that are more consistent with market expectations when independent analysts follow the same firm. |
| Frankel, Nanda, and Wang (2006) | Archival, I/B/E/S, 1995-2002. | Forecast revisions are most informative when potential brokerage profits are higher, and less informative when processing costs are high, consistent with the supply and demand for information impacting the informativeness of analyst reports. |
| *Panel B. Research Question 3.3.2: How informative are analysts' annual earnings growth rate forecasts?* | | |
| Frankel and Lee (1998) | Archival, I/B/E/S, 1975-1993. | Analysts' forecasts of the current year *EPS*, next year's *EPS* and the following three years' *EPS* growth rates contribute significantly to models explaining the cross-section of current year price-to-book ratios. |
| Liu and Thomas (2000) | Archival, I/B/E/S, 1981-1994. | Returns-earnings regression $R^2$ can be improved dramatically by including revisions in analysts' forecasts of next year or two-year-ahead earnings. More modest incremental improvements result from including revisions in analysts' long-term growth forecasts. |

Table 3 (*continued*)

| Reference | Method | Key result |
|---|---|---|
| *Panel B. Research Question 3.3.2: How informative are analysts' annual earnings growth rate forecasts?* | | |
| Claus and Thomas (2001) | Archival, I/B/E/S, 1985-1998. | The authors estimate a 3% market risk premium implied by current prices, current book values, current dividend payout ratios, and forecasted 5-year earnings growth. This estimate is much lower and more realistic than estimates based on historical returns on equity securities. |
| Gebhardt, Lee, and Swaminathan (2001) | Archival, I/B/E/S, 1979-1995. | This study combines forecasts of earnings over 5 years s with dividend payout and terminal value assumptions to derive a firm-specific implied cost of equity capital that can be explained and predicted by risk proxies, including industry membership, B/M ratio (+), forecasted long-term growth rate (+), and analyst earnings forecast dispersion (-). |
| Begley and Feltham (2002) | Analytical and archival -empirical, I/B/E/S, 1988-1997. | Analysts' implied one- and especially two-year-ahead abnormal earnings forecast revisions effectively proxy for persistence of revenues from prior investments and investment opportunities, respectively, in an earnings-based valuation model. |
| Liu, Nissim, and Thomas (2002) | Archival, I/B/E/S, 1982-1999. | Forward earnings forecasts provide the best explanations among considered value drivers, implying that future expectations, relative to historical performance, drive prices. |
| Baginski and Wahlen (2003) | Archival, I/B/E/S 1990-1998. | Historical earnings volatility is a powerful variable in explaining implied firm-specific risk premia. |
| Gode and Mohanram (2003) | Archival, I/B/E/S, 1984-1998. | The firm-specific implied cost of equity capital can be explained and predicted by risk proxies, including $\beta$, unsystematic risk, earnings variability, leverage and size. |
| Easton (2004) | Archival, I/B/E/S 1981-1999. | Analysts' short-term earnings growth rate forecasts effectively proxy for *ex ante* risk estimates. |
| Botosan and Plumlee (2005) | Archival, Value Line, 1983-1993. | The information in generally accepted risk factors is captured by two simple cost of capital estimates: (1) expected return implied by analysts' dividend and price forecasts over a five-year forecast horizon; and (2) the price-deflated square root of a fraction equal to analysts' forecasts of *EPS* growth between years four and five of the five-year forecast horizon. |
| Cheng (2005) | Archival, I/B/E/S, 1991-2000. | Analysts' consensus forecasts of firms' next year earnings and long-term (3-5 year) earnings growth rates contribute significantly (and incrementally) to a model explaining the cross-sectional variation in firms' market-to-book ratios. |
| Easton and Monahan (2005) | Archival, I/B/E/S, 1981-1998. | Approaches combining earnings and long-term growth rate forecasts with current stock prices to infer expected returns are generally unreliable due to low-quality analysts' earnings forecasts, particularly when long-term growth rate forecasts are high (and *ex post* forecast accuracy is low). |
| *Panel C. Research Question 3.3.3: Do forecasts of earnings components provide information incremental to forecasts of earnings?* | | |
| DeFond and Hung (2003) | Archival, I/B/E/S, 1993-1999. | Analysts provide cash flow forecasts to fill an information gap when earnings have low quality or decision-relevance. The long window returns-earnings association is lower among firms with cash flow forecasts, and returns around the earnings announcement date are positively associated (not associated) with cash flow forecast errors (earnings forecast errors). |
| Ertimur, Livnat, and Martikainen (2003) | Archival, I/B/E/S, 1996-2001. | Relative to time-series models, analysts' forecasts provide better proxies for market expectations of both revenues and expenses. Relative to value firms, growth firms have larger revenue and expense response coefficients; the response to earnings surprise is more sensitive to conflicting or confirming signs of revenue surprise; and the market response to barely meeting analysts' expectations is more sensitive to whether revenues met expectations. |
| Melendrez, Schwartz, and Trombley (2005) | Archival, I/B/E/S, 1993-2001. | The authors derive unexpected accruals from analysts' earnings and cash flow forecasts and actuals, and find that the market overprices accruals, particularly for loss firms. |
| McInnis and Collins (2006) | Archival, I/B/E/S, 1993-2004. | Firms making both cash flow and earnings forecasts also implicitly forecast accruals. Accruals are of higher quality when accompanied by both cash flow and earnings forecasts. |
| *Panel D. Research Question 3.3.4: How informative are the various components of analysts' research reports?* | | |
| Broughton and Chance (1993) | Archival, Value Line Options, 1983-1985. | The combined call option and stock rankings have information content, but Value Line's prescribed strategy of investing in call options does not yield abnormal returns. |
| Hirst et al. (1995) | Experiment with 291 graduate business student subjects. | Investors' judgments about a stock are influenced by the strength of the arguments in the analyst report when accompanied by unfavorable recommendations. |

(continued on next page)

Table 3 (*continued*)

| Reference | Method | Key result |
|---|---|---|
| *Panel D. Research Question 3.3.4: How informative are the various components of analysts' research reports?* | | |
| Francis and Soffer (1997) | Archival, Investext, 1988-1991. | Stock recommendation *revisions* contain information incremental to the information in earnings forecast revisions, and investors place a significantly larger weight on earnings forecast revisions accompanied by buy versus both sell and hold recommendations. |
| Kim, Lin, and Slovin (1997) | Archival, DJ News Wire, ISSM, 1991. | The market responds very quickly (within 15 minutes) to private information in initial coverage buy recommendations issued by analysts. |
| Brav and Lehavy (2003) | Archival, First Call, 1990-2002. | The market reacts incrementally to target price revisions, controlling for its reaction to stock recommendations and earnings forecast revisions. |
| Ivkovic and Jegadeesh (2004) | Archival, I/B/E/S, 1990-2002. | Analysts' upward (but not downward) stock recommendations and quarterly earnings forecast revisions shortly before earnings announcements contain more new information than forecast revisions shortly after earnings announcements. |
| Asquith, Mikhail, and Au (2005) | Archival, Investext, 1997-1999. | Earnings forecast revisions, stock recommendations, target price revisions and a coding of the strength of the analysts' (positive or negative) arguments in support of the stock recommendations combine to explain 25% of the variation in returns around the release of analysts' research reports. The target price and strength of arguments variables appear to have the strongest price impacts. |
| Boni and Womack (2006) | Archival, I/B/E/S, 1996-2002. | Analyst recommendation changes lead to more profitable trading strategies within industries than across industries, suggesting that analysts are able to distinguish performance within industry, but are not good predictors of sector/industry performance. |
| Green (2006) | Archival, First Call, 1999-2002. | Early access to analyst recommendation changes enables profitable trades for brokerage firm clients. For NASDAQ stocks, early access to recommendation changes from the top 16 brokerage firms suggests that brokerage clients profit from analyst recommendation advice if they act prior to its public dissemination. |

These questions are addressed almost exclusively using archival empirical methods and drawing data from I/B/E/S or First Call.[14] One study (Conroy, Harris, & Park, 1998) relies on Toyo Kezai data (for forecasts related to Japanese firms), and one study (Cheng et al., 2006) relies on Nelson's Directory of Fund Managers to assess the relative weights placed on buy-side versus sell-side analyst research. We found one experimental study (Hirst, Koonce, & Simko, 1995) addressing the information contained in narrative sections of analyst reports; and we found one study (Begley & Feltham, 2002) that develops an analytical model distinguishing between the information contained in analysts' short- and long-term forecasts.

### *3.3.2. Suggestions for further research related to the information content of analyst research*

In an efficient market, stock prices should reflect the best (most accurate) information available at any point in time. The most recent research focusing on the information content of analysts' short-term earnings forecasts (Table 3, Panel A) relates to a question emerging from O'Brien (1988): why are accuracy and association not two sides of the same coin? Wiedman (1996) and Walther (1997) come to different conclusions. Wiedman (1996) finds that common factors drive both analyst forecast accuracy and the association between analysts' forecasts and stock prices. Walther (1997), on the other hand, finds that investor sophistication, not forecast accuracy, explains the degree to which analyst expectations (relative to time series model forecasts) effectively proxy for market expectations. However, this begs the question: if not for greater accuracy, why would more sophisticated investors rely on sell-side analysts' earnings forecasts? Clement and Tse (2003) find that the market weights the forecast horizon and the number of days elapsed since the last forecast variables positively when responding to individual analysts' forecast revisions, whereas an accuracy prediction model weights them negatively. Analysts issuing forecasts earlier in a sequence (either the first after a public announcement or the first after a long information gap) are likely to have incentives to trade off accuracy for timeliness in order to have more

[14] A few studies rely on Zacks data (Walther, 1997; Bonner, Walther, & Young, 2003; Chen, Francis, & Jiang, 2005), but these studies could be replicated using I/B/E/S data.

impact on the market's earnings expectations. Future research should consider uncertainty resolution as a key ingredient in explaining the variation in the market's response to earnings forecast revisions.[15] More generally, whether, and to what degree, other factors, in addition to (or instead of) forecast accuracy, affect the marginal investor's reliance on one model or another in forming earnings expectations remains an interesting avenue for further research.

In addition, some recent evidence suggests that independent analysts provide forecasts that are relatively better proxies for the market's earnings expectations, particularly in cases of bad news; and also that independent analysts apparently play a disciplinary role, as non-independent analysts produce forecasts that are more consistent with market expectations when independent analysts follow the same firm (Gu & Xue, 2006). These results suggest the need for further research into the respective roles of independent and non-independent analysts in financial markets.

The studies listed in Table 3, Panel B, that combine analysts' long-term earnings forecasts with earnings-based valuation models to infer firms' costs of equity capital depend critically on the assumption that analysts' earnings and/or price forecasts mirror the market's expectations (Botosan & Plumlee, 2005). An important corollary to this assumption is that the current stock price mirrors the analyst's assessment of the firm's intrinsic equity value. Since analysts are in the business of identifying mispriced stocks, this corollary is unlikely to hold.[16] Research regarding divergence between analyst and market expectations can help future studies to evaluate various approaches to estimating the cost of equity capital, make appropriate adjustments to analysts' forecasts, or choose sub-samples where the critical assumption of similar analyst and market expectations is most likely to hold.

As described in Table 3, Panel C, relatively little research has investigated the information contained in analysts' forecasts of earnings components. Ertimur et al. (2003) provide evidence that analysts' revenue forecasts reflect market expectations, and revenue surprise informs the market's response to earnings surprise. Similarly, DeFond and Hung (2003) find that analysts' cash flow forecasts provide useful information when earnings lack quality or relevance. Future research might consider that the difference between analysts' earnings and cash flow forecasts provides a forecast of accruals.[17] For example, researchers might derive unexpected accruals by comparing these accruals forecasts to the actual accrual component of the reported earnings, and use these unexpected accrual estimates to study the degree to which the market uses the information in accruals to assess earnings persistence.[18]

As shown in Table 3, Panel D, researchers have begun examining various components of analyst research reports, and, as described below, many important questions remain unanswered. Francis and Soffer (1997) find that the market responds more strongly to earnings forecast revisions accompanied by buy (versus hold or sell) recommendations. The authors argue that because analysts bias recommendations upward, investors turn to earnings forecast revisions for more information when analysts issue buy or strong buy recommendations. However, Hirst et al. (1995) make the opposite argument. They hypothesize that skepticism about a recommendation extends to other information in the research report and, in an experimental setting, they find that subjects expend effort in analyzing other information in analyst research reports only when analysts' stock recommendations are unfavorable or are revised downward. Asquith et al. (2005) report archival evidence consistent with the Hirst et al. (1995) prediction. They find a higher correlation between the strength of analysts' remarks and returns around the release of analyst reports containing recommendation downgrades, as opposed to reiterations or recommendation upgrades.

To reconcile these three studies, we offer a slightly different perspective on investor perceptions of information credibility. Each study considers investor response to information incremental to the recommen-

[15] Chen et al. (2005) evaluate the market response to individual analyst forecast revisions, and include empirical proxies of the market's prior assessment of the analyst's forecasting ability, but do not include variables to proxy for the precision of the market's prior earnings expectations.

[16] We are grateful to Jake Thomas for discussions leading us to this insight.

[17] McInnis and Collins (2006) observe that firms making both cash flow and earnings forecasts also implicitly forecast accruals, and the paper's evidence suggests that accruals are of higher quality when accompanied by both cash flow and earnings forecasts.

[18] We are grateful to one of the referees, who pointed out that a working paper by Melendrsez et al. (2005) derives unexpected accruals in the manner suggested above, and finds that the market overprices accruals, particularly for loss firms.

dation. However, the incremental information variable in Francis & Soffer (1997) is an earnings forecast revision, whereas the other two studies consider strength of arguments variables. Analysts' reputations often depend on their earnings forecast accuracy, and records of forecast accuracy are carefully maintained by interested observers, whereas the strength of arguments variable is harder to measure and verify. For these reasons, investors may view earnings forecast revisions as being more credible than the strength of analysts' remarks in support of buy recommendations. On the other hand, given analysts' incentives to bias recommendations upward, investors may attach more credibility to analysts' *arguments* in support of hold and sell recommendations. Further empirical research (both experimental and archival) could enhance our understanding of the interaction between the type of recommendation and investors' usage of other information in analyst research reports.[19]

Brav & Lehavy (2003) find that only two-thirds of all analyst reports include target prices, and reports containing buy or strong buy recommendations are more likely to contain target price forecasts. The authors speculate that analysts may provide target prices to stimulate the purchase of equity securities in conjunction with buy recommendations, and that lowering price targets to stimulate sell orders could jeopardize already strained relationships with the managers of the firms followed.[20] These conjectures warrant examination in further research.

The two most prominent summary statistics associated with equity securities are earnings per share and stock price. Studies like Brav & Lehavy (2003), which examine the informativeness of target price forecast revisions, conditional on the informativeness of earnings forecast revisions, potentially provide insight into analyst expertise in modeling the relationship between earnings and equity value. Opening the black box containing the process by which analysts convert earnings forecasts into price forecasts could provide interesting insights into the valuation models that are most relevant to investors and into the allocation of scarce resources in capital markets. However, the persistent explanatory power of the earnings variable with the target price variable in the regression suggests that the market's translation of earnings forecasts into current equity value differs from analysts', or the combination of analysts' price and earnings forecasts proxies for an unknown risk factor. An interesting question for future research is why earnings forecast revisions are significantly related to returns, conditional on both recommendations and target prices.

Asquith et al. (2005, p. 259) note that the earnings forecast revision and strength of arguments variables are highly correlated, and that "this relation suggests that positive (negative) earnings forecast revisions are generally supported by more optimistic (pessimistic) analyst statements." This begs the question as to the interactive effect of the strength of arguments variable on the market's reaction to earnings forecast revisions. Finally, it is not clear what analysts attempt to communicate through their stock recommendations. In particular, what does a reiteration of a strong buy or a downgrade from a strong buy to a buy really mean? In the Asquith et al. sample, when analysts reiterated a strong buy, the target price forecast increased by only 1%, on average. Why would analysts reiterate a strong buy when they only increase their target price forecast by 1%? One explanation might be that the market price has not yet increased from the last strong buy recommendation, and therefore analysts still view the firm as undervalued. However, Francis & Soffer (1997) find that the change in the recommendation has a significant contemporaneous association with returns after controlling for the level of the recommendation. Future research will perhaps shed more light on the

[19] Similarly, Brav and Lehavy (2003) find that when analysts revise a recommendation in a direction opposite to (same as) the direction of the target price revision, the association between returns and the recommendation revision declines (increases) dramatically. In addition, the evidence indicates a significantly larger market response to target price forecast revisions accompanied by corroborating downward (versus upward) earnings forecast revisions. Understanding the interactive effects between all combinations of the three variables warrants further research.

[20] Research also suggests that analysts generate more trading commissions with buy than sell recommendations (e.g., Irvine, 2004; Hayes, 1998) (described in our Table 5). One explanation is that the population of investors who already hold a particular stock is smaller than the population that could potentially buy the stock. While short selling alleviates this problem, short selling constraints (e.g., higher transaction costs) create incentives for analysts to issue more buy than sell recommendations in order to maximize trading commissions. Assuming costly consequences of inaccurate target prices, analysts are more likely to use target prices to justify buy recommendations.

nature of the information in recommendation *changes* that is not subsumed by the information in recommendation *levels*.[21]

### *3.4. Market and analyst efficiency*

#### *3.4.1. Questions addressed since 1992*

A number of studies have examined analysts' forecasts as a means to understanding the broader issue of whether investors respond to new information efficiently.[22] Analysts have long been viewed as sophisticated processors of financial information who are less likely (than naïve investors) to misunderstand the implications of financial information. Thus, evidence of inefficient information processing by analysts is seen as strong evidence of overall inefficiency by market participants. A second reason for examining analysts' forecasts for possible biases is that evidence of market inefficiency based on "abnormal" stock returns is always open to the criticism that the expected return benchmark used in measuring abnormal returns may be misspecified (Fama, 1998). Analysts' forecasts do not suffer from benchmark issues, and thus provide an avenue for mitigating the criticism that evidence of information processing inefficiencies is due to an omitted risk factor.

As shown in Table 4, we have classified the research since 1992 related to market and analyst inefficiency into four sub-questions:

1. Do analysts' forecasts and recommendations efficiently reflect the information in earnings? (Panel A);
2. Do analysts' forecasts and recommendations efficiently reflect information from sources other than earnings? (Panel B);
3. Do stock prices efficiently reflect the information in analysts' forecasts and recommendations, and other information in analyst research reports? (Panel C); and
4. Do analysts' earnings forecasts explain inefficiencies in stock prices with respect to publicly available information? (Panel D).

#### *3.4.2. Suggestions for further research related to market and analyst efficiency*

Regarding the first two questions (Panels A and B), most of the research to date has concluded that analysts underreact to information. The general approach to demonstrating analyst inefficiency is to show that analyst forecast revisions are positively related to the errors in their revised forecasts. In other words, errors in analyst forecasts, on average, are in the same direction as their prior revisions, suggesting that the revisions are incomplete. The research since 1992 has documented analyst underreaction to a wide range of accounting and other economic information. However, not all studies conclude that analysts underreact to information. Easterwood and Nutt (1999) report that inefficiency in analysts' forecasts is not characterized by a uniform overreaction or underreaction to information, but is more appropriately described as general optimism. Specifically, analysts seem to overreact (underreact) to good (bad) news in prior year earnings, which is consistent with incentive-based explanations of analyst optimism. While this finding is consistent with incentive-driven analyst behavior, the sensitivity of the results to truncation rules warrants future research.[23] The systematic errors in analysts' earnings forecasts documented thus far could be attributed to the inefficient processing of information, or could be due to analysts' incentives. We defer a discussion of the research in support of incentives arguments until Section 3.5.

A potentially fruitful area of future research is to investigate analyst ability to anticipate and adjust

[21] Asquith et al. (2005) report that in their sample (1997-99), analysts' reports rarely include prior forecasts and recommendations. Francis and Soffer (1997) report that about half of the reports in their sample (1989-1991) include the analysts' prior earnings forecast and recommendation. This raises the question as to the factors, apart from sample period, that explain analysts' decisions to include comparison forecasts and recommendations from prior reports.

[22] If analysts revise forecasts efficiently in response to new information, then the error in their revised forecasts should be unrelated to that information. A positive (negative) relationship between the information item and the revised forecast error (actual minus forecast) will imply under-reaction (over-reaction) by analysts with respect to the new information.

[23] Some papers note that the findings of Easterwood and Nutt (1999) do not appear to be robust and are sensitive to the treatment of outliers (Mikhail, Walther, & Willis, 2003). Abarbanell and Lehavy (2003) caution that tests of over/underreaction by analysts are affected by the distributional properties of analyst forecast errors. In a recent working paper, Gu and Xue (2005) report that the overreaction to good news documented by Easterwood and Nutt disappears when they control for earnings uncertainty.

Table 4
Selected Papers Addressing Questions Related to Market and Analyst Efficiency (Section 3.4)

| Reference | Method | Key results |
|---|---|---|
| *Panel A. Research Question 3.4.1: Do analysts' forecasts and recommendations efficiently reflect the information in earnings?* | | |
| Chan, Jegadeesh, and Lakonishok (1996) | Archival, I/B/E/S, 1977-1993. | Analysts' forecasts, like returns, respond in a delayed fashion to news in earnings announcements, particularly for firms that have performed poorly in the past. |
| Easterwood and Nutt (1999) | Archival, I/B/E/S, 1982-1995. | Analysts underreact to negative information but overreact to positive information. The authors interpret this to mean that analysts are systematically optimistic in response to new information. |
| Darrough and Russell (2002) | Archival, I/B/E/S, 1987-1999. | Bottom-up analysts, who forecast earnings for individual firms, are more optimistic than top-down analysts, who forecast earnings for market indices, possibly due to incentives or cognitive biases. |
| Mikhail et al. (2003) | Archival, Zacks, 1980-1995. | Analysts underreact less to past earnings information when they have greater experience, implying that inefficiency decreases with experience. Contrary to Easterwood and Nutt (1999), the authors are unable to document analyst overreaction. |
| Gu and Xue (2005) | Archival, First Call, 1989-2002. | When uncertainty is high, analyst overreaction to extreme good news is a rational response and is not necessarily due to cognitive bias. Analyst overreaction to good news is not evident after controlling for earnings uncertainty. |
| Zhang (2006) | Archival, I/B/E/S, 1983-2001. | Positive (negative) forecast errors and forecast revisions follow good (bad) news when greater uncertainty is present, proxied by dispersion. The results support an underreaction hypothesis. |
| *Panel B. Research Question 3.4.2: Do analysts' forecasts and recommendations efficiently reflect information from sources other than earnings?* | | |
| Stickel (1993) | Archival, Zacks, 1981-1985. | Updated forecasts based on information in forecast revisions are less biased and more accurate than other frequently cited measures. |
| Bartov and Bodnar (1994) | Archival, I/B/E/S, 1983-1988. | Similar to market failure to incorporate the valuation implications of changes in the exchange rate for U.S. multinationals, analyst forecast errors are correlated with changes in currency exchange rates. |
| Elliott, Philbrick, and Weidman (1995) | Archival, I/B/E/S, 1982–1991. | Analysts systematically underweight new information, particularly when revising forecasts downward. |
| Ettredge, Shane, and Smith (1995) | Archival, Value Line and I/B/E/S, 1980-1989. | Analysts' forecast revisions around earnings announcements containing undisclosed overstatements adjust for part of the overstatement amounts, implying that analysts use alternative information to "see through" earnings manipulations. |
| Abarbanell and Bushee (1997) | Archival, I/B/E/S, 1983-1990. | Analyst forecast revisions fail to consider all of the information in fundamental signals related to future earnings, implying that analysts ignore available non-earnings information. |
| Frankel and Lee (1998) | Archival, I/B/E/S, 1975-1993. | Errors in three-year-ahead forecasts are predictable based on past sales growth and market-to-book ratios. |
| Chaney, Hogan, and Jeter (1999) | Archival, I/B/E/S, 1987-1992. | Analysts' forecasts are optimistic in the year subsequent to a restructuring charge, despite downward revisions on average following the charge for that forecast horizon. This finding suggests that analysts do not interpret the future implications of past restructuring charges appropriately. |
| Bradshaw, Richardson, and Sloan (2001) | Archival, I/B/E/S, 1988-1998. | Analysts do not fully adjust forecasts for transitory working capital accruals. There is a negative relationship between those accruals and subsequent earnings forecast errors, suggesting that analysts are not aware that high accruals in one period lead to predictable declines in earnings in subsequent periods. |
| Burgstahler and Eames (2003) | Archival, Zacks, 1986-1996. | The distributions of both earnings forecasts and realizations contain a disproportionate number of observations at or barely above zero, suggesting that firms manage earnings to avoid losses, and analysts anticipate that behavior. However, analysts appear to be unable to identify which firms will manage earnings to avoid losses. |
| Louis (2004) | Archival, I/B/E/S, 1992-2000. | Post-merger forecasts initially do not fully anticipate the earnings reversals resulting from abnormal accruals, but the reversals appear to be reflected in subsequent forecasts made prior to earnings announcements, suggesting that analysts are initially fooled, but are eventually guided to beatable forecasts. |
| Shane and Stock (2006) | Archival, I/B/E/S, 1984-1990. | Analysts' forecasts do not fully reflect firms' incentives to manage their earnings to mitigate taxes. |
| *Panel C. Research Question 3.4.3: Do stock prices efficiently reflect the information in analysts' forecasts and recommendations, or the other information in research reports?* | | |
| Barber and Loffler (1993) | Archival, WSJ 'Dartboard' column picks, 1988-1990. | Expert analyst picks experience high trading volume and positive returns in the days surrounding the publication of the 'Dartboard' column picks. Partial price reversals suggest that "price pressure" creates some overreaction, but the evidence of information-driven price reactions remains. |

Table 4 (*continued*)

| Reference | Method | Key results |
|---|---|---|
| *Panel C. Research Question 3.4.3: Do stock prices efficiently reflect the information in analysts' forecasts and recommendations, or the other information in research reports?* | | |
| Womack (1996) | Archival, First Call, 1989-1991. | Post-event drifts following both “buy” and “sell” recommendations exist, but they are larger and more sustained for sells, suggesting that the market does not fully incorporate the information in “sell” recommendations. |
| Frankel and Lee (1998) | Archival, I/B/E/S, 1975-1993. | Valuation estimates based on consensus forecasts are good predictors of future stock returns, especially over longer horizons, implying that current market prices do not fully reflect the information in analysts’ forecasts. |
| Guerard, Blin, and Bender (1998) | Archival, I/B/E/S, 1988-1997. | A technique that creates a “market-neutral portfolio” and relies on a proprietary quadratic form of I/B/E/S earnings forecasts improves predictions of subsequent returns in Japanese and U.S. portfolios relative to those relying on only a value component. |
| Choi (2000) | Archival, Value Line, 1965-1996. | Value Line recommendations result in unexpected returns relative to benchmarks, controlling for post-earnings-announcement drift. However, trading profits are unlikely after transaction costs. |
| Barber, Lehavy, McNichols, and Trueman (2001) | Archival, Zacks, 1985-1996. | A trading strategy based on buying (selling short) stocks with the most (least) favorable stock recommendations yields annual abnormal returns of over 9%. However, net returns are insignificant once transaction costs are taken into account. |
| Ramnath (2002) | Archival, I/B/E/S, 1986-1995. | Analysts’ forecast revisions for later-announcers partially incorporate information from the first earnings announcement in the industry. Stock prices of later-announcers do not fully reflect the information from the first earnings announcement. |
| Ali, Hwang, and Trombley (2003) | Archival, I/B/E/S, 1975-1993. | After controlling for risk factors, this paper confirms the Frankel and Lee (1998) evidence that stock prices do not fully reflect the information in analysts’ forecasts. |
| Gleason and Lee (2003) | Archival, I/B/E/S, 1993-1998. | Investors underreact to analysts’ earnings forecast revisions, particularly in cases of high innovation (i.e., movement away from the consensus), low analyst profile, and low analyst coverage. |
| Barth and Hutton (2004) | Archival, I/B/E/S, 1981-1996. | A trading strategy that simultaneously exploits the accrual anomaly and the forecast revision anomaly yields annual returns of over 28%. The returns from the combined strategy are greater than the returns from either strategy individually. |
| Mendenhall (2004) | Archival, I/B/E/S, 1991-2000. | Post-earnings-announcement drift is an underreaction to information in earnings that persists because arbitrage risk and, to a lesser extent, transaction costs preclude arbitrageurs from bidding it away. |
| Mikhail, Walther, and Willis (2004) | Archival, Zacks, 1985-1999. | Analysts making more profitable recommendation changes in the past also do so in the future. The market recognizes superior recommendation ability, as the market response is stronger to both superior analyst upgrades *and* downgrades, but the response by the market is incomplete. |
| Li (2005) | Archival, I/B/E/S, 1993-2000. | Individual analysts are persistent in making superior recommendations (more so for buy than sell). The market does not fully incorporate the information in superior analysts’ recommendations. |
| Livnat and Mendenhall (2006) | Archival, I/B/E/S, 1987-2003. | The magnitudes of post-earnings announcement drift are greater when earning surprise is defined using I/B/E/S data versus Compustat earnings and seasonal random walk expectations. The return pattern at subsequent earnings announcement dates related to forecast errors differs depending on the definition of earnings surprise. |
| Loh and Mian (2006) | Archival, I/B/E/S, 1994-2000. | Monthly abnormal returns on hedge portfolios based on recommendations of analysts in the top (bottom) quintile of earnings forecast accuracy are, on average, approximately 0.74% (−0.53%). |
| Sorescu and Subrahmanyam (2006) | Archival, I/B/E/S, 1993-2002. | Short-term price reactions to recommendation revisions are larger for more reputed and more experienced analysts. In the long run, smaller (larger) recommendation revisions by analysts with high (low) reputations and more (less) experience are followed by stock price drift (reversals). |
| *Panel D. Research Question 3.4.4: Do analysts' earnings forecasts explain inefficiencies in stock prices with respect to publicly available information?* | | |
| La Porta (1996) | Archival, I/B/E/S, 1982-1990. | Returns to “value” stocks appear high because investors (proxied by analysts) underestimate future performance, not because these stocks are inherently more risky. The results are consistent with an errors-in-expectations explanation, and imply that a reversal of analyst forecast errors impacts security prices. |
| Dechow and Sloan (1997) | Archival, I/B/E/S, 1981-1993. | Over half of the returns to contrarian strategies are due to investors’ naïve incorporation of analysts’ optimistic long-term growth forecasts. |

(continued on next page)

Table 4 (*continued*)

| Reference | Method | Key results |
|---|---|---|
| *Panel D. Research Question 3.4.4: Do analysts' earnings forecasts explain inefficiencies in stock prices with respect to publicly available information?* | | |
| Rajan and Servaes (1997) | Archival, I/B/E/S, 1975-1987. | Analysts' forecasts of earnings and growth are more optimistic for IPO firms than for matched firms. Future stock performance is negatively related to optimism in growth forecasts. |
| Dechow, Hutton, and Sloan (1999) | Archival, I/B/E/S, 1976-1995. | Analysts' year-ahead earnings forecasts fail to fully account for mean-reversion in the abnormal earnings component of current year earnings, and this error is reflected in stock prices, suggesting that investors do not adjust for predictable errors in analyst forecasts. |
| Billings and Morton (2001) | Archival, I/B/E/S, 1981-1995. | Both bias and lag components of book-to-market ratios explain future returns, but the lag component dominates and explains most of the book-to-market anomaly. The results imply that forecast revisions explain most of the returns anomaly. |
| Shane and Brous (2001) | Archival, Value Line, 1977-1986. | Underreaction in analysts' earnings forecasts with respect to the information in earnings announcements explains about 50% of the post-earnings-announcement drift. The market and analysts also appear to underreact similarly to non-earnings surprise information leading to predictable returns and analysts' earnings forecast revisions. |
| Bradshaw and Sloan (2002) | Archival, I/B/E/S, 1985-1997. | The incidence and magnitude of differences between "GAAP" and "street" earnings increase dramatically and market prices increasingly reflect "street numbers" over the sample period. |
| Doukas, Kim, and Pantzalis (2002) | Archival, I/B/E/S, 1976-1997. | Inconsistent with La Porta (1996), the evidence from analyst forecast errors and forecast revisions fails to support the hypothesis that analysts are unduly pessimistic (optimistic) about "value" ("glamour") stocks. |
| Ikenberry and Ramnath (2002) | Archival, I/B/E/S, 1988-1997. | Analysts' forecasts do not appear to incorporate the positive signal of future performance conveyed by stock-split announcements, implying that analyst underreaction contributes to the market underreaction to stock split information. |
| Teoh and Wong (2002) | Archival, I/B/E/S, 1975-1990. | Analysts do not fully adjust earnings forecasts for past abnormal accruals. Accruals-related predictable errors in analyst forecasts explain post-issue underperformance of equity issuers. |
| Elgers, Lo, and Pfeiffer (2003) | Archival, I/B/E/S, 1989-1998. | Analysts' earnings forecasts explain at most about 40% of the market's underestimation of the transitory component in working capital accruals. |
| Kadiyala and Rau (2004) | Archival, I/B/E/S, 1984-1994. | Using earnings surprises as a measure of pre-event information, long-run market returns following corporate events (e.g., SEOs, acquisitions, and repurchases) are most consistent with investor *underreaction* to pre-event information and information in the corporate event announcement. |
| Purnanandam and Swaminathan (2004) | Archival, I/B/E/S, 1980-1997. | IPOs that are overvalued (based on the offer price) tend to have more optimistic long-term growth forecasts (after the IPO date) and more negative long-run returns, relative to undervalued IPOs. |
| Jackson and Johnson (2006) | Archival, I/B/E/S, 1983-1999. | Momentum in returns and post-event drift is manifest only if they are coincident with changes in earnings and earnings growth forecasts. After purging both sets of forecasts of their predictable components, no relationship between adjusted forecasts and abnormal returns remains, implying that subsequent returns follow fundamental (earnings) news which explains momentum. |

forecasts for the effects of firms' incentives to manage earnings. Ettredge et al. (1995) provide evidence that analysts use alternative information to effectively adjust their forecasts for approximately 20% of the current earnings surprise effects of earnings misstatements (which later result in prior period adjustments). Burgstahler and Eames (2003) find that analysts' forecasts reflect a general awareness of firms' incentives to manage earnings in order to barely avoid reporting losses, but the study finds no evidence that analysts can anticipate *which* firms will engage in this behavior. In the context of the Tax Reform Act of 1986, Shane and Stock (2006) find little evidence that analysts anticipate or adjust for the earnings effects of firms' incentives to shift their income from higher to lower tax rate years. Future research might continue these investigations into the ability of analysts to anticipate and adjust for the earnings effects of firms' earnings management incentives in various contexts.

Future research might also develop and test hypotheses explaining the cross-sectional variation in analyst underreaction to information about future earnings, market underreaction to the information embedded in analysts' earnings forecast revisions, and the degree to which inefficiencies in analysts' earnings forecasts explain market inefficiencies. Obviously the context matters, and thus far we have little evidence about the contexts in which we are most likely to find particular forms of information processing inefficiencies.

Regarding the third question in Table 4 (Panel C), some studies demonstrate that investors underreact to analysts' forecast revisions (e.g., Gleason & Lee, 2003), as well as their stock recommendations (e.g., Womack, 1996). Thus, investors seem to be slow in responding, not only to information releases from companies, but also to direct signals from financial analysts. Some studies contend that, while markets may be inefficient with respect to specific pieces of information, like analysts' stock recommendations, exploiting such market inefficiency is unprofitable because of transaction costs (Barber et al., 2001). Nonetheless, it is intriguing that investors continue to systematically underreact to a direct signal, like analysts' recommendations and revisions, despite numerous research studies consistently documenting this phenomenon over a number of years.[24] Explaining such (continued) anomalous behavior on the part of investors is a challenging task for future research.

Inefficiency in analysts' forecasts (Table 4, Panels A and B) is an indication, but not conclusive evidence, of market inefficiency. As described in Table 4, Panel D, a number of studies have considered the relative inefficiency of analysts and investors with respect to specific pieces of information. Most studies find that the stock market is generally more sluggish in incorporating information than financial analysts are. For example, Elgers et al. (2003) find that analysts' forecasts can explain at most 40% of the market's apparent underestimation of the transitory component of current accruals. Thus, analysts at least partially (and more effectively than investors) recognize the difference in the persistence of accrual and cash flow components of earnings. Evidence that investors are less efficient than financial analysts in responding to information is puzzling for a number of reasons. First, incentive-based explanations of analyst bias, such as better access to management, should not explain investor reactions. Second, investors (especially sophisticated investors like financial institutions) have the opportunity to independently (and efficiently) use the same publicly available information that underlies financial analysts' (inefficient) forecasts. Third, investors have the option of adjusting analysts' forecasts for known and widely documented systematic errors. The reason why market prices are relatively less efficient than analysts in various information contexts remains an interesting question for further research.

### 3.5. Analysts' incentives and behavioral biases

#### 3.5.1. Questions addressed since 1992

Analyst forecasting research has evolved considerably since the early work documenting what appeared to be a bias toward optimism in forecasts and recommendations. As shown in Table 5, more recent work has addressed such questions as:

1. How do incentives impact analysts' effort and decisions to follow firms? (Panel A);
2. Do incentives create systematic optimism/pessimism in analysts' forecasts and recommendations? (Panel B);
3. How do management incentives impact communications with analysts, analysts' forecasts, and analysts' recommendations? (Panel C);
4. How does the market consider analysts' incentives in setting prices? (Panel D); and
5. Do economic incentives or behavioral (psychological) biases create an underreaction in analysts' forecasts? (Panel E).

An important distinction between biased forecasts driven by judgment errors as distinct from economic incentives is that the former is non-motive driven, while the latter is motive driven.[25] The principal lines of inquiry since 1992 have considered incentives related to the career concerns of analysts, the underwriting and trading incentives of their employers, and how the incentives of, and communication with, company management influence analyst behavior. As shown in Table 5, in addition to standard archival empirical approaches, researchers have used mathematical modeling, questionnaire surveys, and experimental methods to evaluate these questions.

[24] Givoly and Lakonishok (1979) performed an early study documenting predictable stock returns following analysts' earnings forecast revisions.

[25] We are grateful to a referee for suggesting this distinction.

Table 5
Selected Papers Addressing Questions Related to Analysts' Incentives and Behavioral Biases (Section 3.5)

| Reference | Method | Key results |
|---|---|---|
| *Panel A. Research Question 3.5.1: How do incentives impact analysts' effort and decisions to follow firms?* | | |
| McNichols and O'Brien (1997) | Archival, Research Holdings, 1990-1994. | Analysts cover firms about which they have optimistic views, implying a selection bias in coverage decisions. |
| Hayes (1998) | Mathematical model | Incentives for gathering information are strongest for stocks that are expected to perform well, so forecasts are likely to be more accurate for such stocks. |
| Mikhail, Walther, and Willis (1999) | Archival, Zacks, 1985-1995. | Analyst turnover and earnings forecast accuracy are inversely related, but turnover is not related to stock recommendations, implying that analysts are motivated to issue accurate forecasts. |
| Hong et al. (2000a) | Archival, I/B/E/S, 1983-1996. | Forecast accuracy is directly related to the likelihood of promotion, especially for less experienced analysts. |
| Das, Guo, and Zhang (2006) | Archival, I/B/E/S, 1986-2000. | IPOs with unexpectedly high analyst coverage have better operating and return performance than those with unexpectedly low analyst coverage, suggesting that analysts selectively provide coverage on firms about which expectations are favorable. |
| *Panel B. Research Question 3.5.2: Do incentives create systematic optimism/pessimism in analysts' forecasts and recommendations?* | | |
| Francis and Philbrick (1993) | Archival, Value Line, 1987-1989. | Earnings forecasts are more optimistic for "sell" and "hold" stocks than for "buy" stocks, suggesting that analysts try to maintain relationships with managers when recommendations are negative. |
| Kang, O'Brien, and Sivaramakrishnan (1994) | Archival, Value Line, 1980-1985. | Ex-post optimism bias increases with the forecast horizon, suggesting that forecasting behavior is due to incentives or cognitive biases rather than adaptive adjustment to new information. |
| Dugar and Nathan (1995) | Archival, CIRR and Investext, 1983-1988. | Earnings forecasts and recommendations are relatively optimistic when issued by underwriter analysts. |
| Hunton and McEwen (1997) | Experiment with 60 professional analysts. | Underwriter treatment analysts issue relatively more optimistic forecasts than brokerage treatment analysts, and control group analysts issue the least optimistic forecasts. |
| Das, Levine, and Sivaramakrishnan (1998) | Archival, Value Line, 1989-1993. | Analysts make relatively optimistic forecasts when earnings are least predictable, suggesting that analysts believe that by issuing optimistic forecasts, they obtain better information from managers. |
| Lin and McNichols (1998) | Archival, I/B/E/S, 1989-1994. | Long-term growth forecasts and recommendations made by affiliated underwriter analysts are optimistic relative to non-affiliated analysts. |
| Michaely and Womack (1999) | Archival, First Call, 1990-1991. | Lead underwriter analysts issue more buy recommendations for IPO firms than do unaffiliated analysts. |
| Dechow et al. (2000) | Archival, I/B/E/S, 1981-1990. | All analysts' long-term growth forecasts are optimistic around equity offerings, but affiliated analysts are the most optimistic. |
| Claus and Thomas (2001) | Archival, I/B/E/S, 1985-1998. | Price-deflated forecast errors based on actual earnings minus April forecasts of current year (5-year-ahead) earnings were about 0.78% (3.54%) in 1985 and about 0.15% (0.74%) in 1993. |
| Lim (2001) | Mathematical Model and Archival, I/B/E/S, 1984-1996. | Forecast bias varies predictably as a function of firm size, analyst coverage, company-specific uncertainty and brokerage size, suggesting that analysts may rationally bias forecasts to improve management access and accuracy. |
| Duru and Reeb (2002) | Archival, I/B/E/S, 1995-1998. | Earnings uncertainty, forecasting complexity, the need for management guidance, and forecast optimism increase with corporate international diversification. |
| Eames, Glover, and Kennedy (2002) | Archival, Zacks, 1988-1996. | Contrary to Francis and Philbrick's (1993) results, after controlling for the level of earnings, levels of optimism/pessimism in earnings forecasts are consistent with levels of optimism/pessimism in recommendations. |
| Chan, Karceski, and Lakonishok (2003) | Archival, I/B/E/S, 1982-1998. | I/B/E/S long-term earnings growth forecasts are overly optimistic, and dividend yields are as useful in predicting future earnings as are analyst forecasts. |
| Eames and Glover (2003) | Archival, Value Line, 1987-1999. | After controlling for the level of earnings, there is no relationship between forecast optimism and past predictability (which is not consistent with Das et al., 1998). |
| Hong and Kubik (2003) | Archival, I/B/E/S, 1983-2000. | For underwriter analysts, promotion/demotion depends relatively more on optimism than accuracy, suggesting that analysts have some incentive to issue optimistic forecasts. |
| Irvine (2004) | Archival, I/B/E/S, 1993-1994. | Forecasts departing from the consensus drive trade, but biased forecasts do not. Analysts generate greater trading commissions by issuing optimistic stock recommendations than they do by biasing earnings forecasts, suggesting that analysts have more incentive to bias recommendations. |

Table 5 (*continued*)

| Reference | Method | Key results |
|---|---|---|
| *Panel B. Research Question 3.5.2: Do incentives create systematic optimism/pessimism in analysts' forecasts and recommendations?* | | |
| Jackson (2005) | Survey, Mathematical model, and Archival, I/B/E/S, 1992-2002. | High reputation and analyst optimism generate more trades for employers. Accurate analysts generate higher reputations. Forecast optimism can exist in equilibrium. |
| Malloy (2005) | Archival, I/B/E/S, 1994-2001. | Relative optimism is concentrated in geographically distant, not local, affiliated analyst stock recommendations, and distant analysts are more likely to work at high-status firms with pressure to garner investment banking business. |
| O'Brien, McNichols, and Lin (2005) | Archival, First Call, 1994-2001. | Relative to unaffiliated analysts, affiliated analysts are slower to downgrade recommendations and faster to upgrade recommendations. |
| Cowen, Groysberg, and Healy (2006) | Archival, I/B/E/S and First Call, 1996-2002. | Analysts employed by firms that fund research through underwriting and trading activities issue relatively pessimistic forecasts and recommendations, but brokerage activities are related to forecast optimism, suggesting that optimism is driven by trading versus underwriting incentives. |
| Houston, James, and Karceski (2006) | Archival, Investext, 1996-2000. | During the "bubble period," issue prices of IPO firms were lower than peer firm valuations using "comparable" multiples. In the pre-bubble period, IPO issue prices were higher than comparable firm valuations, but within a month post-IPO target prices were at a premium versus comparables (consistent with investment bankers "low-balling" offer prices during the bubble period). |
| Ljungqvist, Marston, and Wilhelm (2006) | Archival, I/B/E/S, 1993-2002. | Optimistic recommendations do not appear to increase underwriting business. |
| Jacob, Rock, and Weber (in press) | Archival, I/B/E/S, 1995-2003. | Controlling for other factors, affiliated investment bank analysts issue more accurate forecasts than unaffiliated investment bank analysts or non-investment bank analysts. Affiliated analysts' forecasts are no more optimistic than those of other analysts. |
| *Panel C. Research Question 3.5.3: How do management incentives impact communications with analysts, analysts' forecasts, and analysts' recommendations?* | | |
| Francis, Hanna, and Philbrick (1997) | Archival, Corporate presentations to the NYSSA, 1986-1992. | Companies' experience increases in analyst following and positive returns at presentation dates, but analysts' post-presentation forecasts are no more accurate, no less dispersed, and no less biased, suggesting that managers/firms benefit from presentations but analysts do not. |
| Degeorge, Patel, and Zeckhauser (1999) | Archival, Q-Prime, 1974-1984; I/B/E/S, 1984-1996. | The authors provide indirect evidence of earnings/expectations management in the aggregate, noting that the distribution of forecast errors exhibits a discontinuity at zero cents. They report a threshold hierarchy, where reporting positive earnings and earnings greater than the seasonal random walk expectations appears to be more important than meeting analyst forecasts. |
| Libby and Tan (1999) | Experiment with 28 financial analysts. | Consistent with psychological biases, when provided with negative earnings information and warnings simultaneously, analysts made higher future earnings forecasts than analysts provided with warnings and negative earnings information sequentially. |
| Fischer and Stocken (2001) | Mathematical model | The quantity of the information provided by analysts is maximized when analysts receive imperfect information. In other cases, firms communicate directly with investors. |
| Brown (2001a) | Archival, I/B/E/S, 1984-1999. | Over time, median forecast errors have changed, on average, from slightly negative to slightly positive, which is consistent with managers' increased incentives to meet or beat analysts' earnings forecasts. The tendency to just beat forecasts is more prominent for growth firms. |
| Matsunaga and Park (2001) | Archival, First Call, 1993-1997. | CEO annual bonuses are reduced if earnings thresholds are not met for two quarters or more, providing evidence of the incentives managers face to meet earnings forecasts. |
| Bartov, Givoly, and Hayn (2002) | Archival, I/B/E/S, 1983-1997. | A residual market premium for meeting or beating expectations exists, controlling for the total information in a quarter. |
| Kasznik and McNichols (2002) | Archival, I/B/E/S, 1986-1993. | Firms meeting expectations have higher forecasts and realized future earnings, providing a rational explanation for rewards for meeting expectations. |
| Matsumoto (2002) | Archival, Zacks, 1993-1997. | Firms with greater transient institutional ownership, greater reliance on implicit claims, and greater value-relevance of earnings are more likely to meet or beat expectations, providing support for the idea that managers' incentives influence forecasting. |
| Skinner and Sloan (2002) | Archival, I/B/E/S, 1984-1996. | Growth stocks are punished more severely, relative to value stocks, for the same amount of negative earnings surprise, providing incentives for growth firm managers to avoid negative earnings surprises. |

(*continued on next page*)

Table 5 (*continued*)

| Reference | Method | Key results |
|---|---|---|
| *Panel C. Research Question 3.5.3: How do management incentives impact communications with analysts, analysts' forecasts, and analysts' recommendations?* | | |
| Tan, Libby, and Hunton (2002) | Experiment with 149 financial analysts. | Consistent with psychological biases, firms with negative (positive) total news receive the most optimistic earnings forecasts when the pre-announcement overstates (understates) the extent of the news. |
| Brown (2003) | Archival, I/B/E/S, 1984-1999. | Over time, the incidence of slightly missing earnings forecasts has decreased as the negative valuation consequences have amplified, principally for "growth" firms. |
| Richardson, Teoh, and Wysocki (2004) | Archival, I/B/E/S, 1984-2001. | Walk-down to beatable targets is associated with managerial incentives to sell stock (the company's or the managers') after earnings announcements. In these cases analysts tend to issue optimistic forecasts early and slightly pessimistic forecasts late in the forecasting period. |
| Brown and Caylor (2005) | Archival, I/B/E/S, 1985-2002. | Managers' foci shifted from other thresholds towards meeting analysts' earnings expectations in the mid-1990s, as the rewards for doing so became more pronounced. |
| Graham, Harvey, and Rajgopal (2005) | Questionnaire survey of 400+ CFOs. | Managers focus on meeting or beating analysts' forecasts because of stock price implications and concerns about their reputation. Respondents think that an inability to generate a few cents of earnings to beat an earnings benchmark or a downward-guided benchmark are particularly negative signals. |
| Libby, Tan, and Hunton (2006) | Experiment with 95 sell-side analysts. | Analysts' reactions to errors in management guidance are influenced by the guidance form; i.e., wide (narrow) ranges of guidance decrease (increase) the impact of guidance error on forecast revisions. |
| *Panel D. Research Question 3.5.4: How does the market consider analysts' incentives in setting prices?* | | |
| Hirst et al. (1995) | Experiment with 291 graduate business student subjects. | When making prospective stock performance judgments, investors react more negatively to unfavorable recommendations of analysts having investment banking conflicts relative to their reaction to unfavorable recommendations of unaffiliated research analysts. |
| Branson, Guffey, and Pagach (1998) | Archival, Lexis-Nexis, Coverage initiation announcements since 1992. | The market reaction to analyst coverage initiation announcements with buy recommendations depends on prior analyst following, the reputation of the new analyst, brokerage house size, and the richness of the firm's information environment, proxied by firm size and exchange listing. |
| Lin and McNichols (1998) | Archival, I/B/E/S, 1989-1994. | The market reacts negatively to "hold" recommendations and does not react to affiliated analysts' "strong buy" and "buy" recommendations, implying that investors consider analysts' incentives. |
| Michaely and Womack (1999) | Archival, First Call, 1990-1991. | Returns to "buy" recommendations from security underwriters' analysts are lower than returns to buy recommendations from unaffiliated analysts before, at, and after recommendation dates, suggesting that the market considers analysts' incentives. |
| Hayes and Levine (2000) | Archival, Zacks, 1978-1995. | Adjusting for bias makes forecasts more accurate and less biased, but no more correlated with contemporaneous returns, suggesting that either the market does not adjust for bias or the adjustment captured by the researchers is not the same as the market's adjustment. |
| Malloy (2005) | Archival, I/B/E/S, 1994-2001. | Extends the analysis of Lin and McNichols (1998) by showing that the negative market reaction to affiliated analyst hold recommendations relates to geographically distant analysts (as opposed to local affiliated analysts). |
| Barber, Lehavy, and Trueman (2007) | Archival, First Call, 1996-2003. | The market reaction to independent analysts' buy recommendations exceeds the reaction to investment bank analysts' buy recommendations, while the market reaction to investment bank analysts' hold and sell recommendations exceeds the reaction to independent analysts' recommendations of the same type. The findings suggest that the market can unravel optimism in investment bank analysts' recommendations. |
| *Panel E. Research question 3.5.5: Do economic incentives or behavioral (psychological) biases create underreactions in analysts' forecasts?* | | |
| Incentives-oriented papers: | | |
| Mozes (2003) | Archival, First Call, 1990-1994. | Forecast immediacy (proximity to the beginning of a forecast cluster) is positively related to underreaction, suggesting that uncertainty about future earnings drives underreaction, and that some analysts are willing to trade-off some underreaction and accuracy for greater forecast immediacy and usefulness. |

Table 5 (*continued*)

| Reference | Method | Key results |
|---|---|---|
| *Panel E. Research question 3.5.5: Do economic incentives or behavioral (psychological) biases create underreactions in analysts' forecasts?* | | |
| Chen and Jiang (2006) | Archival, Zacks, 1985-2001. | On average, analysts overweight private information, but weighting is asymmetric. Analysts overweight (underweight) private information when issuing forecasts that are more (less) favorable than the consensus. The deviation from efficient weighting corresponds to related cost/benefit considerations, suggesting that incentives, rather than cognitive biases, play a prominent role. |
| Markov and Tan (2006) | Archival, Mathematical Model, I/B/E/S, 1985-2004. | The distributions of analyst forecast errors are consistent with analysts having asymmetric loss functions. |
| Raedy, Shane, and Yang (2006) | Archival, Mathematical Model, I/B/E/S, 1984-1999. | Horizon-dependent underreaction to news about future earnings is consistent with an asymmetric loss function, which provides incentives for analysts to underreact to information. Underreaction reduces the likelihood of subsequent news contradicting the direction of the prior earnings forecast revision. |
| Behavioral bias oriented papers: | | |
| Maines (1996) | Experiments with 228 MBA student subjects. | Consistent with the perception that analysts' forecasts are optimistic, investors' expectations are conservatively biased when combining the forecasts of individual analysts. The evidence suggests that individual investors might not combine forecasts from multiple analysts efficiently. |
| Maines and Hand (1996) | Experiment with 60 MBA students. | Individuals underweight the moving average component of earnings series and misweight the seasonal change component, suggesting that psychological biases may be responsible for market and analyst inefficiency with respect to earnings news. |
| Calegari and Fargher (1997) | Experiments with 87 student subjects. | Individuals underweight innovations in quarterly earnings, suggesting that psychological biases may be responsible for market and analyst underreaction to earnings news. |
| Loffler (1998) | Archival, I/B/E/S, 1988-1993. | Psychological biases related to underreaction and overconfidence explain the empirical evidence of inefficiency better than rational, game-theoretic models. However, inefficiencies do not seem to have important economic consequences. |
| Sedor (2002) | Experimental survey with 86 sell-side analysts. | Consistent with psychological biases, analysts make more optimistic forecasts when provided with management information in scenarios, as opposed to lists. |
| Friesen and Weller (2006) | Archival, Mathematical Model, I/B/E/S, 1993-1999. | The authors develop a model of behaviorally-biased analyst forecasts due to the overconfidence and cognitive dissonance of individual analysts. |
| Kadous, Krische, and Sedor (2006) | Survey with 59 financial analysts. | Building on Sedor (2002), the paper finds that making subjects generate a few, but not many, counter-explanations reduces scenario-induced optimism, suggesting a boundary condition for using counter-explanations. |

### *3.5.2. Suggestions for further research related to analysts' incentives and behavioral biases*

As described in Table 5, Panel A, the research since 1992 has established that the likelihood of analyst promotion/reward increases with their relative forecast accuracy. Thus, analysts have incentives to expend effort towards forecast accuracy. Hong et al. (2000a) find that forecast accuracy is directly related to the likelihood of promotion, especially for less experienced analysts. However, when controlling for forecast accuracy, they find that less experienced analysts are more likely to be fired for being bold (i.e., deviating from the consensus). Hence, less experienced analysts have incentives to trade off some accuracy and timeliness for the safety of proximity to the consensus. An alternative interpretation of these results is that analysts gain experience by watching the consensus, while at the same time testing their own models privately. Once they become confident in their own models, they become bolder and attempt to lead rather than follow. Future research might investigate the descriptive validity of this interpretation. Future research might also explore the importance of market price impact or other proxies for forecast usefulness relative to forecast accuracy at various stages of analysts' careers.

Another promising research area is to further evaluate the selection bias suggested by Hayes (1998) and documented empirically by McNichols and O'Brien (1997). Hayes suggests that analysts' incentives to follow firms for which they have favorable views increase with the extent to which investors already own shares of the stock, which in turn should increase with the size of the firm followed and the extent/influence of analysts' recent buy recommendations. Hayes also predicts that the asymmetry should increase with short selling restrictions on the stock and the dispersion of ownership among investors. These predictions can be tested empirically.

Selection bias may also provide an explanation for the market inefficiency described in the behavioral finance literature. For example, in tests of Hong and Stein's (1999) "gradual information diffusion" theory of market inefficiency, Hong, Lim, and Stein (2000b) hypothesize and find that return momentum increases with a low analyst following. The study also documents "an interesting regularity" (p. 267): the effect of low analyst coverage is most pronounced in stocks that are past losers. This result is consistent with Hayes' (1998) theory and McNichols and O'Brien's (1997) empirical results suggesting that analysts expend less effort in their coverage of underperforming stocks; as well as Hayes and Levine's (2000) evidence that the market does not appear to adjust its expectations for the selection bias documented by McNichols and O'Brien. Thus, the incentives described by Hayes, when combined with the results in Hong et al. (2000b), McNichols and O'Brien (1997), and Hayes and Levine (2000), might contribute to the theory of return momentum developed in Hong and Stein (1999). More generally, the interplay between management and analyst incentives, biases in forecasts and recommendations, naïve investor psychological biases, and the degree to which the market unravels biased forecasts and recommendations, should continue to provide fertile ground for the application of analytical, archival, experimental, and other research methods for many years to come.

A number of recent studies listed in Panel B consider how employers' incentives to gain/maintain underwriting business or generate trading commissions impact analysts' forecasts and recommendations. The results regarding underwriting are generally consistent, in that it appears that affiliated analysts (those whose employers have existing underwriting relationships) make relatively optimistic recommendations (e.g., Dugar & Nathan, 1995; Lin & McNichols, 1998), but the evidence does not suggest that investment banking activities *per se* (without affiliation) cause optimism in forecasts and recommendations (Cowen et al., 2006). Recent research evidence questions the impact of investment banking activities and optimism on analysts' forecasts (e.g., Jacob et al., in press). Further research is needed to sort out the effects of affiliation and investment banking on analyst optimism/pessimism in pre- and post-Enron periods. Future research might also build on Irvine (2004), Jackson (2005), and Cowen et al. (2006), focusing more on trade generation as an incentive for analyst optimism, as opposed to underwriting business.

Interesting questions also remain regarding whether management incentives drive persistent optimism in long-term forecasts, and whether the temporal decreases in both short and long-term forecast optimism, documented by Brown (2001a) and Claus and Thomas (2001), respectively, reflect intertemporal changes in incentives. The nature of these incentives and the reasons why they change over time warrant further research. While Hong and Kubik (2003) report that optimism plays a role in career advancement, future research could focus on whether analyst amenability to a walk-down to beatable forecasts also influences future career prospects. Another fruitful line of inquiry might consider whether beatable short-term forecasts, combined with optimism in recommendations and long-term earnings forecasts, impact analyst employment outcomes. Further, analysts' incentives may depend on where the target firm is in its lifecycle; e.g., a firm with a recent IPO versus a mature firm, or "value" versus "glamour" stocks.

The existence and persistence of biases in analysts' forecasts and recommendations remain open questions. The biases are likely to include optimism at longer horizons, pessimism at shorter horizons, and underreaction to new information. As shown in Table 5, Panel C, Richardson et al. (2004) find that the walk-down to beatable earnings expectations is most pronounced for firms with stock issuances or with insiders selling their own shares in post-earnings announcement periods; and various other studies provide other reasons why managers prefer forecasts that are attainable or beatable (e.g., Matsunaga & Park, 2001; Bartov et al., 2002). However, it is not clear why analysts do not unravel the effects of these incentives on managers' earnings guidance. The evidence is mixed on whether the market adjusts analysts' forecasts for potential biases. For example, as described in Table 5, Panel D, Lin and McNichols (1998) find evidence that is consistent with the market unraveling analysts' incentives to issue optimistic recommendations due to investment banking relations; whereas Hayes and Levine (2000) suggest that the market does not unravel the effects of analysts' incentives to drop the coverage of firms for which they have pessimistic views. The degree to which, and the context in which, the market "sees through" incentives that create biased analysts' forecasts remain areas open for future research. Further, when reported earnings meet analysts' expectations, the forecasts are, by definition, unbiased. In these cases, have firms managed earnings and expectations downward to just meet forecasts and create reserves for future earnings increases? What are the causes and consequences of just meeting versus barely beating analysts' forecasts? These questions also warrant further research.

The research is mixed on whether psychological biases or economic incentives affect analysts' forecasts (Panel E). Analyst incentives may result in analysts underreacting to publicly-available information. Trueman (1990) models underreaction as a function of analysts' incentives to disguise their inability to develop private information about firms' prospects. On the other hand, Raedy et al. (2006) model an underreaction arising from asymmetric loss functions that create incentives for analysts to revise their future forecasts in a direction consistenwith the interpretation of firms' prospects included in the analysts' current research reports.[26] The question of whether the assumptions underlying these models hold true in financial markets awaits further empirical examination. Similarly, future research might attempt to more directly tie specific incentives like career concerns or employer objectives to underreaction bias. Mozes (2003) suggests that forecasts with greater immediacy (i.e., released quickly after a preceding news event) are associated with greater uncertainty and greater underreaction. Future research might investigate the incentives and behavioral factors that lead some analysts to provide forecasts more quickly (i.e., immediately) after an information event, and whether these analysts underreact in ways that protect against inaccuracy, while at the same time creating more useful forecasts for investors. Loffler (1998) offers a promising approach for separating behavioral explanations from rational economics-based explanations for underreaction in analysts' earnings forecasts, and concludes that, while behavioral biases dominate, they are economically immaterial. Loffler finds that analysts issue forecasts that adjust for investor perceptions of the forecasts. Analysts who believe that investors overestimate (underestimate) the precision of the analysts' forecasts will tend to underreact (overreact) to new information. As noted by Loffler (1998, p. 274), these results "raise the question of why analysts do not simply report the precision of their forecasts." Further research is needed to better understand the constraints analysts face, the techniques they use, and their incentives for communicating the precision of their forecasts to investors.

In experimental tests of biases that might cause underreactions to earnings news, Maines and Hand (1996) find that student subjects generally understand the time-series implications of the first-order autoregressive component of seasonal earnings changes but do not understand the implications of the fourth-order moving average component, while Calegari and Fargher's (1997) results suggest the opposite. More generally, if psychological biases affect students' abilities to detect time-series patterns in earnings series, more research is needed to understand whether, and if so, how professional analysts learn to overcome these biases. Further, some behavioral finance theories of market inefficiency assume that psychological biases affect market prices (e.g., Barberis, Shleifer, & Vishny, 1998; Daniel, Hirshleifer, & Subramanyam, 1998). Therefore, an important research question is whether analysts' forecasts reflect psychological biases, and whether these biases, in turn, affect market prices.[27]

### 3.6. Questions related to the regulatory environment

#### 3.6.1. Questions addressed since 1992

The papers summarized in Table 6 examine the impact of the regulatory environment on analyst activities. The questions addressed include:

1. How do new regulations affect the information environment and the characteristics of analysts' forecasts? (Panel A); and

[26] See Markov and Tan (2006) for recent evidence that the distributions of analyst forecast errors are consistent with analysts having asymmetric loss functions.

[27] Friesen and Weller (2006) develop a model of behaviorally-biased analyst forecasts due to overconfidence and cognitive dissonance of individual analysts.

Table 6
Selected Papers Addressing Questions Related to the Regulatory Environment (Section 3.6)

| Reference | Method | Key Results |
|---|---|---|
| *Panel A. Research Question 3.6.1: How do new regulations affect the information environment and the characteristics of analysts' forecasts?* | | |
| Bailey et al. (2003) | Archival, First Call, 1999-2001. | Analyst forecast dispersion and quarterly earnings disclosures increased following Reg FD, implying that Reg FD increased the quantity of information available to the public, but also increased the demands on investment professionals. |
| Berger and Hann (2003) | Archival, I/B/E/S, 1996-1998. | Forecast accuracy improves for multi-segment firms relative to single segment firms following SFAS 131, implying that regulatory changes in reporting can improve forecast quality. |
| Heflin et al. (2003) | Archival, First Call, 1999-2001. | Neither forecast dispersion nor accuracy appear to change following Reg FD, suggesting that Reg FD did not impair the information available to investors prior to earnings announcements. |
| Bushee, Matsumoto, and Miller (2004) | Archival, First Call and BestCalls, 1999-2001. | Managers are more likely to discontinue conference calls after Reg FD, but the amount of information disclosed during conference calls does not decrease. Reg FD increased price volatility for firms that previously restricted access, resulting in more trade. Overall, Reg FD impacted trading during the conference call period for firms most likely to be affected by Reg FD. |
| Eleswarapu, Thompson, and Venkataraman (2004) | Archival, I/B/E/S, 2000-2001. | Information asymmetry (proxied by bid-ask spreads and order flow imbalance) declined after Reg FD, particularly for firms with a low analyst following. |
| Gintschel and Markov (2004) | Archival, First Call, 1999-2001. | The absolute price impact of information disseminated by analysts following Reg FD is reduced by 28%, implying that Reg FD was effective in reducing selective disclosure. |
| Ivkovic and Jegadeesh (2004) | Archival, I/B/E/S, 1990-2002. | Evidence of a stronger market reaction to upward forecast revisions and recommendations just prior to earnings announcements both before and after Reg FD supports the inference that analysts have access to positive (but not negative) insider information, and that Reg FD was unsuccessful in changing this characteristic of the information environment. |
| Barber, Lehavy, McNichols, and Trueman (2006) | Archival, First Call, 1996-2003. | After NASD Rule 2711, the distribution of stock recommendations became more pessimistic. The largest returns are earned based on going long (short) on buy (sell) recommendations from brokers who had issued few buy (sell) recommendations in the past. |
| Francis, Nanda, and Wang (2006) | Archival, Zacks, 1999-2002. | Analyst report informativeness declined for U.S. firm stocks relative to ADRs in the post-Reg FD environment. |
| Monhanram and Sunder (2006) | Archival, I/B/E/S, 1999-2001. | The precision of idiosyncratic information increased after Reg FD, and analysts correspondingly decreased firm coverage, mostly for firms with a large pre-existing coverage. |
| *Panel B. Research Question 3.6.2: How do differences in regulations across countries affect the information environment and the characteristics of analysts' forecasts?* | | |
| Hope (2003a) | Archival, I/B/E/S, 1993, 1995. | Across countries, a strong enforcement of accounting standards is associated with improved forecast accuracy, particularly for thinly-followed firms, implying that enforcement reduces uncertainty about earnings. |
| Hope (2003b) | Archival, I/B/E/S, 1993, 1995. | Across countries, the level of disclosure about accounting policies is inversely related to forecast errors and dispersion, suggesting that increased disclosure reduces uncertainty about earnings. |
| Lang, Lins, and Miller (2003) | Archival, I/B/E/S, 1996. | Foreign firms that cross-list on U.S. stock exchanges obtain the following benefits: greater analyst following, higher valuations, and more accurate analyst earnings forecasts. |
| Lang, Lins, and Miller (2004) | Archival, I/B/E/S, 1996. | Analyst following and forecast accuracy improve from cross listing in the US, and the increase is associated with higher valuations. The results support the notion that cross-listed firms have better information environments, which are valued by the market. |
| Barniv, Myring, and Thomas (2005) | Archival, I/B/E/S, 1984-2001. | Consistent with legal and financial reporting environments influencing analyst activities, superior analysts maintain superiority in common-law countries, but not in civil-law countries. |

2. How do differences in regulations across countries affect the information environment and the characteristics of analysts' forecasts? (Panel B).

A number of studies address whether Regulation Fair Disclosure (Reg FD) served the SEC's intended purpose of proscribing the selective disclosure of important information to particular (preferred) analysts. In effect, the regulation was intended to level the information playing field. Prior to it being passed, there was broad speculation upon Reg FD's likely impact with respect to levels of information asymmetry across analysts, forecast accuracy, forecast dispersion, forecast informativeness, managers' propensity to communicate with analysts, the form of management communication, and volatility in stock prices.

*3.6.2. Suggestions for further research related to the regulatory environment*

Regarding forecast dispersion, directional hypotheses hinge on whether analysts' forecasts rely more heavily on public or private information in the post-Reg FD period. If public information becomes more important after Reg FD, then the forecast dispersion should decrease. Alternatively, if analysts seek to gain an advantage via their own analysis because public information is common, then private information development activities and dispersion could increase after Reg FD. The results related to the effects of Reg FD on forecast dispersion are mixed (e.g., Bailey, Li, Mao, & Zhong, 2003; Heflin, Subramanyam, & Zhang, 2003). Further research is needed to understand how managers and analysts reacted to Reg FD's selective disclosure restrictions. With respect to pricing effects, research generally suggests that price impacts have decreased after Reg FD, and that the decreases are related to the level of selective disclosure pre-Reg FD, as proxied by brokerage and firm characteristics (e.g., Gintschel & Markov, 2004).

Ivkovic and Jegadeesh (2004, p. 433) find "a sharp increase in the information content of upward forecast revisions and recommendation upgrades in the week before earnings announcements, but … do not find a similar increase for downward revisions or for recommendation downgrades." The authors interpret this result as being consistent with analysts accessing managers' inside information in the case of good news preceding an earnings announcement, but not in cases of bad news, and the results are similar in the pre- and post-Reg FD periods. However, the paper notes the small post-Reg FD sample period and the correspondingly imprecise parameter estimation. Thus, the effectiveness of Reg FD in limiting analyst access to inside information remains an open question for further research. The results with respect to return volatility are likewise mixed, though some evidence suggests that the trading volume related to differing opinions increased following the regulation (Bushee et al., 2004).

A challenge for many conclusions regarding the impact of Reg FD is that the regulation impacted all U.S. firms at the same time, and as such, control groups are difficult to find. Francis et al. (2006) attempt to control for omitted macroeconomic variables by comparing the effects of Reg FD on the information environment and analyst forecast characteristics of ADR versus U.S. firms. Their results indicate no differential changes in the information environment of ADR versus U.S. domiciled company stocks, but the informativeness of analyst reports on U.S. domiciled stocks declined relative to the informativeness of analyst reports on ADR stocks. However, as noted by the authors, ADR stocks might not be an ideal control group, because, although they are exempt from the requirements of Reg FD, they have close ties to the U.S. economy, need to compete in U.S. capital markets, and might have either been indirectly affected by Reg FD or voluntarily chosen to comply, thus reducing the power of their tests. In general, researchers need to exercise care in dismissing macroeconomic (e.g., market downturn) and firm-specific effects that occurred concurrently with the implementation of Reg FD. Further research is needed to develop more powerful and better controlled hypothesis tests.

In a pre-Reg FD period, Park & Stice (2000) (described in our Table 3, Panel A) find evidence consistent with a positive relationship between the market's response to analysts' forecast revisions and analysts' prior firm-specific forecast accuracy, but they do not find a spillover effect of forecasting superiority from one firm to other firms followed by the same analyst. The authors interpret these results to suggest that analyst forecasting superiority stems more from access to managers' inside information than from a superior ability to analyze commonly available information. An interesting extension would be to see whether changes in the information environment after Reg FD affect the source of superior analysts' forecasting advantages. As noted in Section 3.1, Previts et al. (1994) observed that analysts prefer to follow firms with effective strategies for presenting smooth earnings streams. It would be interesting to know whether analysts have the same preferences post-Reg FD. Future archival research might consider the relationship between analyst following decisions and the ability of mangers to consistently meet earnings expectations before and after Reg FD.

With the expanded access to international forecasts provided by I/B/E/S and other data providers, researchers have an increased ability to study new research questions about whether differences in accounting standards, regulations, and legal structures and practices across countries impact analyst activities. To date, few studies (Table 6, Panel B) have addressed issues related to the impact of disclosure practices, enforcement standards, and accounting policy disclosures on analysts' forecasting activities. The results generally suggest that rules aimed at improving disclosure and adherence to accounting rules create an information environment conducive to improved forecast accuracy (see, e.g., Hope, 2003a,b; Lang et al., 2004). Future research might consider the effects of institutional/cultural differences across countries on analysts' decision processes, expertise, incentives, forecasts, and recommendations. The increased flow of capital, coupled with the convergence of international accounting standards, makes this line of research important, and we expect it to expand considerably in the future.

### *3.7. Research design issues*

#### *3.7.1. Questions addressed since 1992*

The widely documented evidence of apparent analyst forecast bias and inefficiency with respect to public information has spawned other research that critically examines the validity of these inferences. The papers summarized in Table 7 generally point to the inappropriateness of the assumptions implicit in the research designs adopted by studies documenting bias and inefficiency in analysts' responses to information. The research questions posed in Table 7 are:

1. How might statistical validity issues threaten inferences about the behavior of analysts' forecasts and recommendations? (Panel A); and
2. How might construct or internal validity issues threaten inferences about the behavior of analysts' forecasts and recommendations? (Panel B).

#### *3.7.2. Suggestions for further research related to research design issues*

One criticism leveled against research that documents bias in analysts' forecasts is that evidence of bias depends on whether the tests focus on the mean or the median of analyst forecast errors. Abarbanell and Lehavy (2003) report that, due to possible management of the target earnings variable, the distribution of price-scaled analyst forecast errors contains more large negative forecast errors than large positive forecast errors. For similar reasons, small positive forecast errors outnumber small negative forecast errors. Abarbanell and Lehavy (2003) caution that these asymmetries in the distribution of analyst forecast errors violate assumptions of a normal distribution, and therefore the choice between the mean and median of the distribution affects conclusions about analyst bias.[28]

Other studies question the conclusion of analyst inefficiency in prior research. Gu and Wu (2003) argue that analysts' forecasts may seem inefficient under the assumption that analysts have a quadratic loss function; i.e., that analysts attempt to minimize their mean *squared* forecast error. If analysts' objectives are consistent with minimizing their mean *absolute* forecast error, the evidence is no longer consistent with inefficiency. Future research might identify analysts' loss functions based on the nature of their incentives in the various situations and decision contexts they face. Future research might also identify the determinants of particular forms of loss functions that affect analysts' forecasting decisions, and might assess whether utility functions differ across analyst types (e.g., based on affiliation or experience).

Future research could also examine whether analyst inefficiency depends on the sign and magnitude of the forecast error. Analyst forecast errors are determined by *reported* (rather than unmanaged) earnings, and, as Abarbanell and Lehavy (2003) note, earnings management is more likely in certain regions of the forecast error distribution. Inferences about analyst behavior based on analyst forecast errors are problematic in situations where reported earnings are more likely to (systematically) deviate from unmanaged earnings. Future research should consider the possibility that analysts' forecasts and reported earnings are jointly determined.[29] If firms provide guidance to analysts

[28] Keane and Runkle (1998) conclude that inefficiencies and bias in prior studies are due to research design issues that ignore cross-correlation in analyst forecast errors. Their tests using GMM estimation provide no evidence of bias or inefficiency in analyst forecasts.

[29] Sankaraguruswamy and Sweeney (2006) take a step in this direction by using a simultaneous equations model to study analysts' forecasts and reported earnings.

Table 7
Selected Papers Addressing Research Design Issues (Section 3.7)

| Reference | Method | Key result |
|---|---|---|
| *Panel A: Research Question 3.7.1: How might statistical validity issues threaten inferences about the behavior of analysts' forecasts and recommendations?* | | |
| Keane and Runkle (1998) | Archival, I/B/E/S, 1983-1991. | Inefficiencies and bias in prior studies are due to research design issues that ignore cross-correlation in analyst forecast errors. Tests using GMM estimation provide no evidence of bias or inefficiency in analysts' forecasts. |
| Rock, Sedo, and Willenborg (2000) | Archival, Nelson's Directory, 1985. | Count data econometric models are superior in estimating analyst following, as compared to ordinary least squares regressions. |
| Kim, Lim, and Shaw (2001) | Mathematical Model | Using mean (or median) forecasts to evaluate analyst accuracy and bias overweights the common information in analyst forecasts and underweights private information. Bias increases with the number of forecasts in the consensus. Adding a positive fraction of the *change* in mean forecasts to the prior mean forecast increases the forecast accuracy. |
| Abarbanell and Lehavy (2003) | Archival, Zacks, 1985-1998. | Inferences about analyst bias and inefficiency may be tainted by asymmetries in the distribution of forecast errors, where the distribution contains larger errors in the left tail (tail asymmetry) and more small positive forecast errors in the middle (middle asymmetry). Econometric fixes, such as truncation or winsorization, could reduce the effect of the tail asymmetry, but will magnify the effect of the middle asymmetry. |
| Cohen and Lys (2003) | Archival, Zacks, 1987-1999. | The authors challenge Abarbanell & Lehavy's (2003) conclusion that forecast error asymmetries create serially-correlated forecast errors. The distributions of both forecasts and actuals manifest the asymmetries noted by Abarbanell & Lehavy (2003). |
| Sankaraguruswamy and Sweeney (2006) | Archival, Mathematical Model, I/B/E/S, 1990-2002. | A simultaneous equations model is used to study analysts' forecasts and reported earnings. |
| *Panel B: Research Question 3.7.2: How might construct or internal validity issues threaten inferences about the behavior of analysts?* | | |
| Gu and Wu (2003) | Archival, I/B/E/S, 1983-1998. | Forecast bias is positively related to skewness in the earnings distribution, consistent with analysts forecasting the median value of the earnings distribution rather than the mean. Forecasting the median minimizes the mean absolute forecast error. Analysts' forecasts are rational if their objective is to minimize mean absolute forecast errors. |
| Payne and Thomas (2003) | Archival, I/B/E/S, 1984-1999. | Conclusions based on using split-adjusted data provided by I/B/E/S may be affected by the rounding conventions I/B/E/S uses to adjust forecasts and actuals for stock splits. The split adjustment effect is more severe for studies of earnings forecast errors that are around zero, and for studies using the I/B/E/S Summary File. |
| Basu and Markov (2004) | Archival, I/B/E/S, 1985-2001. | The linear regressions used in analyst efficiency tests assume that analysts' loss functions dictate the minimization of mean squared forecast errors. The results show that analysts' forecasts are efficient when econometric tests are designed under the assumption that analysts seek to minimize mean absolute forecast errors. |
| Ramnath, Rock, and Shane (2005) | Archival, Value Line and I/B/E/S, 1993-1996. | I/B/E/S forecasts are more accurate than Value Line forecasts and proxy better for market expectations. Much of the superiority in I/B/E/S forecasts is attributable to timeliness (recency) and the aggregation of multiple forecasts. Both Value Line and I/B/E/S earnings forecasts, however, exhibit inefficiency with respect to past forecast errors. |
| Frankel, Kothari, and Weber (2006) | Archival, I/B/E/S, 1995-2002. | Discussions with I/B/E/S personnel suggest that there are construct validity issues associated with pre-1995 forecast dates on the I/B/E/S Detail Files. |

and also manage reported earnings, the implicit assumption that analysts' forecasts and reported earnings are independently determined does not hold.

A few studies also focus on database issues and their possible implications for conclusions in prior research. Ramnath et al. (2005) examine whether there are inherent differences between two commonly used analyst forecast databases in accounting and finance research, Value Line and I/B/E/S, and find, for example, that forecasts derived from I/B/E/S dominate Value Line analysts' forecasts as proxies for the market's earnings expectations. Payne and Thomas (2003) note that the manner in which I/B/E/S pre-adjusts data for stock splits could affect inferences in prior research, and Frankel et al. (2006) note that their discussions with I/B/E/S personnel suggest that there may be construct validity issues associated with pre-1995 forecast dates in the I/B/E/S Detail files. The overall message is that the choice of analyst forecast database is not innocuous, and further research is needed to evaluate the degree to which the variables developed from these databases faithfully represent the underlying constructs of interest.

Another avenue for future research-design oriented studies is to address the construct validity of the news variable in studies of the information content of analysts' forecast revisions. Measurement error in the news proxy potentially creates ambiguities in cross-sectional comparisons of the information content of forecast revisions. The literature includes a curious regularity, indicating that the analyst's own most recent (i.e., current outstanding) forecast of the target earnings variable is a better proxy for the market's expectations than a more recent consensus forecast (e.g., Stickel, 1991; Gleason & Lee, 2003 (described in our Table 2, Panel B)). Future research might help us understand how the market forms its expectations regarding the timing and magnitude of an individual analyst's next earnings forecast.

## 4. Summary and conclusion

Discovering the information and valuation models that determine equity security prices in capital markets is a daunting task. Analysts may collectively hold the key, but no single analyst can tell you what it is. Instead, the key lies in the way the market derives a consensus from the distribution of extant individual analysts' forecasts of a company's future earnings, the characteristics of the information impounded in that consensus, and the additional information the market incorporates into its model for valuing a company's equity securities. Important insights can be gained from the research regarding analysts' decision processes, determinants of analyst expertise and distributions of individual analysts' forecasts, the informativeness of analysts' research outputs, market and analyst efficiency with respect to value-relevant information, the effects of analysts' economic incentives and behavioral biases on their research outputs, the effects of the institutional and regulatory environment, and the limitations of databases and various research paradigms. In this paper, we have provided some perspective on the research in each of these important areas.

The areas for future research that seem the most promising to us include the following. First, Schipper's (1991) and Brown's (1993) calls for research providing more insight into analysts' decision processes are as relevant today as they were in 1992. We look forward to research clarifying the distinction between analysts' roles as interpreters of public information and as developers of private information that is useful in determining prices of equity securities. The decision processes of analysts in distinguishing permanent from more temporary components of earnings reports (including temporary components due to earnings management) remain a critical area for future research. We also expect research to clarify the role of heuristics in the price-setting process and the degree to which these heuristics function as effective substitutes for rigorous multi-period valuation models. More research is needed to understand the interaction between analysts' economic incentives and the frictions that limit investors' abilities to arbitrage away any inefficiencies or biases in forecasts and prices resulting from those incentives, and we expect this research to have implications for emerging behavioral finance theories of market inefficiency.

We expect researchers to continue exploring the factors that make some analysts better forecasters than others. We also expect ongoing research attempting to uncover the market's mechanism for developing earnings expectations from individual analysts' forecasts. Further research is required to describe the behavior of the forecasts that have higher price impacts, such as long-term growth forecasts and target prices. Given the evidence of the informativeness of earnings in the presence of analysts' target price forecasts, recommendations, and other information in analysts' research reports, it is not clear that earnings forecasts are simply a means to an end (Schipper, 1991). Further research is needed to explore the importance of analysts' earnings forecasts and actual earnings reports in the allocation of resources in capital markets. Finally, we expect to see more international research describing the institutional and regulatory factors that create cross-country differences in the role of analysts and the properties of their forecasts.

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# The stock price effects from downward earnings guidance versus beating analysts' forecasts: Which effect dominates?

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**Abstract:** This paper provides evidence on the net stock price effects associated with managers following a disclosure strategy of guiding earnings down to a level where they can report a positive earnings surprise. Prior literature documents a stock price premium when firms meet or beat analysts' forecasts. However, studies also show a substantial negative price response to downward earnings guidance that can potentially negate any benefit from reporting a positive earnings surprise. We find that the negative stock price effect for firms that release downward earnings guidance is substantially larger than the stock price premium from meeting analysts' forecasts. Further, this downward guidance stock price penalty persists after explicitly controlling for other news that might be disclosed by managers that voluntarily provide guidance. These findings challenge conclusions made in some prior research that the optimal disclosure strategy is to ensure a positive earnings surprise at the earnings announcement date.

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# The stock price effects from downward earnings guidance versus beating analysts' forecasts: Which effect dominates?

## 1. Introduction

This study examines the net stock price effects from following various disclosure strategies that separate total earnings news into management voluntary disclosures and the subsequent official earnings release. We are particularly interested in the net benefits from following a strategy where managers explicitly guide expectations down during a period in order to subsequently report a positive earnings surprise. In addition, we examine whether or not stock price effects associated with this disclosure strategy are permanent and can be justified on the basis of future earnings performance.

Our research question is motivated by several findings from the extant literature. In particular, prior research provides evidence suggesting that the overall reaction by investors to earnings news varies according to the manner in which the news is disclosed to the market.[1] This evidence implies the existence of an optimal disclosure strategy from the perspective of maximizing stock price, and several studies have drawn inferences as to what is the optimal strategy. For example, Soffer, Thiagarajan, and Walther (2000) and Tan, Libby, and Hunton (2002) argue that the optimal disclosure strategy is one where firms report a positive earnings surprise at the official earnings release date no matter whether the total earnings news is positive, neutral, or negative. Consistent with this conclusion, the popular press and academic literature cite stock price implications as an explanation for why firms tend to walk down earnings expectations to a beatable level (Brown, 2002; Richardson et al., 2004).[2] While not explicitly tested, the evidence in these studies suggests that the absolute stock price response to downward guidance is less than the stock price response to a positive earnings surprise.

[1] See, for example, Kasznik and Lev (1995), Libby and Tan (1999); Soffer, Thiagarajan, and Walther (2000); Tan, Libby, and Hunton (2002); and Miller (2005; 2006).

[2] There are many factors involved in a firm's decision to issue guidance beyond the stock price. These include litigation costs (Francis et al., 1994; Skinner, 1994) and stock option compensation (Aboody and Kasznik, 2000; Noe, 1999). However, our research question is focused on the stock price effects of various earnings disclosure strategies.

However, evidence in other studies yields different implications. Specifically, research shows a more pronounced stock price response to management downward earnings guidance relative to upward guidance.[3] This finding suggests that for firms with negative earnings news, issuing downward guidance is unlikely to yield a more positive response to earnings news relative to remaining silent. Consistent with this view, Kasznik and Lev (1995) find that for a small sample of firms with large negative earnings news that employ a wide variety of voluntary disclosures,[4] the total stock price response for firms that warn is significantly more negative compared to a control sample of non-warning firms.[5] However, Tucker (2007) argues that this finding is driven by firms self-selecting into guidance and non-guidance samples depending on the amount of other bad news they face. Using a Heckman selection model, she finds that after controlling for this self-selection bias, firms with negative earnings news who warn are no longer penalized by the stock market relative to those who keep silent.

Thus, the extant literature showing a stock price penalty for firms that warn is difficult to reconcile with studies that conclude the optimal disclosure strategy is to guide earnings down to a beatable level. Accordingly, the net benefit from guiding expectations down in order to report a positive surprise is ambiguous. We contribute to this literature by explicitly modelling and comparing the stock price effects of issuing downward earnings guidance and meeting analysts' forecasts.

Our study is most closely related to Kasznik and Lev (1995) and Tucker (2007), both of which examine the overall stock price effect from warning about bad news. Besides explicitly comparing the stock price penalty from guiding forecasts down with the stock price premium from meeting analysts' forecasts, our study can be further differentiated from Kasznik and Lev (1995) in that we consider only

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[3] See Hutton et al. (2003), Skinner (1994), and Kothari et al. (2009). Anecdotally, incidents of a large stock price response to downward earnings guidance are easy to find. On October 24, 2002, after the close of trading, CIGNA announced the company would not meet analysts' expectations due to weakness in one of its major segments. The price of the company's shares fell as much as 45 percent the following day. On January 3, 2006, prior to the market open, Pilgrim's Pride guided first-quarter earnings lower citing lower sales prices and worse than expected performance in its Mexico operations. Share prices fell that day by more than 20 percent.

[4] In addition to earnings guidance, a sampling of the types of management disclosures that are included in Kasznik and Lev (1995) are sales forecasts, asset write-offs, gains on asset sales, order backlog, stock repurchases, dividends, earnings components, appointments of officers and board members, and capital expenditures.

[5] Similar results are documented in Atiase et al. (2006).

earnings guidance for a substantially larger sample and over a different time period. We restrict the analysis to management earnings guidance because we are interested in whether the benefits to walking expectations down to a beatable target are worth the costs of issuing downward guidance. We also do not restrict the analysis only to firms with large earnings news, which increases the generalizability of our results. Expanding on the findings of Tucker (2007), we further examine whether any differential valuation can be justified based on either the simultaneous disclosure of unfavourable non-earnings news or future earnings performance. Thus, the evidence here can more directly assess the overall stock price effects of following an earnings disclosure strategy that guides expectations down in order to report a positive earnings surprise.

The sample is comprised of 8,635 firm/quarter observations where managers provide explicit earnings guidance for quarter *t* subsequent to the earnings announcement for quarter *t*-1. Each sample observation is paired with a control firm matched on firm size, industry, time period, and the level of total earnings news disclosed during the quarter. As shown in Figure 1, we define total earnings news as the difference between actual quarterly earnings and the first available mean consensus analyst forecast occurring after the earnings announcement for quarter *t*-1.

[Insert Figure 1 Here]

Consistent with prior research (e.g., Brown, 2001; Cotter et al., 2006; Richardson et al., 2004), we find that analysts' forecasts at the beginning of the quarter are generally optimistic, but tend to move downward over time to an attainable level. The propensity of firms to meet analysts' expectations is much stronger for guidance firms than for non-guidance firms. Specifically, guidance firms meet or beat expectations 79 percent of the time, whereas, the rate for non-guidance firms is only 55 percent. This evidence is consistent with managers using quarterly earnings guidance as a tool to keep expectations in check (Hsieh et al., 2006; Matsumoto, 2002).

We find a significantly negative stock price penalty for firms that provide downward earnings guidance during the quarter, after controlling for the magnitude of total earnings news. Moreover, this downward earnings guidance penalty is larger in absolute value than the equity premium realized by firms that meet analysts' forecasts, as documented in prior research (Bartov et al., 2002; Lopez and Rees, 2002). Thus, this evidence challenges the notion purported by some empirical and experimental studies that firms can maximize stock price by following a strategy of disclosing bad news during the quarter in order to report a positive surprise at the earnings announcement date. In fact, our evidence suggests that when total earnings news is negative, on average, firms are better off from a stock price perspective to not provide guidance during the quarter.

We examine whether the stock price penalty for downward earnings guidance in the current quarter can be explained by poor future earnings performance. As pointed out by Tan et al. (2002), different market reactions to various disclosure paths followed by managers could be due to certain signalling properties. If downward earnings guidance has signalling ramifications for periods beyond the current quarter, then the observed stock price penalty for these firms would be justified. In addition, it is possible that firms providing downward guidance for the current quarter also tend to simultaneously disclose or signal negative information about future performance (Tucker 2007).

To investigate these possibilities, we first estimate a regression model where abnormal returns are measured over multiple periods beginning in the quarter when the guidance is issued. These returns are regressed on contemporaneous aggregated earnings and indicator variables for downward guidance and positive surprises at earnings announcement dates (along with other controls). If the stock price penalty is a consequence of the downward guidance signalling unfavourable information about future earnings, its significance should be attenuated when future earnings are explicitly included in the model. We do not document this result but rather, the stock price penalty for downward earnings guidance in the current quarter persists into the future even when we explicitly control for future earnings. In contrast, we observe a significant reduction in the equity premium to meeting analysts' forecasts, which is consistent with the view that meeting analysts' forecasts is a signal about superior future performance that is impounded into the current stock price (Kasznik and McNichols, 2002). As a sensitivity analysis, we also perform a two-stage Heckman selection model to control for self-selection bias, consistent with Tucker (2007). The use of the two-stage model does not qualitatively affect our results in that we continue to find a significant stock price penalty for firms that provide downward earnings guidance, even when the guidance allows firms to meet analysts' forecasts.

This study contributes to the literature by showing that earnings disclosure strategies that result in a positive earnings surprise are not always preferred from a valuation perspective, because the negative stock price effects from providing downward guidance can dominate the positive equity premium from meeting analysts' forecasts. Further, we show that the stock price penalty to downward earnings guidance persists for several future quarters even after controlling for future earnings performance. These results challenge the conventional wisdom that companies can benefit from warning investors about impending bad news. However, they are consistent with other studies such as Hutton et al. (2003) and Kasznik and Lev (1995) that show a disproportionate negative reaction to downward guidance.

Our study provides a potential explanation for why firms might discontinue the practice of issuing earnings guidance. A 2007 survey by the National Investor Relations Institute indicates that 51 percent of its members in that year provided earnings guidance, which is a substantial decline from 77 percent in 2003. Recent studies that examine firm characteristics associated with the decision to stop providing earnings guidance consistently find that guidance stoppers tend to have poor current operating performance (e.g., Chen et al., 2007; Cheng et al., 2007; Houston et al., 2008). Evidence in this study suggests that firms might decide to discontinue guidance during periods of poor performance because of the significantly negative valuation effect, which is greater than the option of remaining silent and reporting a negative earnings surprise. A recent working paper finds that when total earnings news for a period is negative, a greater proportion of it is released through the earnings announcement relative to positive total earnings news (Roychowdhury and Sletten, 2010). This evidence suggests that many managers might be aware of the penalty for downward guidance and take actions to avoid it.

The paper proceeds as follows. In the next section, we review the literature related to this study and develop our hypothesis. Section 3 describes the sample. Sections 4 and 5 provide empirical results. In section 6, we reconcile results from this study with prior empirical work that has examined earnings preannouncement strategies. The final section offers some conclusions and discussion.

## 2. Literature Review and Hypothesis Development

It is well established that stock returns are positively associated with a firm's earnings news, where total earnings news for a quarter is defined as the difference between the market's earnings expectations at the beginning of the period and actual realized earnings (see Figure 1). Managers can choose when and how to communicate earnings information to the market, and many firms provide voluntary earnings guidance about current and future earnings. Many studies have documented a significant stock price reaction to news contained in earnings guidance, which indicates that these disclosures are credible (Atiase et al., 2005; McNichols, 1989; Pownall et al., 1993; Pownall and Waymire, 1989).

Managers give several reasons for why they provide earnings guidance, including, mitigating stock price volatility, building a wider shareholder base, and satisfying a market demand for information (Hsieh et al., 2006). Achieving higher valuations is another frequently cited reason that is supported by academic research. That is, several studies find a stock price premium (penalty) to meeting (missing) analysts' forecasts (Lopez and Rees, 2002; Skinner and Sloan, 2002). In addition, research evidence is consistent with managers manipulating accruals (Dhaliwal et al., 2004; Moehrle, 2002) or even real decisions (Graham et al., 2005) in order to achieve earnings targets. Managing expectations through earnings guidance is another tool available to managers (Baik and Jiang, 2006; Cotter et al., 2006; Matsumoto, 2002).

From a valuation perspective, guiding earnings down to a beatable level explicitly assumes that the market reaction to a positive earnings surprise at the earnings announcement date more than compensates for the negative response to earnings guidance. Some support for this view is provided by Bartov et al. (2002). Although they do not directly examine explicit earnings guidance disclosed by managers, they find that investors assign a smaller weight to analysts' forecast revisions during a quarter compared to earnings surprises at the earnings announcement date. Other archival and experimental studies provide additional support for the idea that stock price is maximized by ensuring a positive surprise at the earnings announcement date, even when it involves issuing downward guidance during the period. Soffer, Thiagarajan, and Walther (2000) find that most firms use earnings preannouncements to avoid a negative surprise at the official earnings release date, and that firms realize a more negative stock price reaction when they report a negative earnings surprise (holding the level of total earnings news constant). In an experimental setting, Tan, Libby, and Hutton (2002) show that analysts' forecasts of future earnings are higher when firms understate positive news and overstate negative news prior to an earnings announcement. Miller (2005) presents evidence indicating that reactions by investors and analysts to total earnings news are more pronounced when the earnings guidance and the official earnings announcement surprise are of the same sign. In all these studies, the results imply that the optimal strategy from a stock price perspective is to disclose total earnings news to ensure a positive earnings surprise at the earnings announcement date, which would include guiding earnings down during periods when total earnings news is negative.

However, a primary motivation for the current study is extant research that appears to contradict the notion that firms are better off from a stock price perspective to warn investors when they have negative earnings news. Caylor, Lopez, and Rees (2007) do not explicitly examine earnings guidance but examine analyst forecast revisions and abnormal returns for various earnings paths that firms can take during a quarter. They find that across all earnings paths, investors do not always assign a greater weight to the earnings surprise compared to the forecast revision during the period and that, although differential pricing exists across earnings paths, stock returns are not always maximized by reporting a positive earnings surprise at the official earnings release date. The authors reconcile their seemingly contrasting results with prior findings by showing that separate analyses of different earnings paths that were combined in previous research can lead to different conclusions. In addition, Hutton, Miller, and Skinner (2003) find that the stock price response is substantially more pronounced when management provides downward guidance compared to upward guidance. Specifically, they find a mean stock price reaction of -9.96 percent to downward guidance but only 1.93 percent for upward guidance. Other studies find a similar asymmetric response to downward and upward management guidance (Skinner 1994; Kothari et al., 2009). Thus, when a firm has negative total earnings news, it is not obvious that the optimal preannouncement strategy would be to guide expectations down in order to report a positive earnings surprise.

Finally, Kasznik and Lev (1995) examine all corporate voluntary disclosures 60 days prior to a large earnings surprise announcement[6] and find that the stock price reaction to earnings news for firms that warn is more negative compared to a control group of no-warning firms. These results suggest that firms realize a stock price penalty for issuing downward guidance, and contrast with popular opinion in the business press that investors have little tolerance for earnings disappointments and will punish those firms that do not warn. However, Tucker (2007) provides evidence suggesting that the results in Kasznik and Lev (1995) are driven by a failure to control for a systematic bias that occurs when downward guidance firms tend to have other bad news that is not explicitly contained in the current period guidance.

The contrasting implications from the above studies prevent us from extrapolating their results to the net valuation consequences of issuing downward earnings guidance in order to report a positive earnings surprise. Given that recent research finds that firms tend to discontinue the practice of issuing guidance during periods of poor performance, we examine the following hypothesis:

*Hypothesis: Firms realize a stock price penalty from issuing negative quarterly guidance that is greater in absolute value than the stock price premium from meeting analysts' forecasts.*

## 3. Description of Sample

The sample employed in this study is comprised of 8,635 earnings guidance observations issued by 2,751 unique firms over the period 1993-2006 as obtained from the First Call *Company Issued Guidance* (CIG) database.[7] While we are particularly interested in the net effects of downward guidance and a positive earnings surprise, we retain all guidance observations in the sample in order to assess differences in our results across different types of guidance. Table 1 provides a breakdown of the sample

[6] Their sample is restricted to earnings surprises that exceed one percent of stock price.
[7] By comparison, previous archival studies on earnings preannouncements typically employ only a few hundred observations or less.

selection process. We begin by extracting from the CIG database all available management disclosures that relate to earnings. The initial screen eliminates almost 15,000 observations where the management guidance is open-ended or qualitative such that the nature and/or magnitude of the news cannot be unambiguously determined. The focus in this study is on quarterly earnings guidance and accordingly, approximately 48 percent of the remaining observations are deleted because they are disclosures about annual earnings. We include only the last guidance observation for firms that provide guidance more than once during the quarter.

[Insert Table 1 Here]

We obtain data on analysts' forecasts, actual earnings, and earnings announcement dates from I/B/E/S. To conduct the analyses, we require that firms must have a consensus forecast for quarters *t* and *t*+1 prior to the management guidance date for quarter *t* but after the earnings announcement date for quarter *t*-1, and a consensus forecast for quarter *t*+1 that occurs after the earnings announcement date for quarter *t*. Firms are eliminated when these forecasts are unavailable along with actual earnings and an earnings announcement date from I/B/E/S. An additional 97 observations are deleted where the earnings announcement date is more than 75 days after the fiscal quarter end. Thus, for our sample, earnings is disclosed on a timely basis for the period, which mitigates confounding factors that can affect returns but not show up in earnings for quarter *t*. Two additional screens eliminate observations that have missing stock returns data from CRSP (355 observations) and where the matching procedures do not yield a matched firm with sufficient data from I/B/E/S and/or CRSP (2,740 observations).

To control for various factors that could affect the earnings/return relation, we obtain a matched control sample of firms that did not provide earnings guidance during the quarter. The matching procedure is as follows. First, for each firm/quarter guidance observation, we obtain all firms listed on I/B/E/S that are in the same industry[8] and did not provide guidance during the quarter (both qualitative and quantitative guidance firms are excluded). We also require that the sign of total earnings news is the same for the guidance and matched firms, and the absolute difference in total earnings news between the

[8] Industry is represented as the first two digits of the Global Industry Classification Standard code.

guidance and matched firms is less than or equal to five cents. Total earnings news is defined as the difference between actual earnings and the first available mean consensus analyst forecast for quarter *t* that occurs after the earnings announcement for quarter *t*-1 (see Figure 1). Finally, we require that firm size, as measured by the quarter end market value of equity, for the matched firm is between 75 percent and 125 percent of firm size for the guidance firm. From this set of potential matches, we choose the firm that is closest to the guidance firm's total earnings news. If there are more than one possible match firms that minimize the difference in total earnings news, we choose the firm that minimizes the difference in market value of equity. Thus, the non-guidance matched firms control for the sign and magnitude of total earnings news, industry, firm size, and time period.[9]

Table 2 provides descriptive statistics for the guidance and no-guidance control samples. Sample size varies across the different firm characteristics listed in Table 2 because of the availability of financial statement data from COMPUSTAT, which was not a criterion in the sample selection process. The mean undeflated earnings per share (EPS) for the guidance and matched firms are about $0.26 and $0.22, respectively. Most firms have negative total earnings news for the period as indicated by TNews%, defined as total earnings news deflated by price as of the first consensus analyst forecast for quarter *t* occurring after the earnings announcement for quarter *t*-1. This result is consistent with general optimism in analysts' forecasts at the beginning of the quarter. Firm characteristics related to size (analyst following, total sales, and total assets) suggest that the matching procedure on size was successful. Although we use market value of equity as the matching variable, we do not find substantial median differences in analyst following, sales, and total assets across the guidance and no-guidance samples. Dispersion in analysts' forecasts is slightly greater for the no-guidance sample, which might be expected given that the control sample is probably less likely to have provided guidance at any time prior to the first consensus forecast for the period. The median market-to-book ratio (MB) and leverage (Lev) are

[9] We find successful matches for an additional 1,410 firm/quarter guidance observations when we eliminate the industry criterion, and an additional 391 observations when we further eliminate the firm size criterion. All inferences in the paper remain unchanged when we use this expanded sample.

fairly close across the two samples, although the variability in both appears to be somewhat greater for the control firms.

[Insert Table 2 Here]

In Table 3, the guidance observations are partitioned into groups based on the direction of the earnings guidance and the nature of the earnings surprise at the subsequent official earnings release. The direction of earnings guidance is determined by comparing the guidance to the mean consensus analyst forecast that exists prior to the guidance. Similarly, the nature of the earnings surprise at the official earnings release is considered positive (neutral) [negative] when actual earnings are greater than (equal to) [less than] the management forecast. In the final row of Table 3, we present the direction of earnings news at the earnings announcement date for the matched sample of no-guidance firms. For the matched sample, the nature of the earnings surprise is determined by comparing actual earnings with the most recent available mean consensus analyst forecast prior to the earnings announcement date.

[Insert Table 3 Here]

The cell frequencies in Table 3 reveal that most earnings guidance is negative (63%). Also, only 21 percent of guidance firms experience a negative surprise at the earnings announcement date, which is substantially smaller than 45 percent of no-guidance firms that report a negative earnings surprise. Most of the negative earnings surprises for guidance firms occur when downward guidance is disclosed during the quarter but the guidance failed to disclose all of the bad news (76%). However, among all firms with downward guidance, 22 percent disclose all of the bad news at the guidance date, and 53 percent reveal something greater than the bad news (resulting in a positive earnings surprise).

## 4. Contemporaneous Valuation Effects of Downward Earnings Guidance

In this section, we examine the net stock price effects from issuing downward earnings guidance and meeting analysts' forecasts during a quarter. In Table 4, we present statistics on the market reaction to earnings news after partitioning the guidance and matched samples based on the level of total earnings news. Panels A and B report median returns for firms with positive and negative total earnings news, respectively. The variable $CAR^{EG}$ represents the 3-day size-adjusted return from one day before to one day after the guidance date. $CAR^{EA}$ is the 3-day size-adjusted return surrounding the earnings announcement date. The last abnormal return metric (lwCAR) is a long-window size-adjusted return that extends from one day before the first mean consensus analyst forecast for the quarter until one day following the earnings announcement date. This quarterly return metric captures the entire valuation effects of total earnings news disclosed during the period.

[Insert Table 4 Here]

Focusing on the group of firms with small (1 to 5 cents) positive total earnings news in Panel A, the investor response surrounding the guidance is slightly positive, as indicated by the 1.4 percent abnormal return.[10] The median abnormal return surrounding the subsequent earnings announcement is also positive, albeit small in magnitude (only 0.9 percent). This evidence is consistent with managers disclosing only a portion of good news at the guidance date (Soffer et al., 2000). The abnormal return for the no-guidance matched sample is 1.6 percent at the earnings announcement date and is significantly greater than the return for the guidance sample, which is to be expected given that some of the good news for the guidance sample was disclosed previously when the guidance was issued. The overall abnormal return for the quarter (lwCAR) is close to four percent for both groups and is not significantly different across the two samples.

Turning now to the medium (+6 to +15 cents) and large (>+15 cents) total earnings news partitions, we continue to find significantly positive abnormal returns around the guidance date and the earnings announcement date for the guidance sample, indicating that the guidance provides positive news to the market, but that managers saved some positive news for the earnings announcement. One important difference for the medium and large total earnings news subsamples, however, is that we observe a more pronounced quarterly return for the guidance sample relative to the quarterly return for the no-guidance matched sample. The difference is statistically significant at the $\alpha = .01$ level for both

[10] We do not indicate in the table statistical significance for the median levels; however, unless otherwise indicated, all medians are statistically significant at conventional levels.

medium and large positive total earnings news.  Thus, for medium and large total earnings news, univariate differences in medians suggest that firms can realize more positive abnormal returns when they provide guidance during the period.  Assuming that the guidance does not disclose more than 100 percent of the good news, this result is consistent with the cue consistency theory forwarded in Miller (2005).

Results for firms with negative total earnings news are reported in Panel B of Table 4, and it is here where substantial differences arise between the guidance and no-guidance samples.  When the negative total earnings news is small (-1 to -5 cents), the 3-day abnormal return surrounding the guidance is large in absolute value, -3.5 percent.  The absolute magnitude is substantially greater than the 1.4 percent abnormal return for small upward guidance in Panel A, however, this could be due to managers disclosing a greater portion of bad news relative to the portion of good news they disclose at the guidance date.  The median abnormal return at the earnings announcement date is not significantly different from zero for the guidance sample,[11] and is -1.3 percent for the no-guidance sample.  This difference is statistically significant at the $\alpha = .01$ level, as would be expected since the guidance sample likely disclosed their bad news at the guidance date.  However, the finding in the last column that the quarterly abnormal return is significantly more negative for the guidance sample suggests that firms might be penalized from a stock price perspective for providing the guidance relative to those firms with no guidance.  The difference of 4.1 percent is substantial given the relatively low level of total earnings news.

For the medium (-6 to -15 cents) and large (< -15 cents) negative total earnings news groups, we find qualitatively similar results but larger magnitudes for the median levels and differences in medians. Most importantly, quarterly abnormal returns to negative total earnings news are much more pronounced when firms provide guidance during the period.  The differences in lwCAR for the medium and large total earnings news groups are -7.9 and -8.6 percent, respectively.  These magnitudes are substantially greater in absolute magnitude than the corresponding differences for positive total earnings news in Panel A, and

[11] The median abnormal return surrounding the earnings announcement date for the medium total earnings news group is also not significantly different from zero.  All other median levels in the panel are significant at conventional levels.

provide preliminary evidence consistent with there being a stock price penalty for negative quarterly earnings guidance.

To more fully control for the effects of the magnitude of total earnings news on returns, we estimate the following regression (firm and time subscripts omitted):

$$lwCAR = \beta_0 + \beta_1 TNews\% + \beta_2 GUIDE + \beta_3 DOWN^{Guide} + \beta_4 PS^{EA} + \beta_5 PTNews + \gamma_i \sum_{i=1}^{53} QTR + \varepsilon \qquad (1)$$

The variables lwCAR (long window return) and TNews% (total earnings news) have been defined previously. GUIDE is an indicator variable equal to one when the firm provides guidance during the quarter, and zero if the observation is a matched control firm. $DOWN^{Guide}$ is an indicator variable equal to one when the quarterly earnings guidance direction is negative, and zero otherwise. Thus, the sum of $\beta_2$ and $\beta_3$ yields the average effect on returns from issuing downward earnings guidance after controlling for total earnings news. A negative sum would be consistent with the preliminary findings in Table 4 suggesting a market penalty to issuing an earnings warning. The coefficient on GUIDE ($\beta_2$) provides evidence as to how stock prices are affected by the issuance of upward and confirming guidance.

The variable $PS^{EA}$ is an indicator variable equal to one when the firm reports a positive surprise at the earnings announcement date, and zero otherwise. The coefficient on this variable is expected to be positive if the firm receives a market reward from reporting actual earnings that beat expectations, as documented in prior research (Bartov et al. 2002). Thus, the sum of $\beta_2 + \beta_3 + \beta_4$ compares the positive stock price effects that arise from the firm reporting a positive earnings surprise with the negative effects from issuing an earnings warning (after controlling for the magnitude of total earnings news), and represents a formal test of our hypothesis.

PTNews is an indicator variable equal to one when the firm's total earnings news is positive, and zero otherwise. Caylor et al. (2007) provide evidence that the market reward to meeting analysts' forecasts is more a function of the first analyst forecast as opposed to the most recent forecast. Thus, if this finding holds for our sample and period, we expect the coefficient on this variable to be positive.

To test the significance of the coefficient magnitudes in equation 1 (and all other regression equations), we control for dependency in the error terms by reporting standard errors clustered by firm and include quarterly dummy variables in the regression (Petersen, 2009; Rogers, 1993). To control for outliers and observations with undue influence on the regression parameters, we delete observations where the value of total earnings news is greater in absolute value than 25 percent of stock price or abnormal returns is greater than 100 percent in absolute value.[12]

The results from estimating equation 1 are reported in Table 5 (quarterly dummies not reported). In addition to the full model, we report results from estimating a reduced model that merely examines the well-known relation between earnings and contemporaneous returns and forecast revisions. Comparing the full and reduced models provides some insight as to the effect of the indicator variables on the model's fit and their significance in explaining how investors and analysts respond to total earnings news. As expected, TNews% is highly significant. The magnitude of the slope coefficient suggests that for each dollar of total earnings news, stock price increases by approximately $3.41. Measurement error in the explanatory variable and non-linearities in the regression both suggest that this slope coefficient is likely understated (Kothari and Zimmerman, 1995).

[Insert Table 5 Here]

Upon estimating the full model, we find a significant increase in the adjusted-$R^2$ and TNews% remains highly significant. We document a significantly positive coefficient on GUIDE, which indicates that firms realize a small stock price bump from providing upward guidance during the period independent of total earnings news, which is consistent with evidence presented in Table 4. Also consistent with Table 4 results, we find a significantly negative stock price effect on quarterly earnings of about -9.3 percent (-10.8 + 1.5) when firms issue downward earnings guidance. As expected and consistent with prior research, there is an equity premium to meeting the most recent analyst forecast after controlling for the magnitude of total earnings news (Lopez and Rees, 2002). However, this equity

[12] Admittedly, these parameter cut-offs are arbitrary, but they result in fewer deleted observations compared to the no less arbitrary method of deleting observations in the extreme 1 or 5 percentile tails of the distribution, which is a common practice in the literature.

premium does not compensate for the downward earnings guidance, as the absolute magnitude of $\beta_2 + \beta_3$ is significantly greater than that of $\beta_4$ (p-value = .001).[13]

The results in Tables 4 and 5 provide new insight as to the net effects from a valuation perspective of guiding earnings down in order to report a positive earnings surprise. When firms have negative total earnings news, they would appear to benefit from going silent, which helps explain why firms choose this route during periods of poor operating performance (e.g., Chen et al., 2007; Cheng et al., 2007; Houston et al., 2008). The results are in stark contrast with research on preannouncement strategies (e.g., Soffer et al., 2000; Tan et al., 2002) suggesting that the optimal strategy is one that ensures a positive earnings surprise at the earnings announcement date. It appears that the pronounced investor reaction to downward earnings guidance is not offset by the equity reward from reporting a positive surprise, which is a new finding that this study contributes to the literature.

## 5. Rationality of the Stock Price Penalty for Downward Earnings Guidance

The previous section documents a net stock price penalty to issuing downward quarterly guidance, even after considering the stock price bump from beating analysts' forecasts. In particular, the evidence in Tables 4 and 5 consistently shows that downward guidance results in lower quarterly abnormal returns. This response by investors could be rational if firms, by choosing to issue downward earnings guidance in the current period, are signalling (either implicitly or explicitly) poor future performance. Alternatively, given that earnings guidance merely communicates differently the same earnings information for the current period after holding constant the level of total earnings news, it's possible the results are due to a market overreaction to downward earnings guidance. In an experimental setting, Libby and Tan (1999) find that although analysts believe earnings declines are less permanent for those firms that warn investors, the process of sequentially processing two signals (an earnings preannouncement warning and the subsequent actual earnings release) results in lower forecasts of future

[13] We also document an incremental and more pronounced equity premium when firms beat the first mean consensus analyst forecast for the period, which is consistent with Caylor et al. (2007), however, this stock price effect does not depend on whether or not the firm provides guidance during the period.

earnings for firms that warn of bad news. This disconnect between what individuals believe and how they behave is a common finding in the judgment and decision making psychology literatures (Libby, 1981).

To provide evidence on whether the stock price penalty to downward earnings guidance is rational, we first estimate regressions that aggregate earnings news and equity returns over multiple periods. The association of downward guidance with contemporaneous forecast revisions and abnormal returns could be a function of guidance firms disclosing more bad news about future earnings realizations (Tucker, 2007). If this is the case, by including future earnings performance in a regression model where equity returns are cumulated over the corresponding periods that earnings are aggregated, we should observe an attenuation of the coefficient on $DOWN^{Guide}$ since any future earnings signal contained within the downward guidance is explicitly included in the model. Likewise, prior research generally attributes the stock price premium to meeting analysts' forecasts as a signal for superior future performance (Bartov et al., 2002). If this is the case, a similar attenuation for the coefficients on $PS^{EA}$ and PTNnews should be observed as future earnings realizations are included in the model.

Accordingly, we estimate the following three regressions, where earnings and returns are aggregated over two, three, and four quarters, respectively.

<u>Two Period Model</u>

$$CAR^2 = \gamma_0 + \gamma_1 TNews\%^2 + \gamma_2 GUIDE + \gamma_3 DOWN^{Guide} + \gamma_4 PS^{EA} + \gamma_5 PTNews + \gamma_6 PS^{EAt+1} + \gamma_7 PTNews^{t+1} + \beta_i \sum_{i=1}^{53} QTR + \varepsilon \quad (2)$$

<u>Three Period Model</u>

$$CAR^3 = \gamma_0 + \gamma_1 TNews\%^3 + \gamma_2 GUIDE + \gamma_3 DOWN^{Guide} + \gamma_4 PS^{EA} + \gamma_5 PTNews + \gamma_6 PS^{Eat+1} + \gamma_7 PTNews^{t+1} + \gamma_8 PS^{Eat+2} + \gamma_9 PTNews^{t+2} + \beta_i \sum_{i=1}^{53} QTR + \varepsilon \quad (3)$$

<u>Four Period Model</u>

$$CAR^4 = \gamma_0 + \gamma_1 TNews\%^4 + \gamma_2 GUIDE + \gamma_3 DOWN^{Guide} + \gamma_4 PS^{EA} + \gamma_5 PTNews + \gamma_6 PS^{EAt+1} + \gamma_7 PTNews^{t+1} + \gamma_8 PS^{EAt+2} + \gamma_9 PTNews^{t+2} + \gamma_{10} PS^{EAt+3} + \gamma_{11} PTNews^{t+3} + \beta_i \sum_{i=1}^{53} QTR + \varepsilon \quad (4)$$

The dependent variables in the respective models ($CAR^2$, $CAR^3$, and $CAR^4$) are size-adjusted returns extending from one day prior to the first mean consensus forecast in quarter *t* through one day following the earnings announcement in quarters *t*+1, *t*+2, and *t*+3, respectively. Therefore, these returns reflect earnings information disclosed within the earnings guidance in quarter *t* and the entire subsequent quarter(s). $TNews\%^2$, $TNews\%^3$, and $TNews\%^4$ are the total earnings news aggregated over the quarters that correspond with the dependent variable, deflated by stock price as of the first consensus analyst forecast for quarter *t* occurring after the earnings announcement for quarter *t*-1. Specifically, total earnings news in quarter *t* is defined as before (actual earnings in quarter *t* less the first mean consensus analyst forecast after the earnings announcement for quarter *t*-1). In subsequent quarters *t*+1 through *t*+3, total earnings news is defined as actual earnings for those quarters less market expectations existing in quarter *t*. When available, existing analysts' forecasts for the corresponding quarters that exist prior to the earnings guidance in quarter *t* are used as proxies for market expectations. However, most firms do not have analysts' forecasts beyond quarter *t*+1. Therefore, when analysts' forecasts for future quarters are not available, we use actual earnings realized by the firm in the same fiscal quarter one year earlier.[14]

$PS^{EA}$ and PTNews, as defined before, are indicator variables equal to one when the firm reports actual earnings greater than the earnings guidance (or the last available mean consensus analyst forecast for the no-guidance sample) and the first available mean consensus forecast for the quarter *t*, respectively. The remaining variables in the model are similar indicator variables for the quarter indicated. For example, $PS^{EAt+1}$, $PS^{EAt+2}$, and $PS^{EAt+3}$ are equal to one when the firm reports actual earnings in quarters *t*+1, *t*+2, and *t*+3, respectively, that exceed the most recent mean consensus analyst forecast prior to the earnings announcement for that quarter. Similarly, $PTNews^{t+1}$, $PTNews^{t+2}$, and $PTNews^{t+3}$ are equal to one when actual earnings in the respective quarters exceed market expectations as of the guidance date in quarter *t*.

[14] As an alternative approach to obtain market expectations when analysts' forecasts are unavailable, actual earnings in previous periods are adjusted by the difference between consensus analysts' forecasts for quarter *t* that existed immediately prior to the guidance, and the last consensus analyst forecast for quarter *t*-4 prior to the earnings announcement for quarter *t*-4. This approach assumes that any forecasted improvement or decline in earnings for the current period relative to a year ago is permanent and the trend will continue for all subsequent quarters. Results from this alternative approach are qualitatively identical to what is reported in Table 6.

Results from estimating the multi-period regression equations 2 through 4 are presented in Table 6. The coefficient magnitudes and significance levels for $DOWN^{Guide}$, $PS^{EA}$, and PTNews can be compared with the one period model reported in Table 5. As expected, the association between returns and earnings news is strongly positive in every regression, and the magnitude of $\gamma_1$ increases as the number of aggregated periods increase, consistent with prior research (Warfield and Wild, 1992). Of particular interest in these regressions are the magnitudes of $\gamma_2$ through $\gamma_5$. The coefficients on GUIDE and $DOWN^{Guide}$ are significant in every period, and their magnitudes are similar across regressions. Thus, the returns association with a firm's providing guidance and, in particular, the disproportionate decrease in market value from providing downward guidance persists up through quarter *t*+3 and there is virtually no attenuation in this association (change in coefficients across models is not significantly different). This stock price penalty cannot be explained by a decrease in future earnings performance given that future earnings are explicitly included in these models. The association between market value and downward guidance appears to be incremental to any information contained within the guidance about current or future earnings.

[Insert Table 6 Here]

In contrast to the persistent magnitude of the coefficients for GUIDE and $DOWN^{Guide}$, we find a general decline in coefficient magnitudes for $PS^{EA}$ and PTNews and their future counterparts as we increase the number of periods in the model (from the one period model in Table 5 to the four period model in Table 6). For example, the coefficient for $PS^{EA}$ in regression equation (1) reported in Table 5 is 0.024, suggesting a 2.4 percent equity premium for meeting analysts' expectations at the earnings announcement, after controlling for total earnings news. This premium tends to decline as future earnings are included in the regression. The only exception is $\gamma_4$ in the four period model relative to the three period model. A general declining trend for PTNews is also observed and for these variables' future counterparts (coefficients $\gamma_6 - \gamma_9$ in Table 6). These results are consistent with the notion that the premium to beating analysts' forecasts (whether it be the first or last forecast for the period) is a rational market response to signals about future earnings performance, and the premium declines as earnings performance is explicitly included in the model.

To provide further evidence on the rationality of the differential market response to downward guidance, we also re-estimate regression equation (1) using a two-stage Heckman selection model to control for a potential self-selection bias wherein firms who choose to issue guidance may have larger amounts of unfavourable news than other firms. Although researchers have expressed concerns in recent years regarding these types of selection models (e.g., Francis and Lennox, 2008; Kennedy, 2008; Puhani, 2000), the use of such a model increases the comparability of our findings with those of prior research, notably Tucker (2007).

In the first stage, we follow Tucker (2007) in modelling managers' litigation, reputation, and earnings-torpedo-related motives for issuing guidance. The following six instrumental variables from Tucker (2007) are utilized: the log of market value of equity, the log of the absolute value of the earnings surprise, the number of quarterly earnings guidelines issued in the previous year, the average number of analysts following the firm, the market-to-book ratio, and earnings volatility. We also include three additional instruments. Litigation risk is captured by including an indicator variable equal to one if the firm belongs to a high litigation-risk industry as defined by Matsumoto (2002). To capture earnings-torpedo-related effects that might motivate managers to warn (Skinner and Sloan, 2002), we include stock return volatility during the previous 12 months and the consensus analyst long-term earnings growth forecast.

Similar to Tucker (2007), we interact the inverse Mills ratios from this analysis with GUIDE in our second stage. In untabulated analysis, we find that while this control for self-selection does slightly reduce the magnitude of the results in Table 5, inferences remain unchanged.[15] Thus, our results do not appear to be driven by a self-selection bias that is related to other earning news simultaneously disclosed by guidance firms.

[15] Specifically, the negative stock price effect of issuing downward guidance is reduced from -9.4 percent to -6.9 percent, while the equity premium from meeting analysts' expectations decreases from 2.7 percent to 2.0 percent. More importantly, the absolute magnitude of $\beta_2 + \beta_3$ remains significantly greater than that of $\beta_4$ (p-value = .001).

## 6. Reconciling Results with Prior Research

The evidence in this study indicates that firms realize a stock price penalty from issuing negative quarterly earnings guidance that exceeds the stock price premium from meeting analysts' forecasts, after holding total earnings news constant. Our results do not explain the rationale for the penalty, but they can assist in explaining why firms tend to discontinue providing guidance during times of poor operating performance (e.g., Chen et al., 2007; Cheng et al., 2007; Houston et al., 2008). In addition, our results are consistent with some prior research on the differential market response to downward guidance (Hutton et al., 2003) and the market response to pre-earnings announcement warnings of large negative surprises (Kasznik and Lev, 1995). However, our results contrast with research suggesting that the optimal disclosure strategy from a stock price perspective is to ensure a positive surprise at the earnings announcement, even when that means talking analysts' forecasts down. In this section, we attempt to reconcile our results with prior contrasting research by initially estimating the same regression specifications that were implemented in other studies, and then expanding the regressions to examine the incremental significance of $DOWN^{Guide}$.

Two archival studies that draw different conclusions from this study are Soffer et al. (2000) and Miller (2005). Soffer et al. (2000) conclude that the market reacts more strongly to the earnings announcement compared to an earnings preannouncement, which is opposite from what we find for downward guidance observations. Also, Soffer et al. conclude that the optimal preannouncement strategy to maximize stock price is to always report a positive earnings surprise. In their study, the sign of the preannouncement surprise is unimportant so long as it does not preclude a firm from reporting a positive surprise at the earnings announcement date.

Miller (2005) concludes that the market reaction to total earnings news is most pronounced when the guidance news and earnings announcement news are of the same sign. This cue consistency theory is not completely consistent with the implications in this study that suggest the key to an optimal disclosure strategy is not the consistency of the earnings surprises but rather, the sign of the earnings guidance.

We use the same terminology employed in Soffer et al. (2000) to express their regression specification as follows:

$$CAR^{PA-1,EA+1} = \alpha_0 + \alpha_1 TOTNEWS + \alpha_2 NEG^{EA} + \alpha_3(TOTNEWS * NEG^{EA}) + \varepsilon \quad (5)$$

The measurement of the variables in equation (5) is equivalent or very similar to what has already been used in regression equations (1) through (4) in this study, and we continue to employ the same measurement procedures as before. Any differences in variable measurement between this study and Soffer et al. (2000) are specifically delineated. $CAR^{PA-1,EA+1}$ is defined in Soffer et al. (2000) as the size-adjusted return extending from one day before the earnings guidance to one day following the official earnings release date. We extend the window for this variable to one day before the first consensus analyst forecast to ensure that all the earnings news is captured by returns. TOTNEWS or total earnings news is measured the same way as TNews% in equation (1).[16] $NEG^{EA}$ is an indicator variable equal to one when the firm reports a negative surprise at the earnings announcement date and zero otherwise.[17]

Upon initially estimating equation (5) and comparing our results with the results reported in Soffer et al. (2000), we estimate an expanded equation that includes $DOWN^{Guide}$ as an additional explanatory variable, which indicates whether or not the earnings guidance during the period is downward (as defined before).

$$CAR^{PA-1,EA+1} = \alpha_0 + \alpha_1 TOTNEWS + \alpha_2 NEG^{EA} + \alpha_3(TOTNEWS * NEG^{EA}) + \alpha_4 DOWN^{Guide} + \varepsilon \quad (6)$$

Similar to Soffer et al. (2000) we estimate regression equation (6) only for the guidance sample.

A similar process is employed to reconcile our results to those reported in Miller (2005). The regression specification employed in Miller (2005) is as follows:

$$CAR = \beta_0 + \beta_1 TOTSURP + \beta_2 NEGEPSSURP + \beta_3 TOTSURPSIGN + \beta_4(TOTSURPSIGN * TOTSURP)$$
$$+ \beta_5 NEGEARN + \beta_6(NEGEARN * TOTSURP) + \beta_7 PATHTYPE + \beta_8(PATHTYPE * TOTSURP) + \varepsilon \quad (7)$$

[16] Soffer et al. (2000) deflate total earnings news by beginning of quarter stock price instead of stock price as of the first consensus analyst forecast for quarter *t* occurring after the earnings announcement for quarter *t*-1.
[17] Soffer et al. (2000) define $NEG^{EA}$ as equal to one when the earnings preannouncement released more than 105% of its positive news or less than 95% of its negative news.

CAR and TOTSURP are defined equivalently as lwCAR and TNews in equation (1).[18] NEGEPSSURP is defined the same way as $NEG^{EA}$ in equation (6); specifically, it is an indicator variable equal to one when the firm reports a negative surprise at the earnings announcement date. TOTSURPSIGN is defined equivalently to PTNews, which is an indicator variable equal to one when the firm reports actual earnings in excess of the mean consensus analyst forecast prior to the guidance. NEGEARN is an indicator variable equal to one when the actual earnings are negative and zero otherwise. Finally, PATHTYPE tests the primary hypothesis in Miller (2005) that the market reaction will be more pronounced when the guidance and official earnings news are of the same sign. This indicator variable is equal to one when the signs of the surprises on the two dates are consistent, and zero otherwise.

After estimating the regression in Miller (2005), we expand the equation to include $DOWN^{Guide}$ as follows to assess whether or not reporting downward guidance has an incremental effect on stock prices.

$$CAR = \beta_0 + \beta_1 TOTSURP + \beta_2 NEGEPSSURP + \beta_3 TOTSURPSIGN + \beta_4 (TOTSURPSIGN * TOTSURP) + \beta_5 NEGEARN + \beta_6 (NEGEARN * TOTSURP) + \beta_7 PATHTYPE + \beta_8 (PATHTYPE * TOTSURP) + \beta_9 DOWN^{Guide} + \varepsilon \quad (8)$$

The results from this exercise are reported in Table 7. Panel A is related to Soffer et al. (2000) and Panel B relates to Miller (2005). The first row of regression results presents what is reported in the original papers. The second row presents the results from estimating the same regression specifications on our sample. As can be seen in Panel A of Table 7, we are able to produce results that are qualitatively similar to what is reported in Soffer et al. (2000). The only meaningful difference is that we find a significantly negative coefficient for the slope interaction $TOTNEWS*NEG^{EA}$; probably because the size of our sample allows for more powerful tests that can detect smaller effects.

[Insert Table 7 Here]

In the last column, we examine how the interpretation of the results is affected by the inclusion of $DOWN^{Guide}$ in the regression. Consistent with our prior results, we continue to find a negative coefficient for $DOWN^{Guide}$ that is strongly significant. We also continue to find a significant coefficient for $NEG^{EA}$;

[18] Miller (2005) deflates TOTSURP by stock price as of ten days prior to the guidance date.

thus, our results confirm the notion that firms realize more positive returns when they are able to avoid reporting a negative earnings surprise. This result is consistent with what is reported in Tables 5 and 6. However, the significance and magnitude of the $DOWN^{Guide}$ coefficient gives rise to a different interpretation of the relative importance of talking down analysts' forecasts in order to report a positive earnings surprise, as the coefficient on $DOWN^{Guide}$ is significantly more negative than that of $NEG^{EA}$ (p-value = .001), suggesting that the stock price effects of reporting a positive earnings surprise are not as large in absolute value and do not completely offset the negative effects of reporting downward earnings guidance.

The first row of regression results in Panel B presents what was reported in Miller (2005). We are unable to produce an exact replication of Miller (2005). Most importantly, the coefficient on the PATHTYPE*TOTSURP interaction term is not significant for our sample, suggesting that this result is not robust across firms and/or over time. Otherwise, most of the results for our sample are close to what is presented in Miller (2005). Further, the coefficient on $DOWN^{Guide}$ remains strongly significant within this model, providing more evidence of the robustness of our primary findings across regression specifications, and provides a different interpretation from what is presented in Miller (2005) as to the optimal disclosure strategy to maximize stock price.

## 7. Conclusions and Discussion

Prior studies have examined the important issue of the overall market reaction to the combined news disclosed in earnings preannouncements and subsequent official earnings releases. The evidence from this line of literature is not completely consistent. Some studies suggest that warning investors of impending bad news will result in a more negative overall market response even though the total earnings news is the same if there had been no warning (Kasznik and Lev, 1995; Libby and Tan, 1999). In contrast, more recent research indicates that an optimal disclosure strategy is to guide earnings expectations to ensure a positive surprise at the official earnings release date (Soffer et al., 2000; Tan et al., 2002; Miller, 2005). These latter results suggest that investors and analysts tend to react more strongly to earnings announcements compared to preannouncements, but this notion cannot be neatly reconciled with the literature that consistently shows a substantial market reaction to management earnings guidance, especially when the guidance is negative (Hutton et al., 2003). Further, although Caylor et al., (2007) do not examine earnings guidance explicitly issued by managers, they find evidence indicating that the optimal disclosure strategy is not always to ensure a positive earnings surprise.

With the development of First Call's *Company Issued Guidance* database, researchers have access to better data to examine the importance of voluntary management disclosures relative to official earnings announcements. Based upon a large sample extracted from this database, we show that controlling for the magnitude of total earnings news, quarterly stock returns are more negative when the firm provides downward earnings guidance during the period relative to a no-guidance control sample. This study is the first to provide large-sample evidence on the net benefits to explicitly guiding earnings expectations down to a beatable level.

We examine whether this net stock price penalty for downward guidance can be explained by future earnings realizations. The inclusion of future earnings in a multiple-period regression framework reveals that the stock price penalty to downward guidance persists over at least three subsequent quarters relative to the guidance quarter, while the premium to meeting analysts' forecasts is attenuated over the same period. This result indicates that the market response to the guidance cannot be explained by differential operating performance over the next three quarters. Using a Heckman two-stage selection model, we also show that this market response to downward guidance is not driven by a self-selection bias. These results go against the conventional wisdom that companies can benefit from warning investors about impending bad news, and that stock price is maximized when managers report a positive earnings surprise even when downward guidance is required to do so.

Consistent with prior research, we observe that most guidance is negative, which begs the question: if downward guidance is overall harmful to firm value after controlling for total earnings news, why do managers provide downward guidance? A potential response is the general trend among companies of discontinuing the practice of providing short-term guidance. A 2007 survey by the National

Investor Relations Institute indicates that 51 percent of its members in that year provided earnings guidance, which is a substantial decline from 77 percent in 2003. Research has found that company decisions to go silent are associated with negative operating performance (Chen et al., 2007; Houston et al., 2008). Further, a recent working paper finds that when total earnings news for a period is negative, a greater proportion of it is released through the earnings announcement relative to positive total earnings news (Roychowdhury and Sletten, 2010). This evidence suggests that many managers might be aware of the penalty for downward guidance and take actions to avoid it.

Although we are unaware of managers explicitly citing stock price effects of downward guidance as a motive for discontinuing the practice of issuing guidance, it stands to reason that if a stock price penalty exists for downward guidance, then it would serve as an incentive to managers to stop issuing guidance altogether and not only during periods of poor performance. Selectively issuing guidance only when managers have good news would not seem to be a prudent policy, as that would expose the firm to greater liability. When firms do not meet analysts' forecasts and stock price falls precipitously, stockholders are eager to assign blame to managers. Having demonstrated a willingness to provide guidance in the past when analysts' forecasts were too low, managers could be held liable if they stay silent when analysts' forecasts are too high. In contrast, when a firm adopts a "no guidance" policy, managers are unlikely to be held responsible for what third parties (i.e., analysts) say about the firm. In fact, avoiding litigation is a reason cited by managers as to why they discontinue providing guidance (Morgan, 2003). Another potential response as to why most earnings guidance is negative is the possibility that managers believe the conventional wisdom that firms are penalized for not being forthcoming about bad news.

Our results suggest that the market response to negative guidance is not rational. An explanation for the response is beyond the scope of this study, but prior behavioural research provides a possible explanation. Libby and Tan (1999) design an experiment that examines analyst forecast revisions of future earnings under different conditions. One set of analysts are asked to provide a new forecast after an earnings warning and then again after the official earnings release (a sequential condition). Another group of analysts are given the same information from the warning and official earnings release simultaneously (a simultaneous condition) and asked to provide a new forecast. Finally, a third group of analysts provide a new forecast after being informed only about the actual earnings with no warning (a no warning condition). The authors find that analysts seem to prefer a warning about negative earnings because the revisions for the simultaneous condition were less negative compared to the no warning condition. However, the sequential condition resulted in the most negative revisions, which suggests that any perceived benefit from warning investors about negative earnings is more than offset by the cognitive process of sequentially receiving an earnings warning followed by an earnings announcement. These results provide a possible explanation for the apparent disconnect between the conventional wisdom that downward guidance might ultimately benefit companies' stock price and actual market behaviour.

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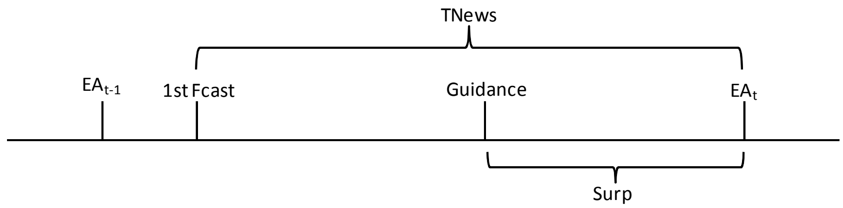
**Figure 1: Earnings News Timeline**




EA = Earnings Announcement
1st Fcast = First Consensus Analyst Forecast for quarters t and t+1
Guidance = Earnings Guidance
TNews = Total Earnings News determination period
Surp = Earnings Surprise determination period

## Table 1
### Sample Selection Process

| | No. of Firms | No. of Observations |
|---|---|---|
| Data on First Call's Company Issued Guidance Database from 1993-2006 | 6,698 | 86,413 |
| Sample Screens: | | |
| Delete open-ended or qualitative management guidance | 5,703 | 71,606 |
| Delete annual guidance | 4,953 | 37,462 |
| Retain only the last guidance for the quarter | 4,902 | 29,222 |
| Delete observations with insufficient analysts' forecast data[a] | 3,257 | 11,823 |
| Delete observations where earnings announcement occurs more than 75 days after quarter end | 3,230 | 11,730 |
| Delete observations with insufficient CRSP data | 3,122 | 11,375 |
| Delete observations with insufficient data for matched firm[b] | 2,751 | 8,635 |
| Total Sample of Quarterly Earnings Guidance Observations | 2,751 | 8,635 |

[a]The following analysts' forecasts from I/B/E/S are required for an observation to be retained in the sample: 1) mean consensus forecast for quarter *t* that occurs after the earnings announcement from quarter *t*-1 and before the earnings guidance for quarter *t*, 2) mean consensus forecast for quarter *t*+1 that occurs after the earnings announcement from quarter *t*-1 and before the earnings guidance for quarter *t*, and 3) mean consensus forecast for quarter *t*+1 that occurs after the earnings announcement in quarter *t*.

[b]We require the matched firm to have returns data available on CRSP and actual earnings and analyst forecast data on I/B/E/S.

## Table 2
### Descriptive Statistics

| Variable | Sample | N | Mean | Median | Inter-quar Range |
|---|---|---|---|---|---|
| EPS | Earnings Guidance Sample | 8,635 | $ 0.26 | $ 0.21 | $0.35 |
| | Matched Sample | 8,635 | 0.22 | 0.18 | 0.40 |
| TNews% | Earnings Guidance Sample | 8,635 | -0.36% | -0.11% | 0.64% |
| | Matched Sample | 8,635 | -0.44 | -0.11 | 0.64 |
| AnaF | Earnings Guidance Sample | 8,635 | 7.6 | 6 | 7 |
| | Matched Sample | 8,635 | 6.4 | 5 | 7 |
| Disp | Earnings Guidance Sample | 7,934 | 1.9% | 1% | 1% |
| | Matched Sample | 7,287 | 3.0 | 2 | 2 |
| MB | Earnings Guidance Sample | 8,613 | 2.9 | 2.2 | 2.0 |
| | Matched Sample | 8,601 | 3.7 | 2.1 | 2.4 |
| Lev | Earnings Guidance Sample | 8,612 | 1.3 | 0.8 | 1.2 |
| | Matched Sample | 8,599 | 1.7 | 0.9 | 1.4 |
| Assets | Earnings Guidance Sample | 8,635 | $2,705 | $533 | $1,559 |
| | Matched Sample | 8,635 | 2,895 | 563 | 1,746 |
| Sales | Earnings Guidance Sample | 8,627 | $569 | $141 | $383 |
| | Matched Sample | 8,628 | 480 | 121 | 335 |

The earnings guidance sample is comprised of observations from First Call's *Company Issued Guidance* database during the period 1993-2006 where the firm disclosed quarterly earnings guidance after the earnings announcement for quarter *t*-1 and before the official earnings announcement for quarter *t* (see Table 1 for the sample selection criteria). Each firm/quarter guidance observation is matched with a no-guidance firm where the matching criteria are calendar quarter , industry, size, and the sign and magnitude of total earnings news. Total earnings news is defined as the unscaled difference between actual earnings per share for quarter *t* less the first mean consensus forecast for the same period that is issued after the earnings announcement for quarter *t*-1.
Variable definitions: EPS = reported actual earnings per share for quarter t; TNews% = EPS minus the first mean consensus analyst forecast for the period occurring after the earnings announcement for quarter *t*-1, deflated by stock price as of the first consensus analyst forecast for the period; AnaF = the number of unique analyst forecasts that comprise the last consensus forecast for quarter *t*; Disp = dispersion in analysts' forecasts that comprise the last consensus forecast for quarter *t*; MB = market value of common stock divided by the book value of common shareholders' equity as of the end of fiscal quarter *t*; Lev = total liabilities divided by total shareholders' equity as of the end of fiscal quarter *t*; Assets = total assets as of the end of fiscal quarter *t*; Sales = total revenues for quarter *t*.

## Table 3
**Frequency Matrix of News Released at the Earnings Guidance and Official Earnings Announcement Dates**

| Direction of Earnings Guidance | Nature of Earnings Surprise: Positive | Neutral | Negative | Totals |
|---|---|---|---|---|
| Up | | | | |
| N | 1,576 | 439 | 367 | 2,382 |
| % of row total | 66% | 19% | 15% | 100% |
| % of column total | 32% | 23% | 20% | 27% |
| Confirming | | | | |
| N | 459 | 312 | 69 | 840 |
| % of row total | 55% | 37% | 8% | 100% |
| % of column total | 9% | 16% | 4% | 10% |
| Down | | | | |
| N | 2,857 | 1,197 | 1,359 | 5,413 |
| % of row total | 53% | 22% | 25% | 100% |
| % of column total | 59% | 61% | 76% | 63% |
| Totals | | | | |
| N | 4,892 | 1,948 | 1,795 | 8,635 |
| % of row total | 57% | 22% | 21% | 100% |
| % of column total | 100% | 100% | 100% | 100% |
| No Earnings | 3,681 | 1,021 | 3,933 | 8,635 |
| Guidance | 43% | 12% | 45% | 100% |

The guidance sample consists of 8,635 observations during the period 1993-2006 as obtained from First Call's *Company Issued Guidance* database where managers provided quarterly earnings guidance for quarter *t* after the earnings announcement for quarter *t*-1 (see Table 1 for sample screening criteria). The direction of earnings guidance is determined by comparing the guidance with the mean consensus analyst forecast that exists immediately prior to the guidance. The nature of the news at the official earnings announcement date is considered positive (neutral) [negative] when actual earnings are greater than (equal to) [less than] the earnings guidance for the guidance sample. For the matched sample, the nature of news at the official earnings announcement date is considered positive (neutral) [negative] when actual earnings are greater than (equal to) [less than] the most recent mean consensus forecast for the period.

## Table 4
**Median Analyst Forecast Revisions of Future Earnings Forecasts and Stock Returns Across Different Guidance Paths**

Panel A: Positive Total Earnings News

| | N | $CAR^{EG}$ | $CAR^{EA}$ | lwCAR |
|---|---|---|---|---|
| TNews from +1 to +5 | | | | |
| Guidance Sample | 1,953 | 1.4% | 0.9% | 3.9% |
| Matched Sample | 1,953 | NA | 1.6 | 3.8 |
| Median Difference | | NA | $-0.6^{***}$ | 0.3 |
| TNews from +6 to +15 | | | | |
| Guidance Sample | 845 | 4.3% | 1.4% | 10.9% |
| Matched Sample | 845 | NA | 2.5 | 7.2 |
| Median Difference | | NA | $-1.4^{***}$ | $2.9^{***}$ |
| TNews greater than +15 | | | | |
| Guidance Sample | 175 | 5.2% | 1.6% | 12.6% |
| Matched Sample | 175 | NA | 2.8 | 8.7 |
| Median Difference | | NA | -1.1 | $4.3^{***}$ |

Panel B: Negative Total Earnings News

| | N | $CAR^{EG}$ | $CAR^{EA}$ | lwCAR |
|---|---|---|---|---|
| TNews from -1 to -5 | | | | |
| Guidance Sample | 1,859 | -3.5% | -0.0% | -6.7% |
| Matched Sample | 1,859 | NA | -1.3 | -2.5 |
| Median Difference | | NA | $1.2^{***}$ | $-4.1^{***}$ |
| TNews from -6 to -15 | | | | |
| Guidance Sample | 2,203 | -8.5% | 0.1% | -12.4% |
| Matched Sample | 2,203 | NA | -1.3 | -5.1 |
| Median Difference | | NA | $1.5^{***}$ | $-7.9^{***}$ |
| TNews less than -15 | | | | |
| Guidance Sample | 975 | -11.4% | -0.4% | -18.0% |
| Matched Sample | 975 | NA | -1.6 | -7.2 |
| Median Difference | | NA | $1.2^{***}$ | $-8.6^{***}$ |

The guidance sample consists of 8,635 observations during the period 1993-2006 as obtained from First Call's *Company Issued Guidance* database where managers provided quarterly earnings guidance for quarter *t* after the earnings announcement for quarter *t*-1 (see Table 1 for sample screening criteria). TNews is defined as the unscaled difference between actual earnings per share for fiscal quarter *t* and the first mean consensus analyst forecast for the same period issued after the earnings announcement for quarter *t*-1. $CAR^{EG}$ is a 3-day size-adjusted return from one day before to one day after the earnings guidance. $CAR^{EA}$ is a 3-day size-adjusted return from one day before to one day after the official earnings announcement. lwCAR is a size-adjusted return extending from one day before the first mean consensus analyst forecast for quarter *t* to one day after the official earnings announcement date for quarter *t*.

$^{*}$, $^{**}$, and $^{***}$ indicate the median difference is statistically significant at the α = .10, .05, and .01 levels, respectively, using a two-tailed sign test.

## Table 5
### Results from Regression Analysis of Market Reaction to Total Earnings News

Regression Equation:

$$lwCAR = \beta_0 + \beta_1 TNews\% + \beta_2 GUIDE + \beta_3 DOWN^{Guide} + \beta_4 PS^{EA} + \beta_5 PTNews + \gamma_i \sum_{i=1}^{53} QTR + \varepsilon$$

| | $\beta_0$ | $\beta_1$ | $\beta_2$ | $\beta_3$ | $\beta_4$ | $\beta_5$ | Adj-$R^2$ | N |
|---|---|---|---|---|---|---|---|---|
| Coef. | -0.003 | **3.406** | | | | | 6.7% | 17,192 |
| (t-stat.) | (-0.36) | **(12.4)** | | | | | | |
| Coef. | **-0.033** | **1.525** | **0.015** | **-0.108** | **0.024** | **0.085** | 15.6% | 17,192 |
| (t-stat.) | **(-3.66)** | **(6.79)** | **(3.45)** | **(-18.82)** | **(5.37)** | **(15.7)** | | |
| | | | | **$\beta_2 + \beta_3 + \beta_4 = -0.069$** | | | | |

Definition of regression variables:
lwCAR is the size-adjusted return extending from one day before the first mean consensus forecast for quarter *t* occurring after the earnings announcement for quarter *t*-1 to one day after the earnings announcement for quarter *t*.
TNews% is defined as the difference between actual earnings per share for fiscal quarter *t* and the first mean consensus analyst forecast for quarter *t* made after the earnings announcement for quarter *t*-1, deflated by stock price as of the first consensus analyst forecast for quarter *t* occurring after the earnings announcement for quarter *t*-1.
GUIDE is an indicator variable equal to one if the company issued earnings guidance during the quarter (and zero otherwise). $PS^{EA}$ is an indicator variable equal to one when actual earnings exceeds the earnings guidance for the guidance sample, or the last mean consensus analyst forecast for the matched sample (and zero otherwise). PTNews is an indicator variable equal to one when TNews% is positive (and zero otherwise). $DOWN^{Guide}$ is an indicator variable equal to one when the earnings guidance is less than the most recent mean consensus analyst forecast that exists prior to the guidance (and zero otherwise).
Coefficients are presented in bold when they are statistically significant at the $\alpha = .05$ level using a two-tailed test. Standard errors clustered by firm with time period dummy variables (coefficients not reported) are used to control for correlation in the error terms.

# Table 6
## Results from Regression of Multiple Period Returns on Aggregated Earnings

Two Period Model

$$CAR^2 = \gamma_0 + \gamma_1 TNews\%^2 + \gamma_2 GUIDE + \gamma_3 DOWN^{Guide} + \gamma_4 PS^{EA} + \gamma_5 PTNews + \gamma_6 PS^{EAt+1} + \gamma_7 PTNews^{t+1} + \beta_i \sum_{i=1}^{53} QTR + \varepsilon$$

Three Period Model

$$CAR^3 = \gamma_0 + \gamma_1 TNews\%^3 + \gamma_2 GUIDE + \gamma_3 DOWN^{Guide} + \gamma_4 PS^{EA} + \gamma_5 PTNews + \gamma_6 PS^{EAt+1} + \gamma_7 PTNews^{t+1} + \gamma_8 PS^{EAt+2} + \gamma_9 PTNews^{t+2} + \beta_i \sum_{i=1}^{53} QTR + \varepsilon$$

Four Period Model

$$CAR^4 = \gamma_0 + \gamma_1 TNews\%^4 + \gamma_2 GUIDE + \gamma_3 DOWN^{Guide} + \gamma_4 PS^{EA} + \gamma_5 PTNews + \gamma_6 PS^{EAt+1} + \gamma_7 PTNews^{t+1} + \gamma_8 PS^{EAt+2} + \gamma_9 PTNews^{t+2} +$$

$$\gamma_{10} PS^{EAt+3} + \gamma_{11} PTNews^{t+3} + \beta_i \sum_{i=1}^{53} QTR + \varepsilon$$

| | $\gamma_0$ | $\gamma_1$ | $\gamma_2$ | $\gamma_3$ | $\gamma_4$ | $\gamma_5$ | $\gamma_6$ | $\gamma_7$ | $\gamma_8$ | $\gamma_9$ | $\gamma_{10}$ | $\gamma_{11}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coef. | **-0.064** | **1.029** | **0.031** | **-0.099** | **0.018** | **0.077** | **0.094** | -0.003 | | | | |
| (t-stat.) | **(-4.71)** | **(7.02)** | **(4.40)** | **(-12.37)** | **(2.94)** | **(10.46)** | **(13.33)** | (-0.42) | | | | |
| | Adj. $R^2$ = 14.5% | | | N = 13,917 | | | | | | | | |
| Coef. | **-0.113** | **1.837** | **0.028** | **-0.083** | 0.007 | **0.058** | **0.051** | **-0.019** | **0.080** | **0.091** | | |
| (t-stat.) | **(-7.46)** | **(9.91)** | **(3.14)** | **(-8.50)** | (0.92) | **(6.30)** | **(5.82)** | **(-2.02)** | **(10.91)** | **(11.31)** | | |
| | Adj. $R^2$ = 16.7% | | | N = 13,436 | | | | | | | | |
| Coef. | **-0.191** | **1.974** | **0.034** | **-0.088** | **0.019** | **0.040** | 0.020 | -0.005 | **0.039** | **0.054** | **0.062** | **0.127** |
| (t-stat.) | **(-10.46)** | **(8.43)** | **(3.14)** | **(-7.50)** | **(2.10)** | **(3.75)** | (1.91) | (-0.49) | **(4.49)** | **(6.11)** | **(6.69)** | **(13.13)** |

Adj. $R^2$ = 18.0%   N = 12,903

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Regression variable definitions:
$CAR^2$, $CAR^3$, and $CAR^4$ are two-, three-, and four-period CARs defined as size-adjusted returns extending from one day after the first consensus analyst forecast available in quarter *t* after the earnings announcement for quarter *t*-1 to one day following the earnings announcement in quarters , *t*+1, *t*+2, and *t*+3, respectively. $TNews\%^2$ ($TNews\%^3$) [$TNews\%^4$] is the sum of total earnings news from quarter *t*+1 (*t*+2) [*t*+3] and the previous quarter(s), deflated by stock price as of the first consensus analyst forecast for quarter *t* occurring after the earnings announcement for quarter *t*-1. Total earnings news in quarter *t* is defined as before. Total earnings news in periods *t*+1, *t*+2, and *t*+3 are defined as the difference between actual earnings for that quarter less the market expectations of earnings for the same quarter that exists prior to the earnings guidance for quarter *t*. When available in quarter *t*, mean consensus analyst forecasts are used to proxy for market expectations for all future quarters. When analyst forecasts for future periods are not available, market expectations are defined as actual earnings per share in the same quarter one year prior to the relevant period. GUIDE is an indicator variable equal to one if the company issued earnings guidance during the quarter (and zero otherwise). $DOWN^{Guide}$ is an indicator variable equal to one when the earnings guidance is less than the most recent mean consensus analyst forecast that exists prior to the guidance, and zero otherwise. $PS^{EA}$ is an indicator variable equal to one when actual earnings for quarter *t* exceeds the earnings guidance for the guidance sample, or the last available consensus analyst forecast for the matched sample, and zero otherwise. $PS^{EAt+1}$, $PS^{EAt+2}$, and $PS^{EAt+3}$ are indicator variables equal to one when actual earnings for the corresponding period exceeds the most recent mean consensus analyst forecast that exists immediately prior to the earnings announcement for the corresponding period. $PTNews^{t+1}$ ($PTNews^{t+2}$) [$PTNews^{t+3}$] is an indicator variable equal to one when $TNews\%^2$ ($TNews\%^3$) [$TNew\%^4$] is positive, and zero otherwise.
Coefficient magnitudes are presented in bold when they are statistically significant at the α=.05 level using a two-tailed test. Standard errors clustered by firm with time period dummy variables (coefficients not reported) are used to control for correlation in the error terms.

# Table 7
## Results from Employing Regression Specifications from Prior Studies

Panel A

Regression Equation from Soffer et al. (2000)

$$CAR^{PA-1,EA+1} = \alpha_0 + \alpha_1 TOTNEWS + \alpha_2 NEG^{EA} + \alpha_3(TOTNEWS * NEG^{EA}) + \varepsilon$$

Expanded Equation to Include Type of News in Earnings Preannouncement

$$CAR^{PA-1,EA+1} = \alpha_0 + \alpha_1 TOTNEWS + \alpha_2 NEG^{EA} + \alpha_3(TOTNEWS * NEG^{EA}) + \alpha_4 DOWN^{Guide} + \varepsilon$$

| | Coefficient Estimates (t-statistics in parentheses) | | | | | | |
|---|---|---|---|---|---|---|---|
| | $\alpha_0$ | $\alpha_1$ | $\alpha_2$ | $\alpha_3$ | $\alpha_4$ | Adj-$R^2$ | N |
| Reduced Model as reported in Soffer et al. (2000) | -0.016<br>(-1.95) | **3.250**<br>**(6.57)** | **-0.070**<br>**(-3.19)** | 1.248<br>(0.95) | | 21.0% | 325 |
| Reduced Model current sample | 0.015<br>(1.66) | **5.463**<br>**(11.34)** | **-0.070**<br>**(-11.40)** | **-3.635**<br>**(-5.42)** | | 11.25% | 8,621 |
| Expanded Model | **0.065**<br>**(6.95)** | **3.540**<br>**(8.55)** | **-0.059**<br>**(-10.15)** | **-2.597**<br>**(-4.61)** | **-0.092**<br>**(-19.35)** | 15.5% | 8,621 |

Panel B

Regression Equation from Miller (2005)

$$CAR = \beta_0 + \beta_1 TOTSURP + \beta_2 NEGEPSSURP + \beta_3 TOTSURPSIGN + \beta_4(TOTSURPSIGN * TOTSURP) + \beta_5 NEGEARN + \beta_6(NEGEARN * TOTSURP) + \beta_7 PATHTYPE + \beta_8(PATHTYPE * TOTSURP) + \varepsilon$$

Expanded Equation to Include Type of News in Earnings Preannouncement

$$CAR = \beta_0 + \beta_1 TOTSURP + \beta_2 NEGEPSSURP + \beta_3 TOTSURPSIGN + \beta_4(TOTSURPSIGN * TOTSURP) + \beta_5 NEGEARN + \beta_6(NEGEARN * TOTSURP) + \beta_7 PATHTYPE + \beta_8(PATHTYPE * TOTSURP) + \beta_9 DOWN^{Guide} + \varepsilon$$

| | Coefficient estimates (p-values in parentheses) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $\beta_0$ | $\beta_1$ | $\beta_2$ | $\beta_3$ | $\beta_4$ | $\beta_5$ | $\beta_6$ | $\beta_7$ | $\beta_8$ | $\beta_9$ | Adj-$R^2$ | N |
| Reduced Model | | | | | | | | | | | | |
| As reported in | **-0.075** | **6.015** | 0.013 | **0.115** | **-3.287** | **-0.029** | **-7.288** | -0.008 | **1.287** | | 33.1% | 840 |
| Miller (2005) | **(.001)** | **(.001)** | (.117) | **(.015)** | **(.001)** | **(.012)** | **(.001)** | (.174) | **(.006)** | | | |
| Current sample | **-0.047** | **4.744** | **-0.018** | **0.100** | **2.549** | **-0.029** | **-4.014** | 0.005 | 0.137 | | 19.0% | 7,928 |
| | **(.001)** | **(.001)** | **(.009)** | **(.001)** | **(.030)** | **(.001)** | **(.001)** | (.314) | (.787) | | | |
| Expanded Model | -0.014 | **4.730** | **-0.023** | **0.077** | **2.699** | **-0.028** | **-3.868** | 0.000 | -0.262 | **-0.031** | 19.2% | 7,928 |
| | (.270) | **(.001)** | **(.001)** | **(.001)** | **(.020)** | **(.001)** | **(.001)** | (.947) | (.602) | **(.001)** | | |

Regression variable definitions from panel A:
$CAR^{PA-1,EA+1}$ is the size-adjusted return from one day before the first mean consensus analyst forecast for quarter *t* to one day following the official earnings announcement for quarter *t*. TOTNEWS is actual earnings per share for quarter *t* less the first mean consensus analyst forecast for quarter *t*, deflated by stock price as of the first consensus analyst forecast for quarter *t* occurring after the earnings announcement for quarter *t*-1. $NEG^{EA}$ is an indicator variable equal to one when actual earnings per share are less than the earnings guidance (and zero otherwise). $DOWN^{Guide}$ is an indicator variable equal to one when the earnings guidance is less than the first mean consensus forecast for quarter *t*.
Regression variable definitions from panel B:
CAR is defined the same as $CAR^{PA-1,EA+1}$. TOTSURP is defined the same as TOTNEWS. NEGEPSSURP is defined the same as $NEG^{EA}$. TOTSURPSIGN is an indicator variable equal to one when TOTNEWS is positive (and zero otherwise). NEGEARN is an indicator variable equal to one when earnings for quarter *t* are less than zero (and zero otherwise). PATHTYPE is an indicator variable equal to one when the signs of $DOWN^{Guide}$ and NEGEPSSURP are consistent (and zero otherwise).
Coefficient magnitudes are presented in bold when they are statistically significant at the $\alpha$=.05 level using a two-tailed test. Standard errors clustered by firm with time period dummy variables (coefficients not reported) are used to control for correlation in the error terms.

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## THE WALKDOWN TO BEATABLE ANALYST FORECASTS: THE ROLES OF EQUITY ISSUANCE AND INSIDER TRADING INCENTIVES

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# The Walkdown to Beatable Analyst Forecasts: The Roles of Equity Issuance and Insider Trading Incentives

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**Abstract**

Security regulators and the business press have alleged that firms play an "earnings-guidance game" where analysts make optimistic forecasts at the start of the year and then 'walk down' their estimates to a level the firm can beat by the end of the year. In a comprehensive sample of I/B/E/S individual analysts' forecasts of annual earnings from 1983-1998, we find strong support for the claim in the post-1992 period. We examine whether the 'walk down' to beatable targets is associated with managers' incentives to sell stock after earnings announcements on the firm's behalf (via new equity issuance) or from their personal accounts (insider trades). Consistent with these hypotheses, we find that the 'walk down' to beatable targets is most pronounced in firms that are either net issuers of equity or in firms where managers are net sellers of stock after an earnings announcement. These findings provide new insights on how capital market incentives affect communications between managers and analysts.

PDF version available from: http://mit.edu/wysockip/www/papers.htm

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## 1. Introduction

In this paper, we investigate allegations by security regulators and the business press that firms and analysts are involved in an "earnings-guidance game." Critics have claimed that analysts make optimistic forecasts (above actual earnings) at the start of the year and then 'walk down' their estimates to a level the firm can beat by the end of the year. We develop and test hypotheses on this pattern of analyst optimism and pessimism based on firm and managerial trading incentives to avoid a "disappointment" on the official announcement of firm earnings.

The motivation for our investigation is straightforward. The recent business press is replete with articles alleging that firms deliberately attempt to deceive or pressure analysts into making 'beatable' or pessimistic forecasts (below actual earnings). Even as far back as 5/6/91, Laurie P. Cohen, staff reporter of the *Wall Street Journal* wrote in the article "Low-Balling: How Some Companies Send Stocks Aloft" that:

> *"... after securities analysts estimate what the companies they follow will earn, the game begins. Chief financial officers or investor-relations representatives traditionally give 'guidance' to analysts, hinting whether the analysts should raise or lower their earnings projections so the analysts won't be embarrassed later.*
>
> *And these days, many companies are encouraging analysts to deflate earnings projections to artificially low levels, analysts and money managers say. If the game is played right, a company's stock will rise sharply on the day it announces its earnings – and beats the analysts' too conservative estimates."*

This alleged gaming of analysts' expectations has worried regulators. For example, Arthur Levitt, Chairman of the Securities and Exchange Commission (S.E.C.) commented on what he terms the "game of winks and nods" in a widely reported speech made on 9/28/98 in New York:[1]

*"This is the pattern earnings management creates: companies try to meet or beat Wall Street earnings projections ... Their ability to do so depends on achieving earnings expectations of analysts. And analysts seek constant guidance from companies to frame those expectations. Auditors, who want to retain their clients, are under pressure not to stand in the way."*

However, the claim that firms systematically beat analysts' targets runs counter to prior academic research on analysts' forecasts. Almost all past empirical studies have found systematic analyst optimism relative to actual earnings outcomes (see, for example, O'Brien, 1988 and Abarbanell, 1991). It is only recently that researchers have documented systematic analyst forecast pessimism relative to actual quarterly earnings (see Brown, 2001 and Matsumoto, 1999). We delve further into this issue by examining how capital market incentives can lead to an "earnings guidance game" where managers walk down analysts' forecasts to beatable targets.

We begin our analysis by developing a framework for the "earnings guidance game." The framework is based on three underlying regularities. First, managers care about their firms' short-term stock price level if they are about to sell shares on their personal account or on behalf of the firm *after* an earnings announcement. We focus on post-earnings announcement equity transactions because the majority of these transactions are restricted to the period after official earnings releases. Second, managers can influence analysts' earnings estimates and targets through discretionary information disclosures. Finally, the market appears to reward firms that beat analysts' latest earnings target, regardless of the path to that target. These three elements have been separately discussed and documented in prior studies. We take the next step by

[1] For the full text of the article, see www.rutgers.edu/Accounting/raw/aaa/newsarc/pr101898.htm.

combining the three elements and arguing that, together, they provide managers with strong incentives to guide analysts' forecasts to beatable targets *prior* to an earnings announcement. In other words, managers wishing to sell stock on favorable terms *after* an earnings announcement are motivated to deflate analysts' earnings targets *before* an earnings announcement.

Our framework has two major empirical predictions. First, structural changes in stock-based executive compensation and changes in insider trading rules have increased managers' incentives to achieve beatable analyst targets during the 1990's. Therefore, we predict a systematic shift toward analyst pessimism *prior* to earnings announcements during the 1990's. Second, we predict that cross-sectional variation in analyst pessimism will vary with firm and managers' demand to sell shares *after* an earnings announcement.

We test these predictions using a large sample of analyst forecasts over the past two decades. We first examine the pattern of analysts' forecasts from 1983 to 1998 in each of the 12-months in the forecast horizon leading up to an annual earnings announcement. In the period 1983-1991, we find that analysts' forecasts are systematically optimistic relative to actual earnings in both the long and short horizons prior to an earnings announcement. However, we find that there is a structural change in the 1992-1998 period. In this latter period, analysts' exhibit systematic optimism at the start of the year, but then switch to systematic pessimism in the final months prior to an earnings announcement. The greater short-horizon pessimism observed in 1990s relative to the 1980s is consistent with our time-series prediction. These findings are robust for a fixed sample of firms that existed for the full 1983-1998 sample period, indicating that the post-1992 switch to pessimism is not due to changes in sample composition.

Consistent with our cross-sectional predictions, we find that forecast pessimism *prior* to an earnings announcement is more common for firms that are about to issue new equity and whose insiders are net sellers of the firm's stock in the period immediately following an earnings announcement. In addition, firms with net insider selling are more likely to experience a switch from optimism early in the forecast horizon to pessimism closest to the earnings announcement. Taken as a whole, the evidence is consistent with the allegation that managers systematically guide analysts toward beatable targets to sell equity on favorable terms after an official earnings announcement.

Our findings complement the results of Aboody and Kasznik (2000) who present evidence consistent with managers strategically disclosing information in order to *obtain* stock options on favorable terms. Our approach examines managerial incentives to strategically disclosing information in order to *sell* stock on favorable terms.

The rest of the paper is structured as follows. In Section 2, we develop hypotheses concerning the time-series and cross-sectional determinants of analysts' forecast bias. Section 3 presents evidence on our time-series predictions using analyst forecast data for the 1980's and 1990's. In Section 4, we test the cross-sectional predictions of forecast bias arising from the earnings expectations game between analysts and management. Section 5 concludes the paper.

## 2. Background and hypothesis development

In this section, we present a framework to motivate the apparent earnings-guidance game between managers and analysts. This framework identifies (i) when managers would care about short-term stock price, (ii) how managers can influence analysts' earnings targets, and (iii) how firms and managers benefit from beating analysts' earnings targets. We combine these elements to develop hypotheses on the time-series and cross-sectional variation in analysts' optimism and pessimism. We first discuss the institutional features that motivate managers to care about the stock price specifically around the earnings announcement date. These institutional features concern the timing of insider transactions in a firm's stock and the timing of new equity sales by the firm.

Next, we discuss how analysts' forecasts influence stock prices, offer explanations as to why analysts cooperate with the managers in setting forecasts, and discuss recent empirical research indicating that managers are indeed able to influence analysts' forecasts. Finally, we discuss recent empirical results indicating that investors fixate on meeting thresholds such as analysts' forecasts, and reward good versus bad news asymmetrically. We argue that if the market rewards firms that beat analysts' latest earnings target and if managers wish to sell equity on favorable terms *after* an earnings announcement then managers have strong incentives to influence analysts' expectations to avoid an earnings disappointment.

These three elements suggest testable hypotheses about managers' capital market incentives to walk down analysts' earnings forecasts to beatable levels. The first prediction links economy-wide changes in analyst forecast bias to structural changes in managerial compensation and changes in the institutional rules governing insider trading during the 1990's. The second prediction links the cross-sectional variation in analyst forecast bias to cross-sectional variations in insider trading and new equity issuance activities.

*2.1 Why and when managers care about short-term stock price*

Managers intending to issue new equity on the firm's behalf clearly care about the firm's stock price level because it directly affects the proceeds from the equity sale. This effect is most pronounced around earnings announcements because new equity issues typically occur in the weeks following a public earnings announcement (Korajczyk, Lucas, and MacDonald, 1990).

Firms typically delay equity issues till after an earnings announcement when information asymmetry is the smallest between the firm and uninformed outside investors to minimize adverse selection problems. Stock-based compensation such as stock options also personally motivates managers to care about the firm's stock price by directly tying compensation to the firm's stock price performance.[2] Hall and Liebman (1998) report that stock options are a significant portion of the manager's compensation. In a sample of 498 of the largest US firms, they report that the Black-Scholes value of stock option grants comprise about 20% of the manager's compensation, and by 1994 the proportion has dramatically increased to be almost 50%. Thus, managers face increasing incentives to care about the firm's stock price from the structure of their compensation package.

Managers focus on the firm's *short-term* stock price specifically during the earnings announcement period because of insider-trading restrictions. These restrictions have arisen because regulators and boards of directors are concerned that managers may strategically use inside information to exercise stock options or trade in the firms' stock at the expense of outside investors. U.S. insider trading laws (Insider Trading and Securities Fraud Enforcement Act of 1984 and 1988) expressly prohibit this direct profit-taking opportunity by insiders. In addition, after the 1988 Insider Trading and Securities Fraud Enforcement Act, firms increasingly have instituted their own policies and procedures to regulate trading of its stock by its insiders. These restrictions generally take the form of explicit blackout periods lasting from about two months prior to the earnings announcement up to the earnings announcement date (see, for example, Bettis, Coles, and Lemmon, 1998 and Jeng, 1999). Bettis, Coles, and Lemmon report that these

[2] Managers also care about the stock price performance because poor stock price performance encourages a hostile takeover and subsequent firing by the acquiror's board of directors. An active external labor market also rewards a manager with a reputation for maintaining good stock price performance. Additionally, a manager is in a better position to bargain for higher future compensation if the stock price performance is good.

blackout periods began to be instituted in the 1990s and by 1997, 80 percent of firms have instituted formal blackout periods. Therefore, especially during the 1990s, insider trades are concentrated in a narrow window *after* an earning announcement.[3]

In sum, stock option compensation, insider trades, and new equity issues motivate managers to care about the firm's *short-term* stock price at the time when new equities are issued or when managers exercise options and trade the firm's stock. Because new equity issues and insider trades are typically restricted to the period immediately following an earnings announcement, we suggest that managers fixate on the firm's stock price around the earnings announcement itself. Consequently, the stock price level during the earnings announcement period carries special significance for firm management.

*2.2 Managers' ability to manage analyst forecasts*

Empirical and anecdotal evidence suggest that managers can indeed influence analysts' earnings forecasts. First, as a key provider of information to analysts, managers can affect analysts' earnings expectations by controlling the content and timing of discretionary information releases. Soffer, Thiagarajan, and Walther (2000) find that firms use pre-announcements of earnings to manage analysts' expectations. They also find that managers are selective in the content of their disclosures and appear to receive stock price benefit from managing analysts toward beatable targets.

Second, it has been argued that managers can pressure analysts to adjust their forecasts away from their true beliefs because of analysts' dependence on management for future

[3] By reducing discretion in the timing of the insider trades, the blackout feature reduces the opportunity of the managers to profit from inside information at the expense of uniformed outside investors. Permitting insider trades

information (see Francis and Philbrick (1993), and Lim (2001)). The business press has also reported incidences when analysts issuing unfavorable forecasts were shunned by the firm at investor conferences.

Third, it has also been alleged that analysts face conflicting incentives in maintaining the quality of investment research versus securing investment-banking deals. Business Week's article "Wall Street's Spin Game" (10/8/98) noted that:

> *"Most Wall Street research is pitched to institutional investors who pay the firm about a nickel a share in commissions. But if an analyst spends his time trying to land an initial public offering, the firm can earn 15 to 20 times that amount per share. Investment banking deals are much more lucrative for the brokerage firm. Merger advisory fees can be sweet as well.... But what happens when there's a conflict between objective analyses and the demands of investment bankers? ...There's no conflict. That's been settled. The investment bankers won."*

Thus, the highly lucrative underwriting deals impose pressure on analysts to cooperate with firms issuing new securities. Michaely and Womack (1999) report that analysts' recommendations are biased because of the conflict of interest introduced by the underwriting relationship. Although Mikhail, Walther, and Willis (1999) argue that career concerns motivate analysts to make more accurate forecasts, it should be recognized that firm profit incentives from trading venture investments and underwriting deals may affect career concerns and influence analysts to bias forecasts in the direction favored by client firms and managers.

*2.3 Managers' incentives to achieve beatable targets*

Almost all past empirical studies on earnings forecasts have found systematic analyst optimism (see, for example, O'Brien, 1988). While past studies have documented increases in the accuracy of analyst forecasts as the earnings announcement approaches, this research found

to the period immediately after earnings announcements also reduces the adverse selection problem by minimizing continued analyst optimism at all forecast horizons (see, for example, Brown, Foster and Noreen, 1985). It is only recently that researchers have provided some evidence of analyst pessimism in quarterly earnings forecasts (see Brown, 2001 and Matsumoto, 1999). These studies argue that management communications with analysts lead to these deflated earnings expectations.

Systematic analyst optimism implies that firms are more likely to miss rather than beat analysts' targets. This can have detrimental effects for a firm if investors' perception of the firm is influenced by whether it meets certain earnings thresholds. For example, Skinner and Sloan (1999) find an asymmetry in investor reaction to beating versus missing a threshold. In particular, they find a greater stock price drop when firms fall short of forecasts than the stock price rise when firms beat forecasts by an equivalent magnitude of earnings surprise. They also find that this asymmetry is especially pronounced for high growth firms. These results are obtained relative to a threshold consisting of analyst forecasts made in the last month prior to the earnings announcement. Thus, the threshold that drives these effects is set by very short-horizon forecasts.

The discontinuity in investor reaction to missing versus meeting or beating analysts' forecasts creates incentives for managers to guide analysts to beatable earnings forecasts prior to an earnings announcement. A slightly lower forecast can cause the firm to barely beat the forecast instead of missing it, which significantly increases the firm's expected post-earnings-announcement stock price. As reported by Bartov, Givoly, and Hayn (2000), the incremental market valuation associated with earnings surprises is independent of the path taken to achieve the earnings target. In other words, the only consensus forecast that seems salient for the stock

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the asymmetry of information between uniformed outsiders and the inside managers.

price reaction to the earnings announcement appears to be the one closest to the earnings announcement.

As discussed earlier, prior research has shown that analyst forecasts tend to be optimistic throughout the forecast horizon, but management has incentives to achieve beatable forecasts prior to an earnings announcement. Therefore, we predict a switch from analyst optimism to pessimism when managers and firms have strong incentives to maximize stock prices immediately after the earnings announcement. Below we discuss two structural changes between 1980s and 1990s that support the claim that these incentives have become stronger in the 1990s.

*2.4 Hypothesis on time-series changes in analyst pessimism*

Two structural changes between 1980s and 1990s are likely to have increased managerial incentives to guide analysts toward beatable earnings targets in recent years. The first structural change is the greater use of stock-based executive compensation by U.S. corporations during the 1990's. For example, Hall and Liebman (1998) present evidence on the growing use of CEO stock option compensation 1990s as compared with the 1980s. The mean salary and bonus in 1994 was \$1.3 million and the mean value of stock options was \$1.2 million. Between 1980 and 1994, mean salary and bonus grew 97 percent whereas mean stock option value grew an astounding 683 percent! Murphy (1998) confirms this growth and shows that the explosive growth trend in stock options continues to 1996, the latest year in his study. The increase in stock options is also widespread among firms; the percentage of CEOs receiving stock options grants increased from 30% in 1980 to 70% in 1994. The data indicates that the number of stock options granted increase dramatically in the late 1980s (the median number of grants was zero until 1985), and many of these are vested in the 1990s.

The greater predominance of exercisable stock options in the 1990s suggests greater managerial attention to stock prices. The fact that a greater number of executives now wish to sell stock in the trading periods after earnings announcements leads to greater incentives for these managers to guide analysts to avoid an earnings disappointment that would negatively affect share prices after the earnings announcement.

The second structural change occurred in May 1991 when securities regulators changed the "short-swing" rule affecting insiders' stock option exercises. Prior to 1991, Section 16b of the Securities Exchange Act requires insiders to hold shares of stocks acquired through an option exercise for at least six months before selling, or the profits will go to the firm. In May 1991, the S.E.C. effectively removed this restriction by changing the starting date of the six-month holding period from the exercise date to the option grant date. Consequently, after May 1991, managers have a more precise target date for when to exercise their stock options and immediately unload their shares, which increases their ability to affect the earnings surprise for when they trade. As discussed earlier, the firm-initiated blackout rules confining permitted insider trades to the period immediately following earnings announcements further sharpens managerial focus on the stock price during the earnings announcement period. Note that these blackout rules became more pronounced during the 1990s.

Given these structural changes in the early 1990's, we hypothesize a systematic change in managers' incentives and ability to guide analysts' earnings targets. Based on these major changes in how managers are compensated and when they can trade, we hypothesize a shift to greater analyst pessimism prior to earning announcements during the 1990's compared to the 1980's. This leads to our first hypothesis.

***Hypothesis 1***: *Structural changes in managerial incentives to achieve beatable forecasts leads to short-horizon pessimistic analyst forecasts prior to earnings announcements in the 1990's.*

*2.5 Hypotheses on cross-sectional determinants of analyst pessimism*

As we previously described, there are three empirical facts that are related to the expectations management game: (i) managers care about short term share prices if they are about to sell shares on their personal account or on behalf of the firm after an earnings announcement, (ii) managers can influence analysts' expectations through their information disclosures, and (iii) the market appears to reward firms that beat analysts' latest earnings targets. Therefore, managerial incentives to guide analysts' forecasts are strongest if the firm and/or its managers are about to sell stock. This leads to the following cross-sectional prediction:

***Hypothesis 2***: *The likelihood of observing short-horizon pessimistic analyst forecasts prior to an earnings announcement is increasing in management and firm demand to sell stock after an earnings announcement.*

Finding evidence in support of this hypothesis is consistent with analysts being guided toward a pessimistic target. However, an observed correlation between post-earnings announcement equity sales and short-horizon pessimism may also be interpreted as stakeholders selling shares after truly unexpected good news. If managers are truly guiding analysts toward beatable targets, then a more compelling sequence of events would be as follows: (i) analysts initially issue optimistic (or unbiased) earnings forecasts, (ii) analysts then *revise* their forecasts to become pessimistic before an earnings announcement, (iii) the firm or its insiders sell stock after the firm beats the revised earnings target. In other words, we should observe an "opportunistic" switch from optimistic (or unbiased) to pessimistic analyst forecasts prior to firm or insider equity sales. This leads to our second cross-sectional prediction on cross-sectional determinants of expectations management:

***Hypothesis** 3: The likelihood of observing a switch from optimistic to pessimistic analyst forecasts prior to an earnings announcement is increasing in management and firm demand to sell stock after an earnings announcement.*

## 3. Pattern of analyst bias over the forecast horizon

In this section, we investigate claims that analysts make optimistic forecasts at the start of the year and then 'walk down' their estimates to a level that the firm can beat by the end of the year. We compare the dynamic pattern of analyst bias over the forecast horizon during the 1980's and 1990's to test our time-series prediction outlined in *Hypothesis 1.*

### *3.1 Sample and variable construction*

Data on individual analysts' forecasts of annual earnings per share are obtained from the *Institutional Brokers Estimate System (I/B/E/S) Detail History U.S. Edition* tapes from 1983 to 1998. Unlike many previous studies, we use individual analysts' forecasts to calculate consensus forecasts to avoid potential staleness of the I/B/E/S consensus forecasts (see, for example, Abarbanell and Bernard, 1992).

The data sample consists of all individual analyst forecasts of annual earnings for firms with data availability on both I/B/E/S and Compustat.[4] We consider forecasts of annual earnings made within twelve months of the annual earnings release date reported by I/B/E/S (*Actuals File*). To track forecast revisions leading up to the annual earnings announcement, we sort analysts' forecasts into twelve groups by 30-day blocks. Forecasts made less than 30 days prior to the earnings announcement are grouped in *Month-1*, forecasts between 30- and 60-day lags in *Month-2*, and so on up to *Month-12*. We then calculate a monthly consensus forecast for each firm using the median of individual-analyst forecasts in that month.

The forecast error is defined as the actual earnings per share minus the median forecast of earnings per share scaled by the stock price at the beginning of the year. The stock price deflator is used to control for potential spurious relations resulting from cross-sectional scale differences in earnings per share[5]. A negative error implies an optimistic forecast whereas a positive error implies a pessimistic forecast. Formally, the forecast error, *FE*, for firm *i* in calendar year *y* and forecast horizon month-*t* is calculated as:

$$FE(i,y,t) = [Earnings\ Per\ Share\ (i,y) - Forecast\ (i,y,t)] \,/\, P(i,y^*) \qquad (1)$$

Firms' actual earnings per share are obtained from I/B/E/S for comparability with the forecast.[6] The deflator $P(i,y^*)$ is the first available stock price for firm *i* in year *y* reported in the

[4] The empirical findings documented in this section also exist for a broader sample of firms not restricted by Compustat data availability.
[5] We also replicate the analysis using total assets per share as a deflator (see Figure 2b). The general results remain unchanged using this alternate deflator.
[6] According to I/B/E/S, analyst earnings forecasts usually exclude extraordinary items and discontinued operations. The I/B/E/S actual earnings number also excludes these items and, as a result, may not correspond to a firm's bottom-line income number.

I/B/E/S Summary Tapes.[7] This stock price is typically available twelve months prior to the actual earning announcement date. To remove the influence of extreme outliers that are likely due to data-coding errors, we remove the extreme forecast errors that are greater than 10% in absolute value of share price.[8]

The initial sample consists of 681,413 analyst-firm-month-year forecast observations for the years 1983-1998. We group forecasts into five calendar sub-periods to determine if there is temporal variation in forecast errors across calendar years. The earlier sub-periods cover three years: 1983-85, 1986-88, 1989-91, 1992-94, and the final sub-period 1995-98 covers four years. Table 1 shows that the number of available observations has increased monotonically with calendar time by about three-fold between the earliest sub-period 1983-85 to the latest sub-period 1995-98. This large increase reflects the expanded coverage of the I/B/E/S database and the proliferation of analysts over time. This is likely driven by increased interest from individual investors in equities and the growth in the number of public companies in the last 16 years.

*3.2 Sub-period analysis*

We present three measures of forecast bias for each of twelve months prior to the earnings announcement in Table 2. Panel A presents a relative pessimism index, *%RelPess*, which measures the proportion of individual analyst forecasts that are pessimistic versus optimistic relative to the actual earnings outcome. The index is computed in each of the 12

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[7] For example, Joe Analyst forecasts $1.15 EPS for XYZ Company on Nov 15, 1995 for the fiscal year ending Dec 31, 1995. I/B/E/S reports an actual EPS of $1.20 on Jan 27, 1996. I/B/E/S also reports that the 1994 fiscal year earnings release date is in January 1995, and the stock price in Feb 1995 (the first month after the release of EPS for the previous fiscal year) is $15.10. Thus, FE for month 3 (73 days lag between earnings release date and forecast date) is ($1.20-$1.15)/$15.10=0.0033 or 0.33%. The FE is considered forecast error for year 1996 because the actual earnings release date is in January 1996.

[8] For example, absolute forecast errors (|forecast EPS - actual EPS|) greater than $3/share for a company trading at $30 per share would be removed from the sample. By any reasonable metric, such outliers may be due to data-coding errors. As a robustness check, we also applied a less stringent cut-off and only removed outliers that were greater than 100% of price. The results are unchanged.

months prior to an earnings announcement. In each month, a firm is assigned a code depending on the median analyst forecast -- the code is equal to 1 if the median forecast is pessimistic, zero if it is unbiased, and -1 if it is optimistic. We then aggregate the codes across firms in each month and an index is calculated as the average value over all firm codes in each month. This index captures the relative proportion of pessimistic forecasts to optimistic forecasts in a given month.[9] We use this categorical index because it is often argued that what really matters is whether the firm beats the consensus earnings target, not by how much the firm beats the target.

For the overall sample, the *%RelPess* index has a value of -0.19 in the twelfth month prior to the earnings announcement. In other words, the majority of analyst forecasts are *optimistic* early in the year. However, by *Month-3* analysts are equally likely to be pessimistic or optimistic. In the month prior to the earnings announcement, the *%RelPess* index has a value of 0.11 indicating that analysts are net *pessimistic* in the overall sample.

*Hypothesis 1* predicts a switch to greater analyst pessimism coincident with the structural changes in executive compensation and insider trading policies during the 1990's. To test this prediction, we examine the pattern of analyst pessimism in 5 sub-periods during the 1980's and 1990's. The dynamic pattern of relative pessimism in each sub-period is presented in Figure 1. Consistent with our first hypothesis, we find that the switch to pessimism only occurs in the 1992-1994 and 1995-1998 sub-periods. For example, in 1995-1998 sub-period, the switch to relative pessimism occurs as early as *Month-4* and by *Month-1* the *%RelPess* index is as high as 22%.

We complement the relative pessimism results with evidence on the mean and median forecast errors in Panel B of Table 2. Bold values for the mean and median statistics are

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[9] A positive *%RelPess* value implies a higher fraction of pessimistic forecasts to optimistic forecasts and a negative

statistically different from zero at the 1% significance level. As in Panel A, high early optimism in forecasts is also observed across all periods in Panel B. The means and medians for the long horizon forecasts in the overall sample and in each sub-period are statistically and economically significant. For example, if the average price of a typical stock is about $30 (Brennan and Hughes, 1992), then a mean of 0.90% for the overall sample in *Month-12* implies a forecast error of about 27 cents and a median of 0.28% implies a forecast error of 8.4 cents.

There is also temporal variation in the forecast bias across calendar years. For all horizons, forecasts are more optimistic in the three earlier sub-periods than in the two later sub-periods. For example, the degree of optimism in *Month-12* in the 1989-1991 sub-period is twice the amount in the 1995-98 sub-period. The temporal variation, however, is not monotonic with time.

Comparing the bias patterns over time periods, Panel B indicates that forecast pessimism exists only in the latter sub-periods. The median forecast in *Month-1* is either optimistic or unbiased in the three earliest sub-periods from 1983-1991. From 1992 onwards, the median forecast in the month before an earnings announcement is significantly pessimistic. The bias pattern across forecast horizons is graphed for each sub-period in Figure 2A. The mean results in Panel B exhibit a similar pattern, but only the *Month-1* forecast in the 1995-1998 period is pessimistic. The observed pessimism is highly statistically significant, but small in magnitude. Assuming an average stock price of $30 again, the median forecast error in *Month-1* is a mere 0.9 cents in the 1992-1994 sub-period and 1.5 cents in the 1995-1998 sub-period. The small magnitude need not imply low economic significance because 'just beating' the forecast may have disproportionate informational signaling value to investors (see, for example, DeGeorge, Patel, and Zeckhauser (1999)). Overall, these univariate results present compelling evidence of a

*%RelPess* value implies the opposite.

switch to systematic pessimism that is coincident with structural changes in the use of executive stock option compensation, focused insider trades in the post-earnings announcement period and the lifting of the "short-swing rule" for insiders during the 1990's.

*3.3 Regression analysis of forecast pessimism*

Potential confounding effects for our univariate results are changes in firm attributes between the 1980's and 1990's that may have driven the pessimism results presented in Table 2. Therefore, we undertake a multiple regression analysis to control for other determinants of systematic bias in analysts' forecasts. For example, managers of high growth firms that require capital would also care about investor perceptions and want to avoid an earnings disappointment. Therefore, we include a growth proxy as an additional determinant of forecast pessimism. We also consider firm profitability and size as additional determinants of forecast bias. Past studies have reported that large firms have less optimistic forecasts, and the forecast bias is also related to whether firms make profits or losses; see Brown (1998, 2001) and Burgstahler and Eames (1999). It is not surprising that analysts ex post turn out to be optimistic for firms reporting losses and to be pessimistic for firms reporting profits.

Our regression tests are based on firm-month observations of forecast errors. This sample is created by calculating the monthly median of individual-analyst forecast errors from the original sample presented in Table 1. The data set is a pooled time-series cross-sectional sample of 213,692 firm-month observations for the full sample period 1983-98. In Table 3, we regress the sign of individual analyst earnings forecast errors on time-period and firm-characteristic variables for the full sample period. The logistic regression model is:

$$PESS = \beta_0 + \beta_1 * P_{8688} + \beta_2 * P_{8991} + \beta_3 * P_{9294} + \beta_4 * P_{9598} + \beta_5 * Profit + \beta_6 * MB + \beta_7 * MV + \gamma_l * Month \quad (2)$$

where *PESS* is an indicator variable that takes the value of 1 if the forecast error is greater than or equal to zero and is 0 otherwise. The forecast error, $FE_{iyt}$ is the median forecast error for each firm *i*, for annual earnings in year *y*, in month *t* prior to the earnings announcement. The period variables, $P_{8688}$, $P_{8991}$, $P_{9294}$, and $P_{9598}$ are dummy variables which equal 1 if the earnings are in the periods 1986-88, 1989-91, 1992-94, and 1995-98, respectively, and equal to 0 otherwise. *MB* is the market-to-book quintile ranking for firm i based on the market and book values of equity at the end of the previous year. *MV* is the annual market value of equity quintile ranking for firm *i* based on the market value of equity at the end of the previous year. *MV* and *MB* rankings are performed each year. *Profit* is an indicator variable taking on value one if the firm reports a profit and 0 otherwise. This *ex post* variable is used to control for truly unexpected economic performance of the firm that is unrelated to expectations management of analysts' forecasts. Month $\in \{-12,-11,..,-2,-1\}$ is a categorical variable for the month lag between the forecast and earnings announcement as described earlier in Section 3.

We find that even after controlling for time-period effects, profitability, and growth opportunities, the degree of optimism still decreases over the twelve months preceding the earnings announcement. As expected, the control variables for profitable firms, large market capitalization firms, and high-growth firms are significant and positively correlated with increased pessimism in analyst forecasts. More importantly, the predicted time-series pattern in analyst pessimism and optimism across sub-periods is robust to the inclusion of other determinants of analyst pessimism. In other words, one observes greater systematic analyst pessimism in (i) the months closest to an earnings announcement and (ii) in the latter sub-periods of the overall sample.

We supplement the prior analysis with regression tests that use actual forecast errors as the dependent variable. The regression model is:

$$FE = \beta_0 + \beta_1 {*} P_{8688} + \beta_2 {*} P_{8991} + \beta_3 {*} P_{9294} + \beta_4 {*} P_{9598} + \beta_5 {*} Profit + \beta_6 {*} MB + \beta_7 {*} MV + \gamma_l {*} Month \qquad (3)$$

where $FE$ is the price-scaled median forecast error as defined in Section 2, and the other variables are the same as regression model (2).

The results in Table 4 confirm our previous results on time variation in the forecast error bias. The three earliest sub-periods exhibit analyst optimism whereas the final two sub-periods exhibit a shift toward less optimistic analyst forecasts[10]. The results also indicate that forecasts are more pessimistic for profit firms and high market capitalization and market-to-book firms.

*3.4 Robustness checks*

Our forecast errors are price-deflated to allow direct comparison across firms, which is standard in the literature. However, scaling by price may introduce inter-temporal variation in the median and mean forecast bias if price-earnings ratios have changed over time. Therefore, we replicate the analysis using an alternate deflator as total assets per share, and graph the results in Figure 2B. The general pattern of increasing forecast pessimism as the horizon shrinks is robust to the choice of deflation. As before, in the two latest sub-periods 1992-1994 and 1995-1998, there is a switch in forecast errors from optimism to pessimism as the earnings announcement approaches. It should also be emphasized that switchover results from optimism to pessimism

[10] In fact, the last two periods exhibit pessimism if the mean values of the independent variables are substituted into equation (3).

(the sign change captured by our %RelPess meaure) cannot be explained by intertemporal variation in price-earnings ratios.

The time series results could also be affected by changing sample composition between 1983 and 1998. For example, a change in the composition of publicly traded companies or in the breadth of coverage on I/B/E/S may have affected the forecast bias over time. To rule out these alternative explanations, we replicate our tests using a fixed sample of firms that existed from 1986 to 1998.[11] Again, analyst forecasts are optimistic at all horizons for pre-1992 sub-sample. However, there is a switch to pessimism in the last month prior to an earnings announcement in recent years for the fixed sample of firms that existed from 1986 to 1998. Therefore, our primary results are confirmed using this fixed sample of firms.

Our main time-series results track analyst forecast bias over the annual horizon. Our trading incentive framework predicts that the shift to pessimism would also occur in quarterly earnings forecasts. Therefore, we examine the dynamic pattern in analysts' forecasts of quarterly earnings per share. For brevity, we report the median and mean forecast errors only for the 1995-98 period in Figure 3.[12] Figure 3 plots the mean and median quarterly forecast error (scaled by price) for a series of two-week windows preceding each frm's quarterly earnings announcement. Similar to the results for the annual window, we document a pattern of increasing pessimism as the quarterly earnings announcement approaches. The forecast errors are either close to zero or optimistic initially, and then become pessimistic in the two weeks preceding a quarterly earnings announcement. Our finding of pessimism in the shortest horizon is consistent with findings reported by Bagnoli, Beneish, and Watts (1999), Brown (2001), and

[11] We also confirm our findings of a switch to pessimism using the I/B/E/S median consensus forecasts from the Summary Tapes between 1983-1998.

[12] A summary of this analysis is available from the authors upon request.

Matsumoto (1999) for forecasts of quarterly earnings at a given point in time relative to the announcement date in recent periods.

In sum, we find evidence of a robust shift towards greater forecast pessimism. The timing of this shift to pessimism prior to earnings announcements is coincident with the increased use of stock-based compensation in the 1990s and regulatory changes in 1991 concerning the "short-swing rule" affecting insider's stock option exercises. These changes clearly provide increased managerial incentives to guide analysts to forecast at a level the firm can beat at the earnings announcement date.

Our finding of optimism in earlier periods and pessimism in more recent periods provides a link between past studies finding forecast optimism and the recent allegations about forecast pessimism. The optimism found in past studies was obtained from data prior to 1992, whereas allegations of pessimism are made more recently. The small magnitude of pessimism we document here is also consistent with press allegations that firms attempt to *just* beat the forecasts.

## 4. Cross-sectional variation in forecast bias

In this section we present empirical tests of our cross-sectional predictions contained in *Hypotheses 2* and *3*. These tests examine the impact of firm and insider trading incentives on the observed walkdown to beatable earnings targets.

### *4.1 New equity issuance data*

We test the prediction that firms issuing new equity are more likely to beat forecasts at the earnings announcement just prior to issuance. Since a firm that is high growth would likely need new capital, and would also care about investor perceptions and want to avoid an earnings disappointment, we include a growth proxy as an additional determinant of forecast pessimism. Similar to our regression results in Tables 3 and 4, we also consider firm profitability and size as additional determinants of forecast bias.

To measure the firm's own trading activity, we consider two dummy variables: *IssueNow* captures equity issuance in the year of the forecast and *IssueNext* captures equity issuance in the following year. *IssueNow* equals one if the firm's statement of cash flows indicates a positive sale of common and preferred stock (COMPUSTAT item #108) greater than 5% of the market value of equity for that year, and is zero otherwise. *IssueNext* equals one if the firm's statement of cash flows indicates a positive sale of common and preferred stock (item #108) greater than 5% of the market value of equity in the next year and is zero otherwise.[13] We include *IssueNow* in addition to *IssueNext* because a firm would likely experience similar pressures to avoid an earnings disappointment immediately after issuance. The issuing firm would like to avoid lawsuits from disgruntled investors unhappy with a sizeable stock price drop from an earnings disappointment, and the investment banker and analysts of the brokerage firm underwriting the issue would like to safeguard reputation.

*4.2 Insider trading data*

Data on insider trading activity are obtained from CDA/InvestNet covering the period 1994 to 1998, so tests on this hypothesis use forecasts from this sub-period only. CDA/InvestNet reports all insider trades that are required to be filed with the SEC, and we examine only open market purchases and sales and option exercises.[14] We eliminate trades by

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[13] The empirical results using the equity issuance dummy are robust to various definitions of sale of equity shares. The regression results are qualitatively similar using equity-sale cutoffs between 1% and 20% of MVE.

[14] CDA/InvestNet lists 26 different transaction codes for insiders. We only include acquisitions and dispositions associated with open market purchases and sales, acquisitions from derivative exercises and other sales and purchases.

non-officer insiders, including block-holders, retirees, trustees, etc., in order to focus on the trading activities of those individuals that are most likely to have an impact on the reporting process of the firm. We examine insider trades in the 20 trading days immediately after the earnings announcement.

A firm is classified as a *Seller* in the year the insiders (CEO, chairman, vice presidents, and directors) are net sellers of the shares of the firm in the 20-day period after the earnings announcement, and is classified as a *Purchaser* in the year the insiders are net buyers of the firm's shares. The regression tests use the dummy variable, *InsiderSale*, which equals one for *Seller* firm-years and 0 for *Purchaser* firm-years. Our sample consists of 1,434 *Seller* and 867 *Purchaser* firm-years.

*4.3 Data analysis*

Table 5 compares the characteristics of the two groups of insider trades, *Sellers* and *Purchasers*. *Sellers* are, on average, higher growth firms and more likely to be issuing equity in the subsequent year or have issued equity in the current year. There are no significant differences in the size and profitability between the two groups.

Of greater interest to our study is the difference between the two groups in both the forecast bias in the final month prior to the earnings announcement and the pattern of analyst forecast bias between long and short horizons. To directly test *Hypothesis 2*, we construct a pessimism variable, $PESS_{last}$, which is equal to one if actual earnings beat or meet forecasts in the last month (month-1) prior to the earnings announcement and zero otherwise. The descriptive evidence on analyst pessimism is in Table 5. Consistent with analyst guidance incentives associated with Insider Sales, we find that analysts are more likely to issue pessimistic forecasts for firms that have Net Insider Sales after the earnings announcements.

We also find that the *Sellers* are more likely to have a switch from optimism to pessimism during the year. Figure 4 demonstrates the general pattern. There is a shift from optimism to pessimism for firms where insiders are net sellers, whereas forecasts remain optimistic in firms where insiders are net purchasers. To document the statistical significance of this phenomenon we define the variable, *SWITCH*, to be equal to one if the first forecast (i.e. month-12) is optimistic *and* the last forecast (i.e. month-1) is pessimistic; and zero if the first and last forecasts are both optimistic. A significantly greater number of net sellers (65.3%) experienced a switch from initial optimism to final pessimism.

Table 6 reports the multivariate tests for the cross-sectional determinants of forecast pessimism. In the top panel, we run the following regression:

$$PESS_{last} = \beta_0 + \beta_1 * InsiderSale + \beta_2 * IssueNow + \beta_3 * IssueNext + \beta_4 * MB + \beta_5 * MV + \beta_7 * Profit + \varepsilon. \qquad (4)$$

The variables are defined earlier. We include but do not report fixed year effects using year indicator variables in the above regression.

Consistent with our prediction in *Hypothesis 2,* we find that firms issuing equity in the following year are more likely to exhibit analyst pessimism at the end of the current year. Furthermore, there is a significant positive relation between *InsiderSale* and $PESS_{last}$, suggesting that firms beat or meet analysts forecasts have insiders who sell in the period immediately following the earnings announcement. These results are consistent with the predictions of *Hypothesis 2.* This result is robust to the inclusion of firm size, growth opportunities, and, most importantly, profitability. It is not surprising that more profitable firms tend to beat analysts' targets because this variable captures truly unexpected good performance.

In Panel B of Table 6, we run the regression of the switch variable on the determinants.

$$SWITCH_t = \beta_0 + \beta_1{*}InsiderSale + \beta_2{*}IssueNow + \beta_3{*}IssueNext + \beta_4{*}MB + \beta_5{*}MV + \beta_6{*}Profit + \varepsilon. \tag{5}$$

As in Panel A, the estimated coefficients for *Profit* and *InsiderSale* variable are statistically significant. The results are consistent with insiders timing their sales to follow immediately after a good news earnings surprise, and consequently after an increase in stock price. This finding is consistent with the predictions of *Hypothesis 3.* In contrast, the new issue dummies are not statistically significant, indicating that the new issue incentive is not incrementally important to explain the switch in forecast pattern over the forecast horizon.

Overall, our results suggest that insiders guide analyst earnings targets to facilitate trading on favorable terms after an earnings announcement. This ability to benefit from the insider transactions is derived from managers' ability to guide forecasts over the horizon of the forecasts prior to trading.

## 5. Conclusion

This paper examines the dynamic behavior of analyst earnings forecasts leading up to earnings announcements. We document time-period and forecast-horizon variation in analyst forecast pessimism. The most striking finding is that, during the 1990's, analysts issue systematically optimistic forecasts early in the fiscal year followed by systematically pessimistic forecasts as the earnings announcement approaches. This short-horizon pessimism in forecasts is consistent with our hypotheses based on managerial and firm incentives to sell shares in the post-announcement period. They are also consistent with recent media allegations and concerns expressed by policymakers that firms are able to guide analysts' forecasts.

We link the pattern of analyst pessimism in the 1990's with institutional and regulatory changes that create capital market incentives for managers to guide and beat forecasts in order to boost stock prices. These systematic changes include greater use of stock option compensation for managers, restrictions on trading by insiders to post-earnings announcement periods in response to the Insiders' Fraud and Securities Trading Act of 1988, and the lifting of the "short-swing rule" for insiders in 1991 allowing insiders to exercise stock options and immediately sell company stock.

Our cross-sectional predictions are motivated by the trading preferences of firms and managers after earnings announcements, which lead them to guide analysts to a systematic pattern of pessimistic forecasts prior to the earnings announcement. Consistent with our hypotheses, we find that pre-announcement forecast pessimism is strongest in firms whose managers have the highest *personal* capital market incentives to avoid earnings disappointments. Firms with managers that sell stock after an earnings announcement are more likely to have pessimistic analyst forecasts prior to the earnings announcement. Firms where the insiders are net sellers of the firm's stock are also more likely to have analysts switch from long-horizon optimism to short-horizon pessimism prior to the earnings announcement. This evidence suggests that managers opportunistically guide analysts' expectations around earnings announcements to facilitate favorable insider trades after earnings announcements.

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**Table 1**
**Descriptive Statistics**

| Variable | All Years | Year Grouping 1983-85 | 1986-88 | 1989-91 | 1992-94 | 1995-98 |
|---|---|---|---|---|---|---|
| **# Analysts** | | | | | | |
| Mean | 15.78 | 17.47 | 17.62 | 17.20 | 15.39 | 13.43 |
| Median | 14 | 17 | 16 | 15 | 14 | 11 |
| Std. Dev. | 10.29 | 9.84 | 10.60 | 11.07 | 9.99 | 9.39 |
| Min | 1 | 1 | 1 | 1 | 1 | 1 |
| Max | 50 | 40 | 47 | 50 | 44 | 46 |
| **# FirmYrs** | 25,623 | 2,130 | 3,805 | 5,080 | 6,210 | 8,398 |
| **# Forecasts** | 681,413 | 63,749 | 113,530 | 143,439 | 167,014 | 193,681 |
| **MB** | | | | | | |
| Mean | 2.83 | 2.19 | 2.46 | 2.48 | 2.97 | 3.40 |
| Median | 2.18 | 1.79 | 1.97 | 2.00 | 2.22 | 2.60 |
| Std. Dev. | 2.29 | 1.50 | 1.72 | 1.73 | 2.50 | 2.78 |
| Min | 0.23 | 0.32 | 0.43 | 0.37 | 0.24 | 0.46 |
| Max | 35.94 | 33.49 | 23.51 | 28.21 | 26.09 | 35.94 |
| **MVE ($m)** | | | | | | |
| Mean | 2,861.94 | 1,862.94 | 2,147.40 | 2,746.12 | 3,154.34 | 3,455.57 |
| Median | 905.51 | 841.68 | 903.13 | 910.20 | 920.91 | 928.50 |
| Std. Dev. | 5,072.30 | 2,481.70 | 3,079.77 | 4,470.97 | 5,423.36 | 6,463.42 |
| Min | 3.25 | 7.89 | 5.98 | 3.37 | 3.70 | 6.34 |
| Max | 44,092.08 | 13,622.89 | 19,708.78 | 29,418.93 | 38,192.50 | 44,092.08 |

The statistics for the number of analysts are based on the number of unique analysts that provided at least one forecast for a given firm in year t. The number of firm-years is calculated by identifying the number of firms in the database in each year. A firm may have multiple analysts following and multiple forecasts for a given analyst, but is counted once in each year. In each sub-period, the number of firm-years is summed across the relevant years in the sub-period. The number of forecasts is the total number of analyst forecast observations recorded in each sub-period. This number is the product of the number of years, number of firms, number of analysts per firm, and number of forecasts by each analyst in each month in the year. MB is the ratio of market value of common equity to book value of common equity in year t-1. MVE is the market value of common equity ($million) at the end of year t-1.

**Table 2**
**Temporal Pattern of Analysts Forecasts Throughout the Year**

***Panel A: Relative Pessimism Index of Analyst Forecasts***

| Year | Month of Analyst Forecast Relative to Earnings Release Date* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Group** | *Month-12* | *Month-11* | *Month-10* | *Month-9* | *Month-8* | *Month-7* | *Month-6* | *Month-5* | *Month-4* | *Month-3* | *Month-2* | *Month-1* |
| All | -0.19 | -0.19 | -0.17 | -0.17 | -0.17 | -0.14 | -0.13 | -0.11 | -0.03 | **0.00** | **0.05** | **0.11** |
| 1983-85 | -0.22 | -0.25 | -0.19 | -0.20 | -0.23 | -0.22 | -0.24 | -0.22 | -0.16 | -0.12 | -0.06 | -0.03 |
| 1986-88 | -0.30 | -0.31 | -0.30 | -0.28 | -0.29 | -0.28 | -0.25 | -0.22 | -0.19 | -0.15 | -0.09 | -0.06 |
| 1989-91 | -0.30 | -0.27 | -0.28 | -0.28 | -0.26 | -0.27 | -0.25 | -0.22 | -0.16 | -0.10 | -0.06 | **0.00** |
| 1992-94 | -0.25 | -0.23 | -0.23 | -0.21 | -0.19 | -0.16 | -0.13 | -0.11 | -0.04 | **0.01** | **0.06** | **0.12** |
| 1995-98 | -0.08 | -0.08 | -0.06 | -0.06 | -0.06 | -0.03 | -0.01 | **0.00** | **0.09** | **0.11** | **0.16** | **0.22** |

The pessimism index, *%RelPess*, is computed as the mean of a categorical variable, *CatFE,* which takes on the value 1 when an individual analyst forecast is pessimistic relative to the actual earnings outcome, 0 when an analyst forecast exactly equals actual earnings, and -1 when an individual analyst forecast is optimistic relative to the actual earnings outcome. Thus, *%RelPess* measures the relative proportion of pessimistic forecasts to optimistic forecasts at any point in time (for example, the relative proportion of pessimis tic forecasts made during the month prior to an earnings announcement). A positive *%RelPess* value imlies a higher fraction of pessimistic forecasts to optimistic forecasts and a negative value implies the opposite.

* For example, *Month-12* corresponds to an earnings forecast made in the 12th month prior to the actual earnings announcement.

**Table 2 - Continued**

***Panel B: Mean and Median Scaled Forecast Error (in percent)***

| Year Group | Month of Analyst Forecast Relative to Earnings Release Date* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Month-12* | *Month-11* | *Month-10* | *Month-9* | *Month-8* | *Month-7* | *Month-6* | *Month-5* | *Month-4* | *Month-3* | *Month-2* | *Month-1* |
| **All years** | | | | | | | | | | | | |
| Mean | -0.90 | -0.86 | -0.80 | -0.75 | -0.72 | -0.62 | -0.54 | -0.46 | -0.32 | -0.25 | -0.18 | -0.08 |
| Median | -0.28 | -0.27 | -0.22 | -0.20 | -0.19 | -0.12 | -0.10 | -0.07 | 0.00 | 0.00 | 0.00 | 0.03 |
| Number | 28246 | 25306 | 28545 | 27034 | 26209 | 30946 | 28935 | 27624 | 33264 | 30628 | 26313 | 21429 |
| **1983-85** | | | | | | | | | | | | |
| Mean | -0.87 | -0.88 | -0.78 | -0.79 | -0.82 | -0.68 | -0.63 | -0.54 | -0.41 | -0.32 | -0.23 | -0.16 |
| Median | -0.43 | -0.47 | -0.33 | -0.34 | -0.31 | -0.27 | -0.24 | -0.23 | -0.12 | -0.07 | -0.03 | 0.00 |
| Number | 1780 | 1701 | 1833 | 1906 | 1869 | 1975 | 2017 | 1947 | 2095 | 2152 | 1871 | 1402 |
| **1986-88** | | | | | | | | | | | | |
| Mean | -1.18 | -1.12 | -1.10 | -0.99 | -1.01 | -0.87 | -0.80 | -0.70 | -0.55 | -0.47 | -0.39 | -0.27 |
| Median | -0.55 | -0.57 | -0.48 | -0.42 | -0.43 | -0.34 | -0.27 | -0.21 | -0.13 | -0.08 | -0.05 | -0.03 |
| Number | 3585 | 3468 | 3545 | 3639 | 3564 | 3821 | 3851 | 3696 | 4159 | 4083 | 3633 | 2596 |
| **1989-91** | | | | | | | | | | | | |
| Mean | -1.22 | -1.08 | -1.04 | -1.05 | -0.96 | -0.89 | -0.80 | -0.69 | -0.56 | -0.44 | -0.32 | -0.25 |
| Median | -0.58 | -0.50 | -0.47 | -0.46 | -0.37 | -0.33 | -0.28 | -0.22 | -0.11 | -0.05 | -0.02 | 0.00 |
| Number | 5112 | 4693 | 4979 | 4995 | 4762 | 5441 | 5368 | 5033 | 5759 | 5752 | 4959 | 3684 |
| **1992-94** | | | | | | | | | | | | |
| Mean | -0.92 | -0.87 | -0.84 | -0.77 | -0.67 | -0.58 | -0.48 | -0.43 | -0.29 | -0.20 | -0.14 | -0.05 |
| Median | -0.36 | -0.33 | -0.28 | -0.23 | -0.19 | -0.13 | -0.09 | -0.06 | 0.00 | 0.00 | 0.00 | 0.03 |
| Number | 6551 | 5784 | 6520 | 6263 | 6054 | 7071 | 6778 | 6378 | 7738 | 7201 | 6073 | 4819 |
| **1995-98** | | | | | | | | | | | | |
| Mean | -0.65 | -0.65 | -0.60 | -0.51 | -0.51 | -0.45 | -0.34 | -0.28 | -0.16 | -0.09 | -0.05 | 0.03 |
| Median | -0.08 | -0.09 | -0.05 | -0.04 | -0.05 | 0.00 | 0.00 | 0.00 | 0.02 | 0.03 | 0.04 | 0.05 |
| Number | 11218 | 9660 | 11668 | 10231 | 9960 | 12638 | 10921 | 10570 | 13513 | 11440 | 9777 | 8928 |

The forecast error is the median earnings forecast error for analysts covering firm *i*, for annual earnings announced in year *y*, in month *t* prior to the earnings announcement. The forecast error is defined as the *[Actual Earnings Per Share (i,y)-Forecast Earnings Per Share (i,y,t)]/P*(i,y-1)*, where *P*(i,y-1)* is the first stock price when the first forecast is available on I/B/E/S for firm *i* in year *y*-1. The highlighted forecasts error values are statistically different from zero at the 1% level of significance.

* For example, *Month-12* corresponds to an earnings forecast made in the 12th month prior to the actual earnings announcement.

## Table 3
## Multivariate Analysis: Time-Series Determinants of Pessimism

Logistic regression of analyst earnings forecast optimism/pessimism on time-period and firm-characteristic variables. The data set is a pooled time-series cross-sectional sample of 213,692 firm-month observations for the period 1983-98.

$$PESS = \beta_0 + \beta_1 * P_{8688} + \beta_2 * P_{8991} + \beta_3 * P_{9294} + \beta_4 * P_{9598} + \beta_5 * Profit + \beta_6 * MB + \beta_9 * MV + \gamma_1 * Month$$

| Variable | Coefficient Estimate | Standard Error | p-value |
|---|---|---|---|
| *Intercept* | -1.1456 | 0.0289 | 0.0001 |
| $P_{8688}$ | 0.0491 | 0.0215 | 0.0123 |
| $P_{8991}$ | 0.1119 | 0.0205 | 0.0001 |
| $P_{9294}$ | 0.2563 | 0.0200 | 0.0001 |
| $P_{9598}$ | 0.6343 | 0.0188 | 0.0001 |
| *Profit* | 1.0925 | 0.0187 | 0.0001 |
| *MB* | 0.0585 | 0.0036 | 0.0001 |
| *MV* | -0.0116 | 0.0038 | 0.0002 |
| *Month* | 0.0748 | 0.0014 | 0.0001 |
| Model $\chi^2$ | 9,402.2 | | |
| p value | 0.0001 | | |

*PESS* is an indicator variable that takes the value of 1 if *FE* is greater than zero and 0 otherwise. *FE* is the price-scaled median analyst earnings forecast error for firm *i*, for annual earnings in year *y*, in month *t* prior to the earnings announcement. It is defined as the *[Actual Earnings Per Share (i,y)-Forecast Earnings Per Share (i,y,t)]/P*(i,y-1)*, where *P*(i,y-1)* is the first stock price when the first forecast is available on I/B/E/S for firm i in year *y*-1. $P_{8688}$, $P_{8991}$, $P_{9294}$, and $P_{9598}$ are dummy variables which equal 1 if the earnings are in the periods 1986-88, 1989-91, 1992-94, and 1995-98, respectively, and equal to 0 otherwise. *Profit* is a dummy variable which equals 1 if the *Actual Earnings(i,y)>0*, and equal to 0 otherwise. *MB* is the market-to-book quintile ranking for firm *i* based on the market and book values of equity at the end of year *t-1*. *MV* is the annual market value of equity quintile ranking for firm *i* based on the market value of equity at the end of year *t-1*. *MV* and *MB* rankings are done for every year. *Month* is a variable that indicates when an individual analyst earnings forecast was made. *Month* $\in \{-12,-11,..,-2,-1\}$ is the number of months prior to the earnings announcement date (e.g. –12 is twelve months prior to earnings announcement date).

## Table 4
## Multivariate Analysis: Time-Series Determinants of Forecast Error

Regression of median analyst earnings forecast errors on time-period and firm-characteristic variables. The data set is a pooled time-series cross-sectional sample of 213,692 firm-month observations for the period 1983-98.

$$FE=\beta_0+\beta_1*P_{8688}+\beta_2*P_{8991}+\beta_3*P_{9294}+\beta_4*P_{9598}+\beta_5*Profit+\beta_6*MB+\beta_7*MV+\gamma_1*Month$$

| Variable | Coefficient Estimate | White Standard Error | p-value |
|---|---|---|---|
| *Intercept* | -0.0247 | 0.0004 | 0.0001 |
| $P_{8688}$ | -0.0003 | 0.0002 | 0.1121 |
| $P_{8991}$ | -0.0004 | 0.0004 | 0.1943 |
| $P_{9294}$ | 0.0022 | 0.0002 | 0.0001 |
| $P_{9598}$ | 0.0044 | 0.0002 | 0.0001 |
| *Profit* | 0.0206 | 0.0002 | 0.0001 |
| *MB* | 0.0011 | 0.0000 | 0.0001 |
| *MV* | 0.0002 | 0.0000 | 0.0001 |
| *Month* | 0.0008 | 0.0000 | 0.0001 |
| Adj $R^2$ | 0.107 | | |

*FE* is the price-scaled median earnings forecast error for analysts covering firm *i*, for annual earnings in year *y*, in month *t* prior to the earnings announcement. It is defined as the *[Actual Earnings Per Share (i,y)-Forecast Earnings Per Share (i,y,t)]/P*(i,y-1)*, where *P*(i,y-1)* is the first stock price when the first forecast is available on I/B/E/S for firm *j* in year *y*-1. $P_{8688}$, $P_{8991}$, $P_{9294}$, and $P_{9598}$ are dummy variables which equal 1 if the earnings are in the periods 1986-88, 1989-91, 1992-94, and 1995-98, respectively, and equal to 0 otherwise. *Profit* is a dummy variable which equals 1 if the *Actual Earnings(i,y)>0*, and equal to 0 otherwise. *MB* is the market-to-book quintile ranking for firm i based on the market and book values of equity at the end of year *t-1*. *MV* is the annual market value of equity quintile ranking for firm *i* based on the market value of equity at the end of year *t-1*. *MV* and *MB* rankings are done for every year. *Month* is a variable that indicates when an individual analyst earnings forecast was made. *Month* $\in$ {-12,-11,..,-2,-1} is the number of months prior to the earnings announcement date (e.g. –12 is twelve months prior to earnings announcement date).

## Table 5
## Characteristics of Firms with Net Insider Sales and Net Insider Pnrchases Following an Earnings Announcement

Descriptive statistics for firms with insider purchases and insider sales following an earnings announcement. Mean values are reported with standard deviations in parentheses. T tests are reported for differences in means with p-values in parentheses. The data set is a pooled time-series cross-sectional sample of 2,301 firm-year observations for the period 1994-98.

| Variable | Net Insider Position: Seller | Net Insider Position: Purchaser | Difference |
|---|---|---|---|
| | *N = 1,434* | *N = 867* | |
| ***MB*** | 4.315 | 3.302 | 7.529 |
| | (3.473) | (2.896) | (0.001) |
| ***Size*** | 4.836 | 4.887 | -0.807 |
| | (1.489) | (1.432) | (0.419) |
| ***IssueNow*** | 0.194 | 0.153 | 2.514 |
| | (0.396) | (0.361) | (0.012) |
| ***IssueNext*** | 0.682 | 0.434 | 11.943 |
| | (0.466) | (0.496) | (0.001) |
| ***Profit*** | 0.851 | 0.844 | 0.317 |
| | (0.356) | (0.363) | (0.751) |
| $PESS_{last}$ | 0.767 | 0.606 | 5.453 |
| | (0.423) | (0.489) | (0.001) |
| ***SWITCH*** | 0.653 | 0.496 | 3.707 |
| | (0.477) | (0.501) | (0.001) |

$PESS_{last}$ is an indicator variable equal to 1 if $FE_{last}$ is greater than or equal to zero, and 0 otherwise. $FE_{last}$ is the price-scaled median earnings forecast error for analysts covering firm *i*, for annual earnings in year *y*, in month after an annual earnings announcement. It is defined as the *[Actual Earnings Per Share (i,y)-Forecast Earnings Per Share (i,y,t)]/P*(i,y-1)*, where *P*(i,y-1)* is the first stock price when the first forecast is available on I/B/E/S for firm *j* in year *y*-1.

*SWITCH*, is an indicator variable equal to one if the earliest forecast in the year was optimistic (i.e, $FE_{month}-12$, *year t* < 0) and the final forecast in the year either was pessimistic (i.e, $FE_{month\text{-}1,\, year\, t}$ >= 0), and zero if the first <u>and</u> last forecast are both optimistic.

A firm is classified as a seller (purchaser) if the insiders (CEO, Chairman, VP, directors) are net sellers (purchasers) of company shares in the 20 trading days after an earnings announcement.

*IssueNow* is a dummy variable which equals if the firm's statement of cash flows indicates a positive sale of common and preferred stock (item #108) greater than 5% of the market value of equity in year *t*. *IssueNext* is a dummy variable which equals if the firm's statement of cash flows indicates a positive sale of common and preferred stock (item #108) greater than 5% of the market value of equity in year *t+1*. *MB* is the market-to-book quintile ranking for firm i based on the market and book values of equity at the end of year *t-1*. *MV* is the annual market value of equity quintile ranking for firm *i* based on the market value of equity at the end of year *t-1*. *MV* and *MB* rankings are done for every year.

### Table 6
### Relation of Final Forecast Pessimism and Switching from Initial Optimism to Final Pessimism with Insider Trading

Regression of (1) analyst pessimism in the final month before an earnings announcement and (2) switch from optimism to pessimism, on the sale of stock by the firm's CEO in the trading-window after the earnings announcement. The data set is a pooled time-series cross-sectional sample of 2,301 firm-year observations for the period 1994-98.

**Panel A: Final Forecast Pessimism**

$$PESS_{last} = \beta_0 + \beta_1 {*}InsiderSale + \beta_2 {*}IssueNow + \beta_3 {*}IssueNext + \beta_4 {*}MB + \beta_5 {*}MV + \beta_6 {*}Profit + \varepsilon$$

| Variable | Coefficient Estimate | Standard Error | p-value |
|---|---|---|---|
| *Intercept* | -0.9624 | 0.1835 | 0.0001 |
| *InsiderSale* | 0.5859 | 0.0997 | 0.0001 |
| *IssueNow* | 0.0388 | 0.1287 | 0.7630 |
| *IssueNext* | 0.3068 | 0.1004 | 0.0022 |
| *MB* | -0.1448 | 0.1486 | 0.3300 |
| *MV* | 0.2215 | 0.151 | 0.1425 |
| *Profit* | 1.1883 | 0.1221 | 0.0001 |
| Model $\chi^2$ | 193.221 | | |
| p value | *0.0001* | | |

**Panel B: Switch from Optimism to Pessimism**

$$SWITCH = \beta_0 + \beta_1 {*}InsiderSale + \beta_2 IssueNow + \beta_3 {*}IssueNext + \beta_4 {*}MB + \beta_5 {*}MV + \beta_6 {*}Profit + \varepsilon$$

| Variable | Coefficient Estimate | Standard Error | p-value |
|---|---|---|---|
| *Intercept* | -0.6271 | 0.3485 | 0.0720 |
| *InsiderSale* | 0.3386 | 0.0968 | 0.0005 |
| *IssueNow* | -0.1581 | 0.2684 | 0.5558 |
| *IssueNext* | -0.0810 | 0.1910 | 0.6714 |
| *MB* | 0.2047 | 0.2842 | 0.4713 |
| *MV* | 0.1322 | 0.2870 | 0.6451 |
| *Profit* | 0.7622 | 0.2329 | 0.0011 |
| Model $\chi^2$ | 34.230 | | |
| p value | *0.0002* | | |

$PESS_{last}$ is an indicator variable equal to 1 if $FE_{last}$ is greater than or equal to zero, and 0 otherwise. $FE_{last}$ is the price-scaled median earnings forecast error for analysts covering firm *i*, for annual earnings in year *y*, in last month before an annual earnings announcement. It is defined as the *[Actual Earnings Per Share (i,y)-Forecast Earnings*

*Per Share (i,y,t)]/P*(i,y-1)*, where *P*(i,y-1)* is the first stock price when the first forecast is available on I/B/E/S for firm *j* in year *y*-1.

*SWITCH*, is an indicator variable equal to one if the earliest forecast in the year was optimistic (i.e, $FE_{month-12,\ year\ t} < 0$) and the final forecast in the year either was pessimistic (i.e, $FE_{month-1,\ year\ t} >= 0$), and zero if the first <u>and</u> last forecast are both optimistic.

A firm is classified as a seller (purchaser) if the insiders (CEO, Chairman, VP, directors) are net sellers (purchasers) of company shares in the 20 trading days after an earnings announcement. *InsiderSale* is an indicator variable equal to one for seller firm years and 0 for purchaser firm years.

*IssueNow* is a dummy variable which equals if the firm's statement of cash flows indicates a positive sale of common and preferred stock (item #108) greater than 5% of the market value of equity in year *t*. *IssueNext* is a dummy variable which equals if the firm's statement of cash flows indicates a positive sale of common and preferred stock (item #108) greater than 5% of the market value of equity in year *t+1*. *MB* is the market-to-book quintile ranking for firm i based on the market and book values of equity at the end of year *t-1*. *MV* is the annual market value of equity quintile ranking for firm *i* based on the market value of equity at the end of year *t-1*. *MV* and *MB* rankings are done for every year. *Profit* is a dummy variable which equals 1 if the *Actual Earnings(i,y)>0*, and equal to 0 otherwise

**Figure 1:**
**% Relative Pessimism Across Calendar Years**

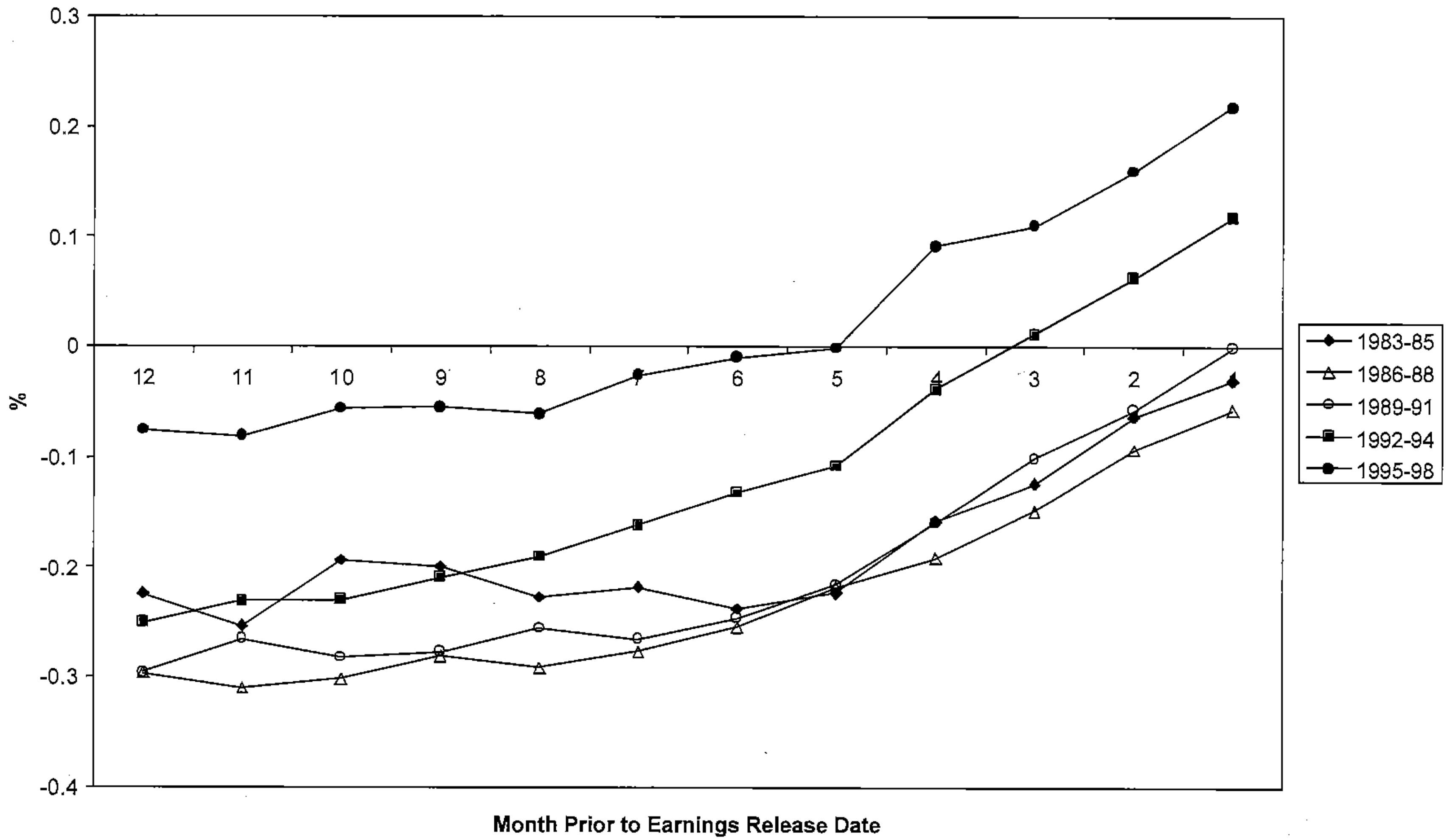


**Figure 2A:**
**Median Forecast Error Scaled by Price**

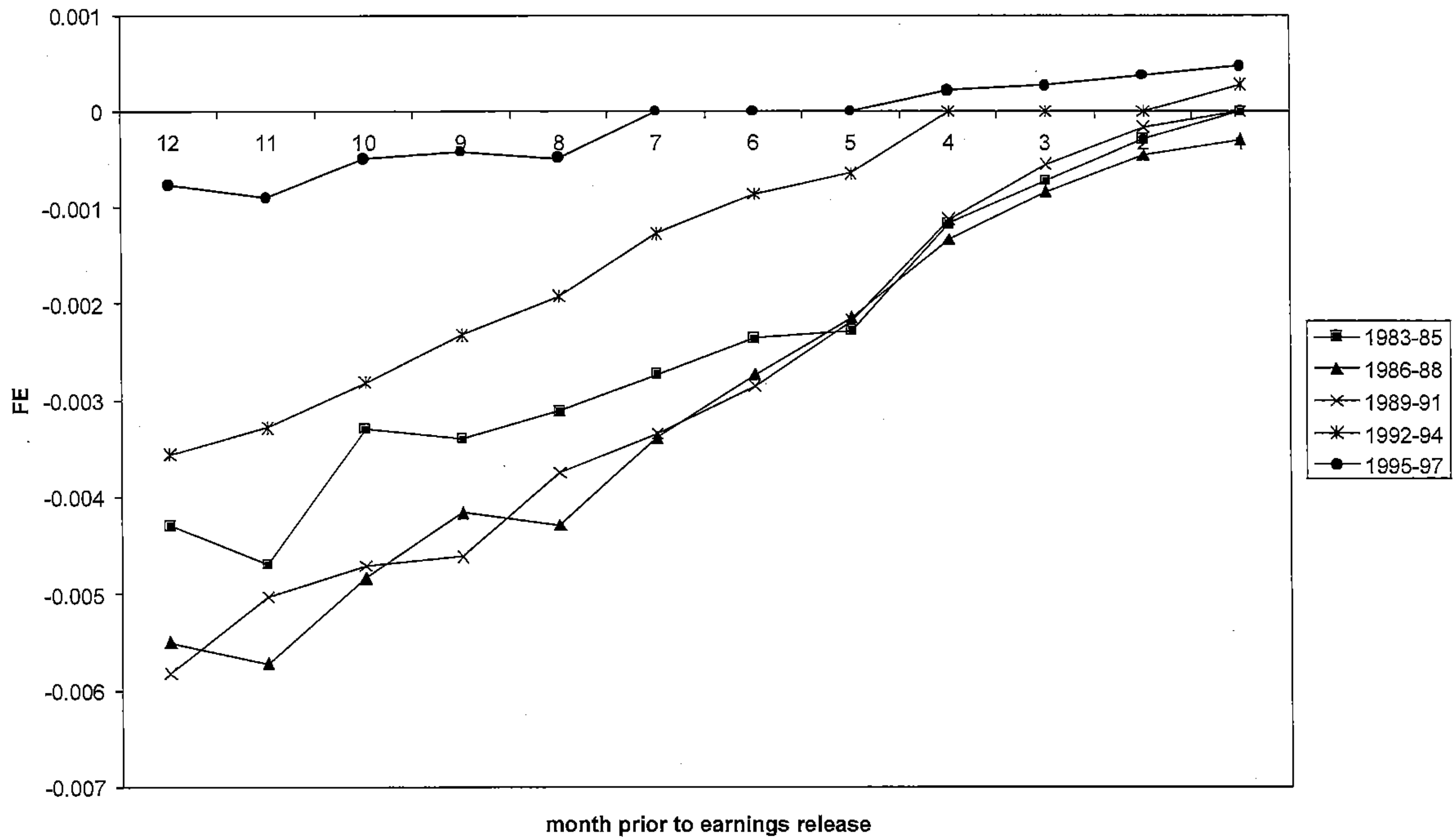


**Figure 2B:**
**Median Forecast Error Scaled by Total Assets**

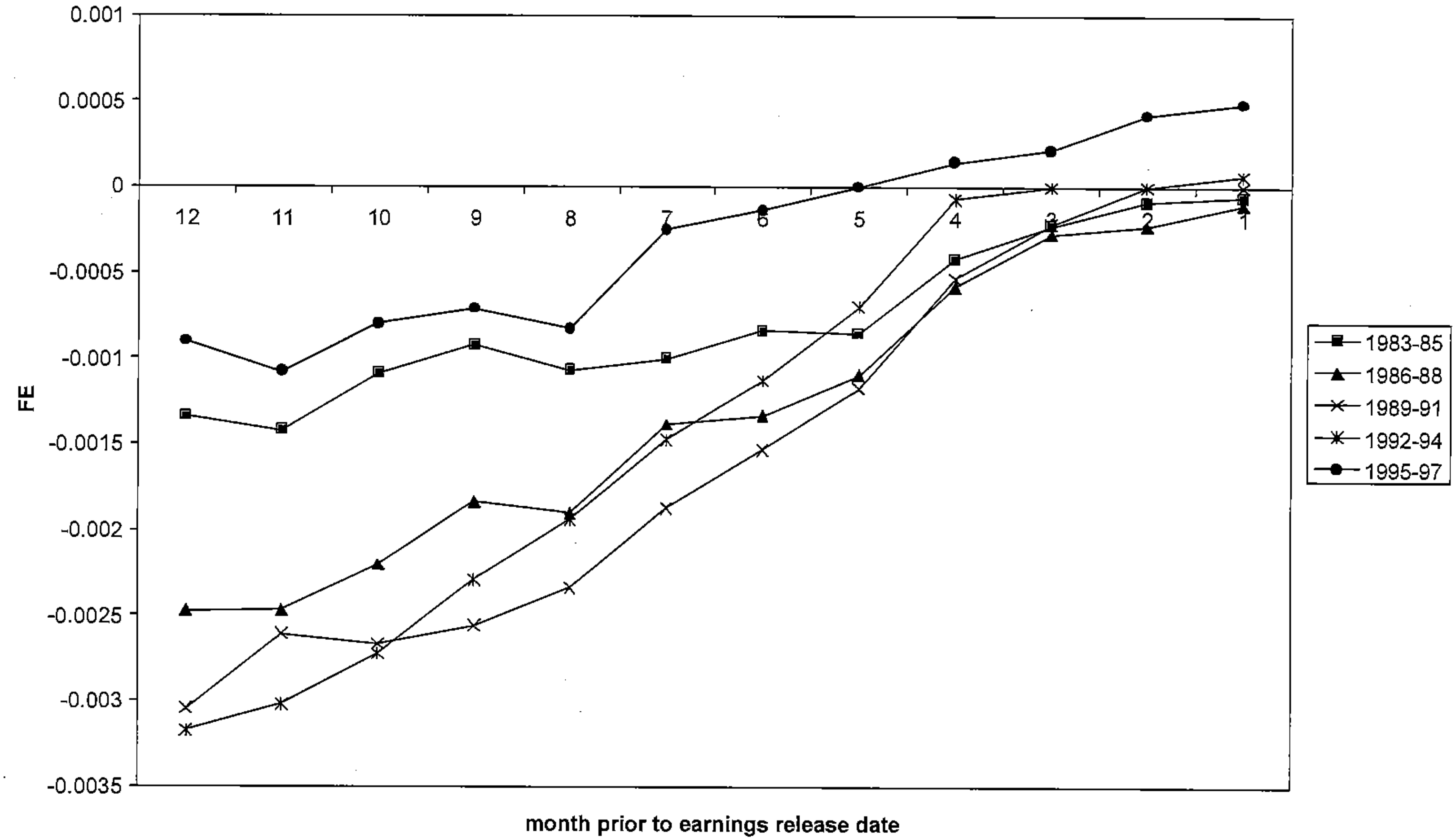


**Figure 3:**
**Quarterly Earnings 1995 to 1998 - constructed consensus forecasts**
**Mean and median of the median forecast per firm (scaled by price)**

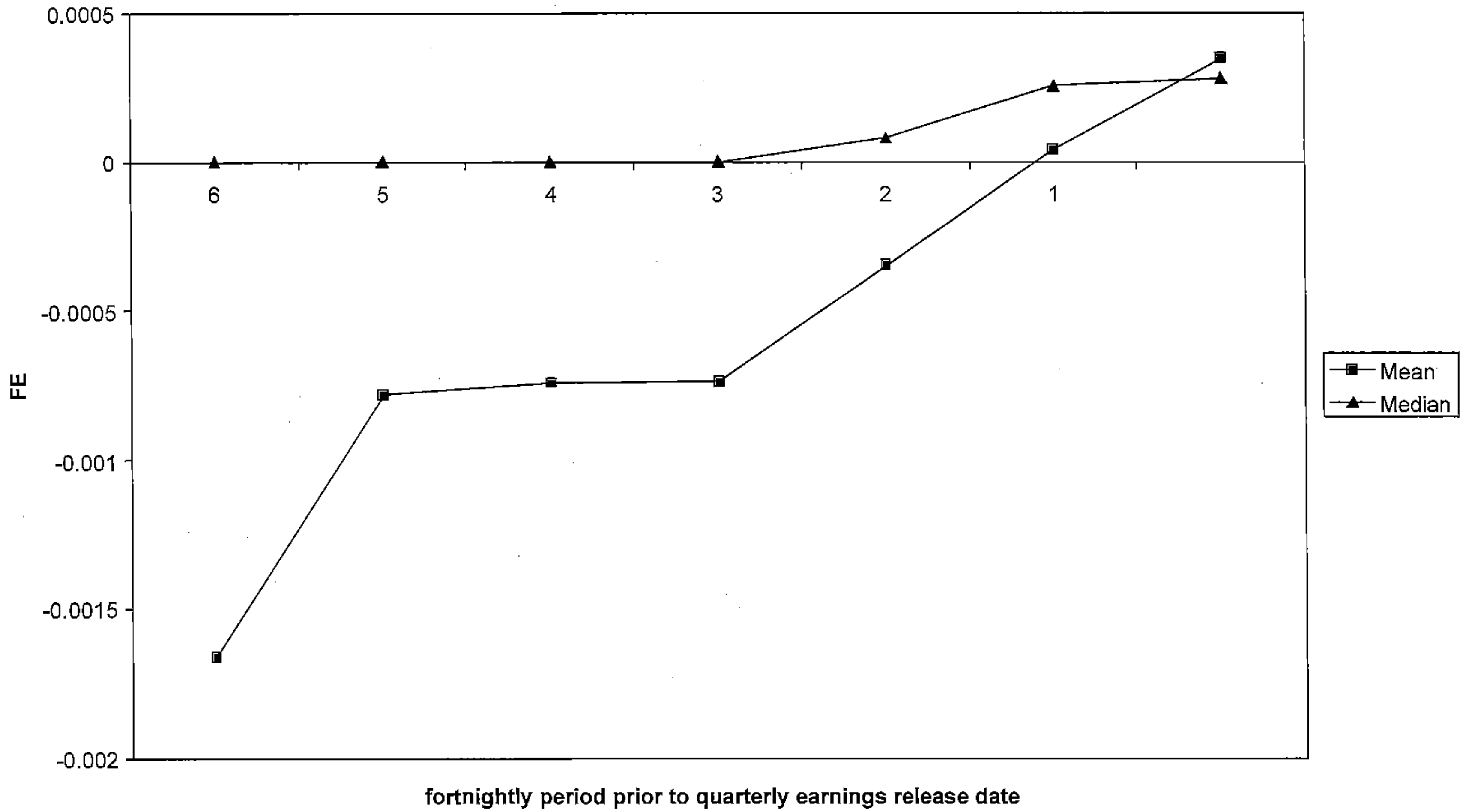
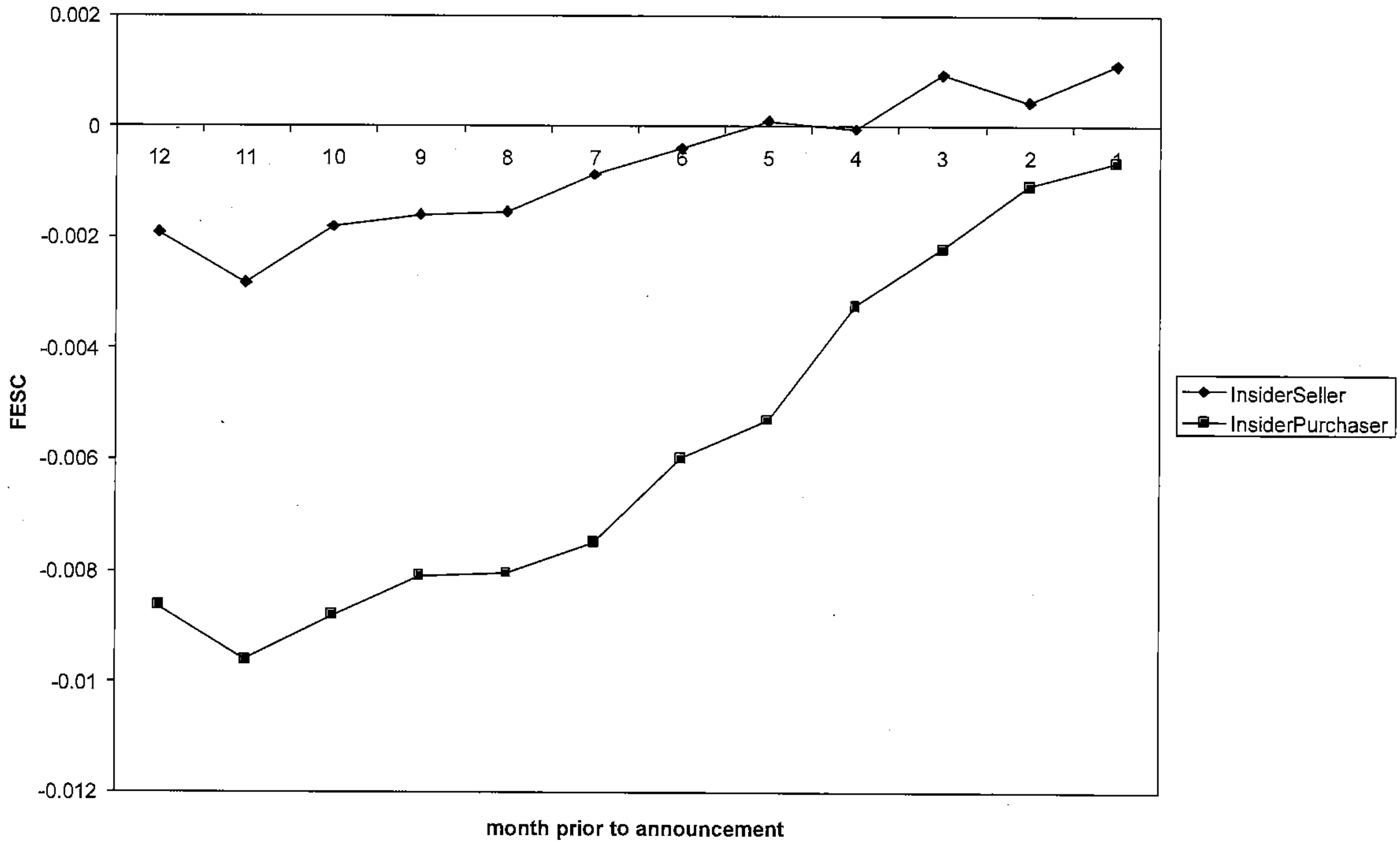


**Figure 4 - InsiderSeller vs InsiderPurchaser Median Forecast Error**



# The Walk-down to Beatable Analyst Forecasts: The Role of Equity Issuance and Insider Trading Incentives*

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**Abstract**

It has been alleged that firms and analysts engage in an "earnings-guidance game" where analysts first issue optimistic earnings forecasts and then "walk down" their estimates to a level that firms can beat at the official earnings announcement. We examine whether the walk-down to beatable targets is associated with managerial incentives to sell stock after earnings announcements on the firm's behalf (through new equity issuance) or from their personal accounts (through option exercises and stock sales). Consistent with these hypotheses, we find that the walk-down to beatable targets is most pronounced when firms or insiders are net sellers of stock after an earnings announcement. These findings provide new insights on the impact of capital-market incentives on communications between managers and analysts.

**Keywords** Analysts' forecasts; Earnings guidance; Insider trading; New equity issuance; Stock options

**JEL Descriptors** G14, G30, G38, K22, M41

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## La réévaluation des prévisions des analystes à des niveaux permettant le dépassement : le rôle de l'émission d'actions et des facteurs incitatifs aux délits d'initiés


### Condensé

Certains prétendent que les sociétés et les analystes se livrent à un « exercice de guidage des résultats » dans lequel les analystes produisent d'abord des prévisions de résultats optimistes pour revenir ensuite sur leurs estimations et les ramener à un niveau que les sociétés sont en mesure de dépasser lors de l'annonce officielle de leurs résultats. Les auteurs élaborent et testent des hypothèses relatives à ce passage des analystes de l'optimisme au pessimisme, à partir des facteurs qui incitent les dirigeants à vendre les actions de la société à des conditions avantageuses en évitant de décevoir les investisseurs lors de l'annonce officielle des résultats de l'entreprise.

L'analyse des auteurs repose sur cinq éléments sous-jacents à l'exercice de guidage des résultats. Premièrement, dans la majorité des opérations, les ventes d'actions par les dirigeants et par l'entreprise se déroulent sur un court laps de temps après les annonces de résultats. Deuxièmement, les dirigeants qui ont l'intention de vendre des actions pour leur propre compte ou au nom de la société après une annonce de résultats s'intéressent au cours des titres de la société à brève échéance après l'annonce. Troisièmement, les dirigeants peuvent influencer les analystes dans leurs prévisions de résultats grâce à la publication d'informations discrétionnaires, et les analystes sont, pour leur part, enclins à collaborer. Quatrièmement, les analystes tendent généralement à être optimistes dans leurs prévisions initiales. Enfin, le marché paraît gratifier les sociétés qui dépassent les dernières prévisions de résultats des analystes d'évaluations supérieures à celles qu'il octroie aux entreprises qui ne sont pas parvenues à dépasser l'objectif prévisionnel, peu importe la voie ou le moyen emprunté pour atteindre l'objectif (soit le guidage des anticipations ou la gestion des résultats). À partir de ces éléments, les auteurs font l'hypothèse que les dirigeants guident systématiquement les analystes vers des objectifs prévisionnels qui peuvent être dépassés, de sorte qu'eux-mêmes ou leurs sociétés puissent vendre des actions à des conditions avantageuses après une annonce de résultats.

Les auteurs exposent d'abord des faits qui relient l'évolution du profil des prévisions des analystes entre les années 1980 et les années 1990 et les changements institutionnels et réglementaires qui ont accentué les facteurs liés au marché financier incitant les dirigeants à guider les analystes dans leurs prévisions de résultats et à dépasser ces objectifs prévisionnels, afin de hausser le cours des actions. Ces changements systémiques incluent l'utilisation accrue de la rémunération des dirigeants sous forme d'options sur actions, la restriction des négociations par les initiés à la période postérieure aux annonces de résultats en réponse à l'*Insiders' Fraud and Securities Trading Act* de 1988 et le remaniement, en 1991, de la règle relative au délai d'attente que doivent respecter les initiés entre les opérations de négociation (« *short-swing rule* »), de façon à leur permettre de lever leurs options et de vendre immédiatement les actions de la société. L'analyse des auteurs montre qu'entre 1984 et 2001, les prévisions de résultats initiales trimestrielles et annuelles des analystes sont trop optimistes par rapport aux résultats réels finals. Lorsque la date de l'annonce des résultats approche, les analystes révisent à la baisse leurs prévisions afin qu'elles soient moins optimistes par rapport aux résultats réels. Il existe une différence essentielle entre les années

1980 et les années 1990 : les révisions moyennes et médianes des prévisions de résultats des analystes au cours de la période s'échelonnant du milieu jusqu'à la fin des années 1990 deviennent bel et bien pessimistes lorsque la date de l'annonce des résultats approche. Ce virage systématique des analystes vers le pessimisme dans les années 1990 coïncide avec les changements institutionnels et réglementaires qui ont accentué les facteurs liés au marché financier incitant les dirigeants à guider les analystes dans leurs prévisions de résultats et à dépasser ces objectifs prévisionnels, afin de hausser le cours des actions à brève échéance.

Les auteurs soumettent à des tests transversaux leur prédiction principale selon laquelle les facteurs incitatifs liés au marché financier découlant de la vente d'actions, soit à titre personnel (la levée d'options et la vente d'actions par les initiés) soit au nom de la société (l'émission de nouvelles actions), sont associés au fait que les analystes ramènent leurs prévisions à un niveau que les sociétés sont en mesure de dépasser. Dans leurs tests transversaux, les auteurs utilisent un vaste échantillon de prévisions des analystes, du milieu des années 1980 jusqu'à 2001, tirées de la base de données I/B/E/S. Les données sur la vente d'actions par les dirigeants sont tirées de la compilation, effectuée par la société Thompson Financial, des opérations d'initiés soumises à la SEC. Seules les opérations des initiés parmi les achats et les ventes sur le marché libre et la levée d'options figurent dans le calcul des ventes nettes d'actions par les dirigeants. Les auteurs mesurent les ventes d'actions au nom de la société en utilisant les données relatives aux émissions d'actions dans le trimestre au cours duquel sont annoncés les résultats et le trimestre subséquent.

Conformément à leur principale prédiction transversale, les auteurs constatent que le pessimisme dans les prévisions antérieures à l'annonce de résultats est le plus marqué dans le cas des sociétés dont les dirigeants sont le plus fortement incités par les facteurs liés au marché financier à éviter les déceptions relatives aux résultats. Les auteurs observent que les sociétés dont les dirigeants vendent des actions après une annonce de résultats sont plus susceptibles d'être associées à des prévisions pessimistes des analystes avant l'annonce des résultats. La probabilité de pessimisme des prévisions passe de 54 %, dans le cas d'une société moyenne pour laquelle n'est enregistrée aucune vente nette par les initiés, à 66 % dans le cas d'une société moyenne pour laquelle est enregistrée une vente nette subséquente par les initiés. En outre, les sociétés dont les initiés sont des vendeurs nets d'actions de l'entreprise sont également plus susceptibles d'être associées à des analystes qui passent de l'optimisme à long terme au pessimisme à court terme avant l'annonce de résultats. La probabilité du passage de l'optimisme, tôt dans le trimestre, au pessimisme, à proximité de l'annonce des résultats, augmente de 21 % chez les sociétés pour lesquelles n'est pas enregistrée de vente nette des initiés à 27 % chez les sociétés pour lesquelles est enregistrée une vente nette des initiés. Cette constatation est conforme au fait que les dirigeants orientent les analystes vers des prévisions de résultats pouvant être dépassées pour faciliter les opérations avantageuses que peuvent conclure les initiés après les annonces de résultats.

Les auteurs constatent que les résultats de leur série chronologique résistent : 1) à différents déflateurs des prévisions de résultats des analystes, 2) aux horizons prévisionnels annuel aussi bien que trimestriel, 3) à l'utilisation de la population entière des sociétés figurant dans la base de données I/B/E/S et à l'utilisation d'un échantillon déterminé de sociétés examinées durant toute la période étudiée et 4) aux ajustements visant la prise en compte des fractionnements d'actions susceptibles d'influer sur le calcul des erreurs prévisionnelles des analystes.

Ils constatent également que leurs résultats empiriques transversaux résistent : 1) à différents déflateurs des prévisions de résultats des analystes, 2) aux horizons prévisionnels annuel aussi bien que et trimestriel, 3) à l'inclusion de diverses caractéristiques des sociétés précédemment liées aux prévisions de résultats des analystes, 4) aux différents types d'analystes (précurseurs ou retardataires) et 5) aux différentes classes d'investisseurs, y inclus les investisseurs institutionnels et les investisseurs individuels.

Les constatations des auteurs complètent les résultats d'Aboody et Kasznik (2000) dont les observations confirment que les dirigeants publient de l'information à des fins stratégiques, en vue d'obtenir des options sur actions à des conditions avantageuses. L'approche des auteurs consiste à examiner les facteurs qui incitent les dirigeants à publier de l'information à des fins stratégiques dans le but de lever des options et de vendre des actions à des conditions avantageuses. Ils poussent également plus loin les études récentes portant sur les caractéristiques des sociétés qui se livrent au guidage des résultats (Matsumoto, 2002) en analysant explicitement les facteurs qui incitent directement les dirigeants à tirer profit de ce guidage. Pour conclure, les résultats empiriques de l'étude nous renseignent davantage sur l'incidence des facteurs incitatifs liés au marché financier sur les communications entre dirigeants et analystes.

## 1. Introduction

Security regulators and the business press have often alleged that firms and analysts are involved in an "earnings-guidance game". These critics claim that analysts issue systematically optimistic earnings forecasts at the start of the fiscal period and then "walk down" their estimates to a level the firm can beat on the formal earnings announcement. For example, Laderman (1998, 148) noted in a *Business Week* article:

> Thanks to the IR [investor relations] people and analysts, in recent years, earnings estimates for the S&P 500 in any quarter tend to start out an average 5% to 8% higher than where the earnings end up. The Street knows this and allows for analysts to whittle down the numbers as the quarter proceeds.

We develop and test hypotheses about this pattern of analyst optimism-to-pessimism based on managerial incentives to sell company stock on favorable terms by avoiding a "disappointment" on the official announcement of firm earnings. The motivation for our investigation is straightforward. As Ken Brown (2002, C1) indicates in his *Wall Street Journal* column:

> the reasons that executives became so obsessed with hitting their numbers are clear. A company that shows steady growth with few surprises often gets rewarded with a sweet premium from investors — a high stock price — which goes a long way toward keeping the executives' stock options in the money.

The business press is replete with articles alleging that firms deliberately attempt to deceive or pressure analysts into issuing "beatable" earnings targets. Even as far back as May 6, 1991, Laurie P. Cohen, staff reporter of the *Wall Street Journal* wrote that

> after securities analysts estimate what the companies they follow will earn, the game begins. Chief financial officers or investor-relations representatives traditionally give "guidance" to analysts, hinting whether the analysts should raise or lower their earnings projections so the analysts won't be embarrassed later.
>
> And these days, many companies are encouraging analysts to deflate earnings projections to artificially low levels, analysts and money managers say. If the game is played right, a company's stock will rise sharply on the day it announces its earnings — and beats the analysts' too conservative estimates.

Prior academic research documents that analysts issued systematically optimistic forecasts during the 1980s (see, e.g., O'Brien 1988). However, consistent with media reports of forecast pessimism, more recent empirical evidence suggests that firms attempt to meet or beat earnings-forecast benchmarks (see, e.g., Bartov, Givoly, and Hayn 2002; Burgstahler and Eames 2002; DeGeorge, Patel, and Zeckhauser 1999; Kasznik and McNichols 2002; Matsumoto 2002; and Richardson, Teoh, and Wysocki 1999). In this paper, we explore empirically whether capital-market incentives stemming from the sale of equity either on personal account (insider option exercise and stock sale) or on the firm's behalf (new equity issuance) are associated with the walk-down of analysts' forecasts to targets that are eventually beaten through successful guidance of expectations or earnings management.

We begin our analysis by developing a framework for the earnings-guidance game. The framework is based on five underlying elements outlined below, and discussed in more depth in section 2. First, in the majority of transactions, managerial and firm equity sales occur during a short window after earnings announcements. Second, managers who are about to sell shares on their personal account or on behalf of the firm after an earnings-announcement care about the firm's short-term post-announcement stock price level. Third, managers can influence analysts' earnings targets through discretionary information disclosures and analysts have incentives to cooperate. Fourth, analysts' initial forecasts generally tend to be optimistic. Finally, the market appears to reward firms that beat analysts' latest earnings target with higher valuations than those that fail to beat the target, regardless of the path to the target or how the target is achieved (that is, through guiding expectations or earnings management). On the basis of these elements, we hypothesize that managers systematically guide analysts toward beatable targets so that they or their firms can sell equity on favorable terms after an earnings announcement. According to this managerial guidance hypothesis, such guidance allows the manager to maintain favorable stock market valuations exactly when they are needed, just after earnings announcements.

In our empirical study, we test this hypothesis by examining the association between firms' and managers' equity sales after earnings announcements and (1) the walk-down in analysts' optimistic forecasts early in the fiscal period and (2) firms meeting or beating analysts' final revised earnings targets. Given that neither managers' intentions to guide analysts nor their communications with analysts can be directly observed in our sample, we follow prior empirical studies of agency models and examine principals' and agents' observable actions, after controlling for other influences.[1] In our study, the analysts' observable actions are their beatable forecast revisions and the managers' observable actions are their post-earnings announcement equity transactions. Our evidence is consistent with the predictions of our managerial guidance hypothesis, whereas alternative interpretations do not appear to explain the totality of our results.[2]

In our tests, we use a large sample of analyst forecasts from the mid-1980s to 2001 available from I/B/E/S. Data on managers' sale of shares are obtained from Thomson Financial's compilation of insider trades that are filed with the Securities and Exchange Commission (SEC). Only insiders' trades from open-market purchases and sales and option exercises are included in the calculation of the net sale of shares by the managers. We measure the sale of shares on the firm's own behalf using data on equity issuances in the quarter of and quarter after the earnings announcement.

Consistent with our main predictions, we find that analysts' earnings forecast pessimism prior to an earnings announcement is (1) more prevalent in the late 1990s following institutional and regulatory changes that increased managers' capital-market incentives to guide and beat analysts' forecasts to boost short-term stock prices, and (2) more common for firms that are about to issue new equity and whose insiders are net sellers of the firm's stock in the quarter immediately following an earnings announcement.

Our findings complement the results of Aboody and Kasznik 2000, who present evidence consistent with managers' strategically disclosing information in order to obtain stock options on favorable terms. Our approach examines managerial incentives to strategically disclose information in order to exercise options and sell stock on favorable terms. We also contribute to the recent literature (e.g., Matsumoto 2002) examining firm characteristics that influence earnings guidance by explicitly considering firm and managers' direct incentives to profit from earnings guidance in our study.

The rest of tbe paper is structured as follows. In section 2, we develop our hypotheses. Section 3 describes the sample and data. Section 4 presents descriptive evidence for the behavior of earnings forecasts over the fiscal period in various calendar subperiods. In section 5, we present primary cross-sectional tests and a robustness analysis of the predictions arising from the earnings-expectations game. Section 6 concludes the paper.

## 2. Background and hypothesis development

In this section, we motivate the prediction that managers' capital-market trading incentives are related to their guidance of analysts' earnings forecasts. We first discuss the institutional rules governing the timing of stock-sale transactions that motivate managers to focus on the firm's stock price around earnings announcements. We then discuss how analysts' forecasts influence stock prices, suggest why analysts cooperate with managers in setting forecasts, and discuss recent empirical research consistent with managers' influencing analysts' forecasts. Finally, we discuss recent research indicating that investors fixate on meeting earnings thresholds such as analysts' forecasts and reward good versus bad news asymmetrically. We argue that if the market rewards firms that beat analysts' latest earnings target and if managers wish to sell equity on favorable terms after earnings announcements, then managers have strong incentives to influence analysts' expectations to avoid an earnings disappointment. We combine these elements to develop hypotheses on the cross-sectional variation in analysts' optimism and pessimism. Together, these elements suggest that insider trading and new equity issuance activities are linked to analyst forecast bias within the fiscal period.

***Why and when managers care about short-term stock price***

Managers intending to issue new equity on the firm's behalf care about the firm's stock price level after an earnings announcement because the stock price directly affects the proceeds the firm can raise through an equity sale. Managers care particularly about the stock price right after an earnings announcement because new equity issues typically occur in the weeks following a public earnings announcement (see, e.g., Korajczyk, Lucas, and MacDonald 1991). Lucas and MacDonald (1990) explain this timing as an attempt to minimize information asymmetry between the firm and uninformed outside investors by delaying equity issues until after an earnings announcement.

Stock-based compensation such as stock options also motivates managers to care about the firm's stock price by directly tying compensation to the firm's stock price performance.[3] Hall and Liebman (1998) report that stock options have become an increasingly important portion of managers' compensation. They report that stock option grants increased to make up almost 50 percent of chief executive officer (CEO) compensation by 1994. Thus, managers face increasing incentives to care about the firm's stock price from the structure of their compensation package.

Furthermore, managers care about the firm's short-term stock price specifically during the earnings-announcement period because of institutional constraints on insider trading. These restrictions have arisen because regulatory and corporate concerns that managers may use their inside information to exercise stock options or trade in the firms' stock at the expense of outside investors. U.S. insider trading laws (Insider Trading Sanctions Act 1984; Insider Trading and Securities Fraud Enforcement Act 1988) expressly prohibit this direct profit-taking opportunity by insiders. In response to the 1988 Insider Trading and Securities Fraud Enforcement Act, firms increasingly have instituted their own policies and procedures to regulate trading by insiders prior to earnings announcements. These restrictions generally take the form of explicit blackout periods specifically in the last two months before the earnings-announcement date (see, e.g., Bettis, Coles, and Lemmon 2000; Jeng 1999). Bettis et al. reported that firms increasingly instituted formal blackout periods during the 1990s, and that by 1997, 80 percent of firms had blackout periods.[4] Therefore, the occurrence of insiders' option exercises and stock sales are increasingly focused in a narrow window immediately after an earnings announcement. Consistent with this, Sivakumar and Waymire (1994) report a higher incidence of insider trades in the week immediately after a quarterly earnings announcement. Similarly, Noe (1999) reports that insider transactions cluster after voluntary disclosures that are favorable to stock prices.

In sum, stock option compensation, insider trading restrictions, and new equity issue guidelines motivate managers to care about the firm's short-term stock price immediately following an earnings announcement. As a result, the stock price level during the earnings-announcement period carries special significance for firm management.

### *Managers' ability to manage analysts' forecasts and analysts' incentives to cooperate*

Empirical and anecdotal evidence suggest that managers can indeed influence analysts' earnings forecasts. As a key provider of information to analysts, managers can affect analysts' earnings expectations by controlling the content and timing of discretionary information releases. Soffer, Thiagarajan, and Walther (2000) find that firms use pre-announcements of earnings to manage analysts' expectations. They also find that managers are selective in the content of their disclosures and appear to receive stock price benefit from managing analysts toward beatable targets. Cotter, Tuna, and Wysocki (2004) find that the switch to pessimistic forecasts appears to be concentrated around the release of management forecasts. Using survey data, Hutton (2003) finds that firms where managers indicated that they provide active guidance to analysts are less likely to experience negative earnings surprises. Together these papers suggest that managers are both able and willing to engage in expectations management.

Francis and Philbrick (1993) and Lim (2001) argue that managers can pressure analysts to revise forecasts away from their true beliefs because of analysts' dependence on management for future information. The business press has reported incidents of analysts who issued unfavorable forecasts being shunned by the management. Analysts may find it very difficult to do their jobs if they are ignored by management at investor conferences and if the firm does not return analysts' phone calls for information. At tbe extreme, there have been allegations of analysts losing their jobs after writing negative reports about favored clients.

It has also been alleged that analysts face conflicting incentives in maintaining the quality of investment research versus securing investment banking deals. Laderman (1998) asserts that

> [m]ost Wall Street research is pitched to institutional investors who pay the firm about a nickel a share in commissions. But if an analyst spends his time trying to land an initial public offering, the firm can earn 15 to 20 times that amount per share. Investment banking deals are much more lucrative for the brokerage firm. Merger advisory fees can be sweet as well … . But what happens when there's a conflict between objective analyses and the demands of investment bankers? … There's no conflict. That's been settled. The investment hankers won.

It is a widespread belief in the business press and among regulators that highly lucrative underwriting deals often pressure analysts to cooperate with firms issuing new securities. The SEC's investor education website specifically mentions the potential for analyst conflict of interest because of investment banking relationships. The recent well-publicized $1.4 billion settlement between 10 major brokerages and the U.S. securities regulators stems from this very allegation that investment banking influences compromise analysts' objectivity. The legal investigation revealed many instances where analysts yielded to investment banking business pressures. The new Regulation AC, released by the SEC in April 2003, specifically requires a research analyst to certify that "the views expressed in the research report accurately reflect such research analyst's personal views". It also requires analysts to certify that his or her compensation was not directly or indirectly related to the recommendation; if it was, the extent and source of the relation must be disclosed in the report.[5]

Previous academic research has also provided some evidence that analysts yielded to client firm pressures. Collectively, Lin and McNichols (1998), Michaely and Womack (1999), Dechow, Hutton, and Sloan (2000), Teoh and Wong (2002), and Bradshaw, Richardson, and Sloan (2003) provide evidence that analysts' recommendations, forecasts, and price targets are biased because of the conflict of interests introduced by external financing and the associated potential for underwriting business.

***General optimism in long-horizon forecasts***

To have a walk-down from optimism to pessimism as the forecast horizon shortens, there needs to be optimism at long horizons. All past empirical studies on earnings forecasts have found systematic analyst optimism at long horizons, and we confirm this for our sample in both earlier and more recent periods. Our hypothesis is potentially consistent with different possible reasons for the pervasive initial optimism.

One possibility is an agency problem wherein analysts, on behalf of firms, make high forecasts in order to improve market perceptions of the firms.[6] The analysts benefit from covering firms that subsequently do well, so there may be a self-selection tendency for analysts to cover firms about which they are optimistic (see McNichols and O'Brien 1997). Alternatively, analysts could simply be irrationally prone to optimism. Regardless of the source of the initial optimism, our hypothesis is based on the presence of a distinct force acting toward pessimism just before earnings announcements.

***Managers' incentives to achieve beatable targets***

In addition to long-horizon forecast optimism, past studies have shown increased forecast accuracy as the earnings-announcement approaches. However, this research has generally found continued analyst optimism at all forecast horizons (see, e.g., Brown, Foster, and Noreen 1985). As discussed in the introduction, it is only in more recent periods that researchers have found evidence of analyst pessimism in short horizons. These authors suggest that management communications with analysts lead to the deflated earnings expectations.

Systematic analyst optimism implies that firms are more likely to miss rather than beat analysts' targets. This can have detrimental effects for a firm if investors' perception of the firm is influenced by whether it meets certain earnings thresholds.

For example, Skinner and Sloan (2002) find an asymmetry in investor reaction to beating versus missing a threshold consisting of analyst forecasts made in the last month prior to the earnings announcement. They find that when firms fall short of forecasts, the stock price drops more than the stock price rises when firms beat forecasts by an equivalent magnitude of earnings surprise. They also find that this asymmetry is especially pronounced for high-growth firms. The discontinuity in investor reaction to missing versus meeting or beating analysts' forecasts creates incentives for managers to guide analysts to beatable earnings forecasts prior to an earnings announcement. A slightly lower forecast can cause the firm to barely beat the forecast instead of missing it, which significantly increases the firm's expected post-earnings-announcement stock price.

Kasznik and McNichols (2002) and Bartov, Givoly, and Hayn (2002) find that the capital market provides a valuation premium to firms whose earnings meet or beat analysts' estimates. Specifically, Bartov, Givoly, and Hayn (2002, 196) find that the capital-market premium for meeting or beating forecasts remains significant after controlling for the overall earnings performance in the quarter and even despite the earlier dampening of expectations by earnings guidance. Their further tests provide evidence that the market-valuation premium persists for firms that meet or beat analysts' earnings forecasts that were revised late in the quarter. In other words, the path by which analyst forecasts come to be beaten appears to be less crucial than whether the forecast ultimately becomes beatable just prior to the earnings announcement, consistent with investor limited attention about the shifting benchmark.

### *Institutional forces and incentives to beat targets*

Two structural changes between the 1980s and 1990s are likely to have increased managerial incentives to guide analysts toward beatable earnings targets. The first structural change is the greater use of stock-based executive compensation by U.S. corporations during the 1990s. For example, Hall and Liebman (1998) present evidence on the growing use of CEO stock option compensation in the 1990s as compared with the 1980s. The mean salary and bonus in 1994 was $1.3 million and the mean value of stock options was $1.2 million. Between 1980 and 1994, mean salary and bonus grew 97 percent whereas mean stock option value grew by over 680 percent. Murphy (1999) confirms this growth and shows that the explosive growth trend in stock options continued to 1996, the latest year in his study. The greater predominance of exercisable stock options in the 1990s encouraged greater managerial attention to stock prices, especially around the earnings-announcement date, given the insider-trading restrictions mentioned earlier. This increase in managerial stock sales after earnings announcements in the 1990s likely led to widespread incentives for managers to guide analysts' earnings forecasts to avoid any disappointments that would negatively affect share prices.[7]

The second structural change occurred in May 1991, when securities regulators changed the "short-swing rule" affecting insiders' stock option exercises. Prior to 1991, section 16b of the Securities Exchange Act of 1934 required insiders to hold shares of stocks acquired through an option exercise for at least six months before selling, or the profits would go to the firm. In May 1991, the SEC effectively removed this restriction by changing the starting date of the six-month holding period from the exercise date to the option grant date. Consequently, since May 1991, managers have a more precise target date for when to exercise their stock options and immediately unload their stock, typically in the trading window after earnings announcements. Thus, the incentives to avoid an earnings disappointment by guiding forecasts to a beatable target increased subsequent to 1991.

### *Hypotheses on cross-sectional determinants of analyst pessimism*

To summarize, the key elements that are related to the expectations-management game are that managers care about short-term share prices if they are about to sell shares on their personal account or on behalf of the firm after an earnings announcement, that managers can influence analysts' expectations through their information disclosures, and that the market appears to reward firms that beat analysts' latest earnings targets. Therefore, managerial incentives to guide analysts' forecasts are strongest if the firm and/or its managers are about to sell stock. This leads to the following cross-sectional prediction:

HYPOTHESIS 1. *The likelihood of observing short-horizon pessimistic analyst forecasts prior to an earnings announcement is increasing in management and firm incentives to sell stock after an earnings announcement. These effects are likely to be stronger in the 1990s than in earlier periods.*

Finding evidence in support of this hypothesis is consistent with analysts' being guided toward a more pessimistic target. However, another way to interpret the correlation between post-earnings-announcement equity sales and short-horizon pessimism is that stockholders sell shares after truly unexpected good news. If managers guide analysts toward beatable targets, then a stronger prediction can be derived on the basis of the following: (1) analysts initially issue optimistic (or unbiased) earnings forecasts, (2) analysts then revise their forecasts to become pessimistic before an earnings announcement, and (3) the firm or its insiders sell stock after the firm beats the revised earnings target. Therefore, we should observe an "opportunistic" switch from optimistic (or unbiased) to pessimistic analyst forecasts prior to firm or insider equity sales.[8] This leads to our second more restrictive prediction on cross-sectional determinants of expectations management:

HYPOTHESIS 2. *The likelihood of observing a switch from optimistic to pessimistic analyst forecasts prior to an earnings announcement is increasing in management and firm incentives to sell stock after an earnings announcement. These effects are stronger in the 1990s than in earlier periods.*

## 3. Sample and variable construction

Data on individual analysts' forecasts of quarterly and annual earnings per share are obtained from the Institutional Brokers Estimate System (I/B/E/S) Detail

History U.S. Edition tapes from 1984 to 2001. Unlike many previous studies, we use individual analysts' forecasts to calculate consensus forecasts to avoid potential staleness of the I/B/E/S consensus forecasts (see, e.g., Abarbanell and Bernard 1992).[9] The data sample consists of all individual analyst forecasts for firms with data availability on both I/B/E/S and COMPUSTAT.[10] To track forecast revisions leading up to the earnings' announcement, we sort analysts' forecasts into groups by 30-day blocks prior to the earnings release date over the annual horizon, and into finer two-week blocks over the quarterly horizon in the I/B/E/S Actuals File. We calculate a 30-day (or two-week) consensus forecast for each firm using the median of individual analyst forecasts within a period. We ensure that the calculation of the period's initial consensus forecast is made after the prior period's earnings announcement.

The forecast error (*FE*) is defined as the actual earnings per share minus the median forecast of earnings per share scaled by the stock price at the beginning of the quarter. The stock price deflator is used to control for potential spurious relations resulting from cross-sectional scale differences in earnings per share.[11] A negative error implies an optimistic forecast (that is, bad news), whereas a positive error implies a pessimistic forecast (that is, good news). Formally, the scaled forecast error (*FESC*) for firm $i$ in quarter $q$ and forecast-horizon period $-t$ is calculated as:

$$FESC_{i,q,t} = [Actual\ EPS_{i,q} - Forecast\ EPS_{i,q,t}]/P_{i,q-1} \quad (1).$$

Firms' actual earnings per share are obtained from I/B/E/S for comparability with the forecast. The deflator $P_{i,q-1}$ is the stock price when the first forecast is available on I/B/E/S for firm $i$ in quarter $q$. For annual forecasts, the deflator is the first available stock price in the year reported in I/B/E/S, which is typically available 12 months prior to the actual earnings-announcement date.[12] For quarterly forecasts, the deflator is the first available stock price in the quarter reported in I/B/E/S, which is typically available 3 months prior to the actual earnings-announcement date. To remove the influence of extreme outliers due to data-coding errors, we remove the extreme forecast errors that are greater than 10 percent in absolute value of share price.[13]

## 4. Pattern of forecast bias over the fiscal horizon

In section 2, we described how significant structural changes in executive compensation and insider-trading policies may affect managerial trading incentives in the 1990s, and consequently increased managerial incentives to guide analysts' forecasts. Before testing for a relation between managers' trading behavior and forecast revisions, we first examine temporal changes in analysts' forecast bias in the period from 1986 to 2001.

Panel A of Figure 1 shows the dynamic pattern of forecast bias over the annual forecast horizon for five calendar subperiods: 1984–88, 1989–91, 1992–94, 1995–97, and 1998–2001. For each subperiod, the forecasts show a consistent walk-down pattern. All subperiod initial median forecasts are optimistic, and the forecasts become increasingly less optimistic as the horizon shrinks toward the announcement date. A key difference across subperiods is that the median forecast crosses over to become pessimistic toward the earnings-announcement date only for the later calendar subperiods in the 1990s, consistent with the institutional changes noted for the 1990s. Furthermore, the median forecasts become pessimistic earlier in the forecast horizon as the 1990s progressed. For example, the median forecast becomes pessimistic in *Month −2* for the 1992–94 period, and in *Month −3* for 1995–97 and 1998–2001 subperiods. These findings are mirrored in the quarterly forecast data depicted in panel B of Figure 1. In this panel, one gets a more detailed picture of the short-horizon shift to pessimistic forecasts using two-week windows just prior to quarterly earnings announcements. Again, the shift to pessimism is only evident in the 1990s for the quarterly horizon.

The dynamic patterns of a shift toward pessimistic forecasts over the forecast horizon and over calendar subperiods are robust with respect to the empirical measures of forecast pessimism. For example, similar patterns are observed using mean analyst forecast errors. More important, our focus on the median forecasts indicates that the dynamic pattern of forecast bias documented here is independent of the debate on whether the mean forecast is biased.

The median forecast error in *Month 0* is only one cent in the post 1992 subperiods. The small magnitude does not imply low economic significance because "just beating" the forecast may have disproportionate informational signaling value to investors (see, e.g., DeGeorge et al. 1999). Overall, the univariate results present compelling evidence of a switch to systematic pessimism that is coincident with increased use of executive stock option compensation, greater concentration of insider trades in the post-earnings-announcement period, and the lifting of the short-swing rule for insiders during the 1990s.

***Robustness checks on the temporal pattern***

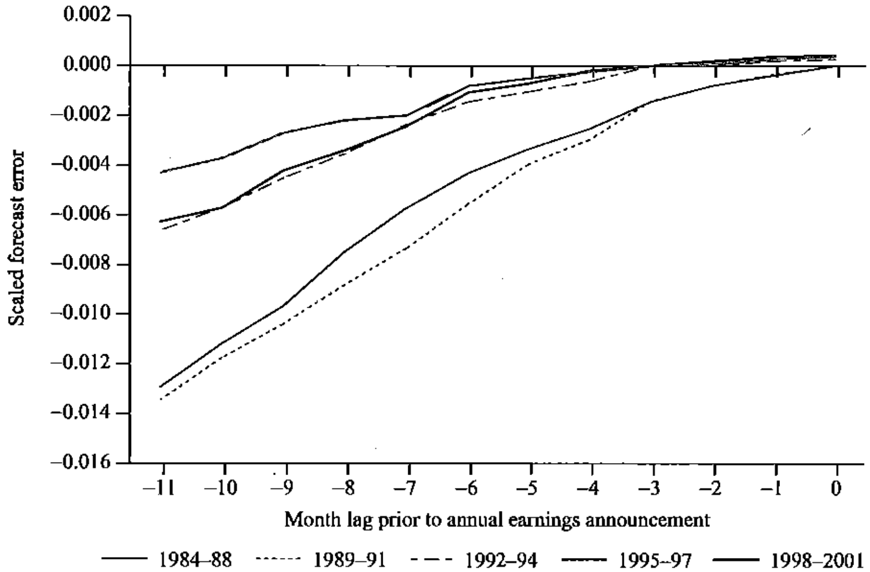
The analyst forecast errors in our sample are price-deflated to allow direct comparison across firms, which is standard in the literature. Given that scaling by price may introduce intertemporal variation in forecast bias if price–earnings ratios change over time, we also perform the tests using total assets per share as an alternative deflator. Our findings are robust using this alternative deflator. Figure 1 documents a switch in forecast error from optimism to pessimism as the horizon moves toward the earnings announcement in the subperiods after 1991. Note that the sign switch from optimism to pessimism forecasts is independent of the deflator because both price and total asset deflators are positive.

We also considered whether the time-series patterns are affected by changing sample composition during the sample period. For example, a change in the composition of publicly traded companies or in the breadth of coverage on I/B/E/S may affect the forecast bias over time. To rule this out, we replicated our tests using a constant sample of firms that existed throughout the sample period and found a similar dynamic pattern.

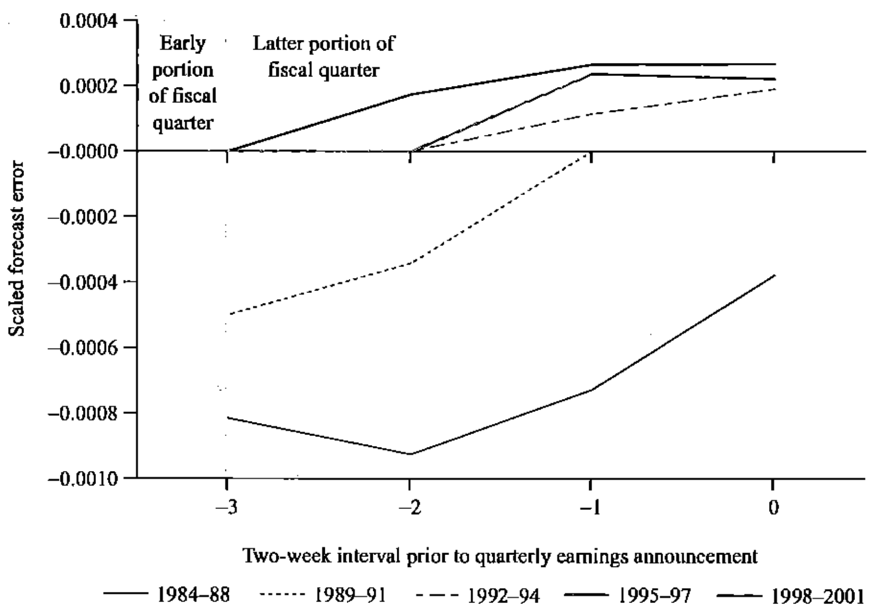
Finally, Baber and Kang (2002) report that forecast errors collected by data providers such as I/B/E/S are rounded to the nearest cent after making retroactive

**Figure 1** Median scaled forecast error*

**Panel A** Annual forecast horizon




**Panel B** Quarterly forecast horizon




(The figure is continued on the next page.)

**Figure 1** (Continued)

**Notes:**

* The sample includes all firm-year (firm-quarter) observations with data available on the I/B/E/S detail files to construct a median consensus for the monthly (two-week) periods leading up to the annual (quarterly) earnings announcement. All individual analyst forecasts are included except forecasts that create forecast errors greater than stock price (that is, scaled forecasts greater than 100 percent are excluded from the consensus measure). The most recent month (two-week) period prior to the earnings announcement is 0. The sample is broken into five subperiods: 1984–88, 1989–91, 1992–94, 1995–97, and 1998–2001.

and cumulative stock split adjustments. This data-processing artifact compresses analyst forecast errors for firms that have experienced stock splits, which can generate a conservative bias in time-series analyses of forecast errors. Specifically, firms experiencing several stock splits have smaller forecast errors early in times series. The fact that we are still able to document a concentration in small positive forecast errors in recent years speaks to the strength of the walk-down phenomenon. However, as a robustness check, we recalculate our forecast variables using an I/B/E/S data set that does not contain this stock-split problem. Our results are robust using this data set and, therefore, retroactive, and cumulative stock-split adjustments do not explain our results.

In sum, we find evidence of a robust shift toward greater final forecast pessimism. The timing of this shift to pessimism is coincident with the increased use of stock-based compensation in the 1990s and regulatory changes in 1991 concerning the short-swing rule affecting insider's stock option exercises. These changes provide increased managerial incentives to guide analysts to forecast beatable final earnings targets.

## 5. Quarterly forecast bias and trading incentives

We turn next to tests of the two hypotheses developed in section 2. Although the longer 12-month horizon is useful to show clearly the walk-down pattern over the forecast horizon, we base our tests of the relation between forecast bias and managerial trading incentives using quarterly forecasts.[14] Examining forecasts over the quarterly horizon allows us to focus our analysis on walk-down effects that are not a direct consequence of quarterly earnings announcements. Furthermore, our test results can be compared with recent studies on pessimism in the shortest horizon (e.g., Bagnoli, Beneish, and Watts 1999; Brown 2001; and Matsumoto 2002). Our empirical tests include controls for other factors that affect analyst forecast bias including firm size, growth, and profitability (e.g., Brown 2001).

Table 1 presents descriptive statistics on the sample by calendar subperiods. Firm size is measured at the start of the fiscal quarter as closing stock price at the start of the fiscal quarter (COMPUSTAT data item 14) times the number of common shares outstanding (COMPUSTAT data item 61). The book-to-market ratio is calculated as the book value of common equity at the start of the fiscal quarter

TABLE 1
Descriptive statistics for 53,653 firm-quarter observations for the period 1984–2001

| Variable | All years | Year grouping 1984–88 | 1989–91 | 1992–94 | 1995–97 | 1998–2001 |
|---|---|---|---|---|---|---|
| *Size* ($M) | | | | | | |
| Mean | 2,571 | 1,662 | 1,718 | 1,758 | 2,274 | 4,113 |
| Standard deviation | 10,729 | 3,560 | 4,701 | 4,834 | 7,214 | 17,638 |
| Q1 | 137 | 155 | 108 | 127 | 132 | 160 |
| Median | 422 | 492 | 336 | 376 | 386 | 519 |
| Q3 | 1,504 | 1,632 | 1,286 | 1,302 | 1,388 | 1,862 |
| *BM* | | | | | | |
| Mean | 0.52 | 0.596 | 0.635 | 0.521 | 0.473 | 0.474 |
| Standard deviation | 0.38 | 0.375 | 0.426 | 0.324 | 0.299 | 0.435 |
| Q1 | 0.27 | 0.347 | 0.346 | 0.292 | 0.257 | 0.217 |
| Median | 0.44 | 0.538 | 0.552 | 0.466 | 0.414 | 0.383 |
| Q3 | 0.68 | 0.771 | 0.823 | 0.674 | 0.621 | 0.608 |
| *Profit Indicator* | | | | | | |
| Mean | 0.87 | 0.90 | 0.90 | 0.90 | 0.88 | 0.82 |
| Standard deviation | 0.34 | 0.30 | 0.30 | 0.31 | 0.32 | 0.38 |
| Q1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Median | 1 | 1 | 1 | 1 | 1 | 1 |
| Q3 | 1 | 1 | 1 | 1 | 1 | 1 |
| *IssueNow* | | | | | | |
| Mean | 0.02 | 0.015 | 0.015 | 0.024 | 0.020 | 0.020 |
| Standard deviation | 0.06 | 0.055 | 0.055 | 0.073 | 0.064 | 0.065 |
| Q1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Median | 0.001 | 0.000 | 0.001 | 0.001 | 0.001 | 0.002 |
| Q3 | 0.006 | 0.004 | 0.004 | 0.007 | 0.006 | 0.007 |
| *IssueNext* | | | | | | |
| Mean | 0.02 | 0.013 | 0.013 | 0.018 | 0.017 | 0.018 |
| Standard deviation | 0.06 | 0.047 | 0.049 | 0.061 | 0.056 | 0.063 |
| Q1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Median | 0.001 | 0.000 | 0.001 | 0.001 | 0.002 | 0.002 |
| Q3 | 0.006 | 0.004 | 0.004 | 0.006 | 0.006 | 0.007 |
| *Insider Sale Indicator* | | | | | | |
| Mean | 0.65 | 0.666 | 0.645 | 0.668 | 0.682 | 0.611 |
| Standard deviation | 0.48 | 0.472 | 0.479 | 0.471 | 0.466 | 0.487 |
| Q1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Median | 1 | 1 | 1 | 1 | 1 | 1 |
| Q3 | 1 | 1 | 1 | 1 | 1 | 1 |

(The table is continued on the next page.)

TABLE 1 (Continued)

| Variable | All years | Year grouping 1984–88 | 1989–91 | 1992–94 | 1995–97 | 1998–2001 |
|---|---|---|---|---|---|---|
| *% Shares Sold* | | | | | | |
| Mean | 0.0014 | 0.0010 | 0.0014 | 0.0016 | 0.0016 | 0.0013 |
| Standard deviation | 0.0038 | 0.0030 | 0.0040 | 0.0039 | 0.0040 | 0.0037 |
| Q1 | −0.0000 | −0.0000 | −0.0000 | −0.0000 | −0.0000 | −0.0001 |
| Median | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0001 |
| Q3 | 0.0013 | 0.0006 | 0.0010 | 0.0014 | 0.0016 | 0.0012 |
| *Value Shares Sold* ($M) | | | | | | |
| Mean | 1.12 | 0.46 | 0.59 | 0.83 | 1.16 | 1.76 |
| Standard deviation | 3.39 | 1.62 | 1.97 | 2.44 | 3.15 | 4.75 |
| Q1 | −0.01 | −0.01 | −0.01 | −0.01 | −0.01 | −0.02 |
| Median | 0.08 | 0.05 | 0.05 | 0.09 | 0.12 | 0.91 |
| Q3 | 0.65 | 0.31 | 0.37 | 0.57 | 0.83 | 1.05 |
| Sample size | 53,653 | 6,368 | 7,098 | 10,172 | 14,348 | 15,667 |

**Notes:**

Size is the market capitalization as reported on COMPUSTAT at the start of the fiscal quarter. It is calculated as COMPUSTAT data item 14 (closing stock price at the end of the previous fiscal quarter) multiplied by data item 61 (number of common shares outstanding at the end of the previous quarter).

*BM* is the book-to-market ratio. It is calculated as the book value of common equity at the start of the fiscal quarter (COMPUSTAT data item 59) divided by market capitalization (Size) at the start of the fiscal quarter.

*Profit Indicator* is an indicator variable equal to one if EPS as reported on I/B/E/S for the fiscal quarter is positive, and zero otherwise.

*IssueNow* is the amount of equity issued in the current fiscal quarter. It is calculated as the dollar value of common and preferred equity issued (COMPUSTAT data item 84) divided by market capitalization at the start of the fiscal quarter (that is, at the end of quarter $t-1$).

*IssueNext* is the amount of equity issued in the next fiscal quarter. It is calculated as the dollar value of common and preferred equity issued (COMPUSTAT data item 84) in quarter $t+1$ divided by market capitalization at the start of quarter $t+1$ (that is, at the end of quarter $t$).

*Insider Sale Indicator* is an indicator variable equal to one if the insiders are net sellers of stock in the 20-day period after the quarterly earnings announcement, and zero otherwise. Insiders include the CEO, chair, vice-presidents, officers, and directors. We use the following relationship codes from the Thomson Financial data base: "CB", "D", "DO", "H", "OD", "VC", "AV", "CEO", "CFO", "CI", "CO", "CT", "EVP", "O", "OB", "OP", "OS", "OT", "OX", "P", "S", "SVP", "VP".

(The table is continued on the next page.)

TABLE 1 (Continued)

*% Shares Sold* is the fraction of shares sold by insiders in the 20-day period after the quarterly earnings announcement. This variable is calculated as the net number of shares sold by insiders divided by the number of shares outstanding at the end of the fiscal quarter. The variable is increasing in net sales (that is, negative numbers correspond to net acquisitions by insiders).

*Value Shares Sold* is the dollar value of shares sold by insiders in the 20-day period after the quarterly earnings announcement. This variable is calculated as the net number of shares sold by insiders multiplied by the price at which those transactions took place. The variable is increasing in net sales (that is, negative numbers correspond to net acquisitions by insiders).

(COMPUSTAT data item 59) divided by market capitalization at the start of the fiscal quarter. Consistent with growth in the economy, the market capitalization has increased and the book-market-to-book ratio has decreased from the 1980s relative to the 1990s. The average value of the profit indicator variable (one if I/B/E/S earnings per share [EPS] for the fiscal quarter are positive, and zero otherwise) shows a marked decline toward the latter half of the 1990s through 2001, consistent with the increase in the number of loss firms over time.[15]

### *New equity issuance data*

One of our key test variables is the firm's own trading activity. We consider two equity issuance variables. *IssueNow* reflects equity issuance in the same quarter as the forecast and *IssueNext* reflects equity issuance in the quarter following the forecast. The issuance variables are measured as the dollar value of common and preferred equity issued from the statement of cash flows (COMPUSTAT data item 84) divided by market capitalization at the beginning of the quarter.[16]

We include *IssueNext* in addition to *IssueNow* because a firm would likely experience similar pressures to avoid an earnings disappointment immediately after issuance. The issuing firm would like to avoid lawsuits from disgruntled investors unhappy with a sizable stock price drop from an earnings disappointment, and the investment banker and analysts of the brokerage firm underwriting the issue would like to safeguard reputation. Table 1 shows a greater level of new equity issuance by firms in the 1992–2001 subperiods relative to the earlier subperiods.

### *Insider trading data*

The second test variable measures managers' trading activity on their personal account. Insider-trading data are obtained from the Thompson Financial insider-trading data hase (TFN) covering the period 1984 to 2001. TFN reports all insider trades filed with the SEC resulting from stock transactions and option exercises. We only examine open market sales and purchases of the underlying security (transaction codes "P" and "S" as reported on the data base that originate from Form 4 filings, which include the sale of stock from option exercises). In order to focus on the trading activities of those individuals that are most likely to have an impact on the reporting process of the firm, we include only directors and officers as "insiders" (e.g., the CEO, chair, vice-presidents, and directors) and eliminate trades hy nonofficer insiders (e.g., blockholders, retirees, trustees, etc.); see the note in Table 1 for the officer relationship codes. We examine insider trades in the 20 trading days immediately after the earnings announcement.

The *Insider Sale Indicator* equals one if the insiders are net sellers of stock in the 20-day period after the quarterly earnings announcement, and zero otherwise. We also consider two other continuous measures of insider trading activity. *% Shares Sold* is the fraction of shares sold by insiders in the 20-day period after the quarterly earnings announcement. It is the calculated as the net number of shares sold by insiders divided by the number of shares outstanding at the end of the fiscal quarter. The second measure, *Value Shares Sold*, is the dollar value of shares sold by insiders in the 20-day period after the quarterly earnings announcement. This variable is the calculated as the net number of shares sold by insiders multiplied by the price at which those transactions took place. Both continuous measures are increasing in net sales (that is, negative numbers correspond to net acquisitions by insiders).

Table 1 shows a slightly higher frequency of firms with insider selling in the two 1990s subperiods (66.8 percent and 68.2 percent) than in the two subperiods beginning in the 1980s (66.6 percent and 64.5 percent). The lowest frequency of selling (61.1 percent), however, is in the very latest subperiod (1998–2001). A similar pattern is reported for the *% Shares Sold* variable. However, the *Value Shares Sold* variable indicates a monotonic increase over time, perhaps reflecting both the increasing number of stock option exercises as well as increasing stock prices over time.

***Cross-sectional variation in forecast bias***

Our hypotheses focus on the relation between insider trading behavior and analyst forecast bias. Thus, we group firms by the *Insider Sale Indicator* variable and compare their firm characteristics in Table 2. A firm is classified as a *Seller* in the quarter the *Insider Sale Indicator* equals one, and is classified as a *Purchaser* otherwise. The sample consists of a total of 35,287 *Seller*-quarter and 18,366 *Purchaser*-quarter observations.

Table 2 indicates that *Sellers* are, on average, higher-growth firms as measured by the book-to-market ratios than *Purchasers*. *Sellers* also are larger firms and more profitable. There is, however, no significant difference in the level of issuing activity.

The key focus of our tests is on the difference between the *Seller* and *Purchaser* groups across samples of firms that differ in the forecast bias in the final month prior to the earnings announcement and in the pattern of analyst forecast bias between long and short horizons. To test Hypothesis 1 directly, we first construct a pessimism indicator variable, $PESS_{last}$, which is equal to one if the price scaled error of the last forecast, $FESC_{last}$, is greater than or equal to zero, and zero otherwise. In other words, the firm was able to meet or beat forecasts in the last month (*Month 0*) prior to the earnings announcement. The Pearson (Spearman) correlation between $PESS_{last}$ and $FESC_{last}$ is 0.48 (0.85). Consistent with analyst guidance incentives associated with insider sales, we find that analysts are significantly more likely to issue pessimistic forecasts for *Seller* firms (66 percent) than for *Purchaser* firms (54 percent).

Next, we calculate a walk-down indicator variable, *SWITCH*, as equal to one if the earliest forecast in the fiscal quarter was optimistic (that is, $FESC_{last} < 0$) and the final forecast in the quarter either equaled actual earnings or was pessimistic (that is, $FESC_{last} \geq 0$), and zero if the first *and* last forecast are both optimistic. This variable is coded as missing for firm-quarter observations where the earliest forecast is pessimistic. Thus, *SWITCH* turns on when the forecast was initially optimistic and the firm was able to meet or beat the forecasts at the end of the quarter. As with the $PESS_{last}$ variable, Table 2 indicates that there is also a significantly higher *SWITCH* for *Sellers* than *Purchasers*, consistent with the prediction in Hypothesis 2.

TABLE 2
Characteristics of firms with net insider sales and net insider purchases following an earnings announcement

Descriptive statistics (means) for firms with insider purchases and insider sales following an earnings announcement. The data set is a pooled time-series cross-sectional sample of 53,653 firm-quarter observations for the period 1984–2001.

| | Net insider position | | |
|---|---|---|---|
| Variable | Seller, $n = 35,287$ | Purchaser, $n = 18,366$ | $t$-statistic ($p$-value) |
| *BM* | 0.458 | 0.618 | −44.09* (<0.001) |
| *MV* | 6.70 | 5.89 | 31.70* (<0.001) |
| *IssueNow* | 0.0195 | 0.0194 | 0.12 (0.90) |
| *IssueNext* | 0.0163 | 0.0158 | 0.92 (0.36) |
| *Profit Dummy* | 0.90 | 0.84 | 17.01* (<0.001) |
| $PESS_{last}$ | 0.66 | 0.54 | 27.41* (<0.001) |
| *SWITCH* | 0.27 | 0.21 | 11.22* (<0.001) |

(The tahle is continued on the next page.)

TABLE 2 (Continued)

**Notes:**

A firm is classified as a seller (purchaser) if the insiders are net sellers (purchasers) of company shares in the 20 trading days after an earnings announcement. Insiders include the CEO, chair, vice-presidents, officers, and directors. We use the following relationship codes from the Thomson Financial data base: "CB", "D", "DO", "H", "OD", "VC", "AV", "CEO", "CFO", "CI", "CO", "CT", "EVP", "O", "OB", "OP", "OS", "OT", "OX", "P", "S", "SVP", "VP".

*MV* is the log of market capitalization as reported on COMPUSTAT at the start of the fiscal quarter. Market capitalization is calculated as COMPUSTAT data item 14 (closing stock price at the end of the previous fiscal quarter) multiplied by data item 61 (number of common shares outstanding at the end of the previous quarter).

*BM*, *IssueNow*, and *IssueNext* are as defined in Table 1.

*Profit Dummy* is equal to one if EPS as reported on I/B/E/S for the fiscal quarter is positive, and zero otherwise.

$PESS_{last}$ is an indicator variable equal to one if $FESC_{last}$ is greater than or equal to zero, and zero otherwise. $FESC_{last}$ is the price-scaled median earnings forecast error for analysts covering firm $i$, for earnings in quarter $q$, in the most recent month prior to the quarterly earnings announcement. It is defined as $[Actual\ EPS_{i,q} - Forecast\ EPS_{i,q,t}]/P_{i,q-1}$, where $P_{i,q-1}$ is the stock price when the first forecast is available on I/B/E/S for firm $i$ in quarter $q$.

*SWITCH* is an indicator variable equal to one if the earliest forecast in the fiscal quarter is optimistic (that is, $FESC_{earliest} < 0$) and the final forecast in the quarter is pessimistic (that is, $FESC_{last} \geq 0$), and zero if the first *and* last forecast are both optimistic. This variable is coded as missing for firm-quarter observations where the earliest forecast is pessimistic.

* Significant at the 1% level.

### *Cross-sectional regression results on forecast pessimism*

Table 3 reports the multivariate tests for the cross-sectional determinants of forecast pessimism to evaluate the influence of incentives from insider trading and equity issuance on the final forecast pessimism, after controlling for other factors. We consider two alternative dependent variables, the continuous measure of the scaled forecast error, *FESC*, and the indicator variable for whether the firm beat or met forecast, *PESS*. The measurement of these variables is described above in section 3.

The three key test variables, *InsiderSale*, *IssueNow*, and *IssueNext*, measure the incentives from insider trading and equity issuance. Both *IssueNow* and *IssueNext* are calculated as described earlier. We consider both a binary measure (*InsiderSale Indicator*) as well as a continuous measure for insider selling activity (*%Shares Sold*).[17] These variables are defined above under the heading "Insider trading data". We consider two alternative regression models that differ only in the

TABLE 3

Relation of forecast pessimism with new equity issuance and insider trading

Regression of analyst pessimism on the sale of stock by the firm's CEO in the trading window after the earnings announcement. The data set is a pooled time-series cross-sectional sample of 158,089 firm-quarter-forecast month observations for the period 1986–2001.

**Panel A:** Scaled forecast error (*FESC*)

$$FESC = \beta_0 + \beta_1{}^*InsiderSale + \beta_2{}^*IssueNow + \beta_3{}^*IssueNext + \beta_4{}^*BM + \beta_5^*MV + \beta_6^*Profit + \beta_7^*Year + \beta_8^*Horizon + \gamma_1^*RD + \gamma_2^*LITIG + \gamma_3^*IMPLICIT + \gamma_4^*CHEARN + \gamma_5^*LABINT + \gamma_6^*LT\_CHEARN + \varepsilon \quad (2b)$$

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| Variable | *Insider Sale Dummy** | *% Shares Sold** | *Insider Sale Dummy** | *% Shares Sold** |
| Intercept | −0.016‡ | −0.016‡ | −0.017‡ | −0.017‡ |
| | (−101.4) | (−98.6) | (−94.6) | (−93.1) |
| *InsiderSale* | 0.002‡ | 0.147‡ | 0.001‡ | 0.096‡ |
| | (32.0) | (20.7) | (23.1) | (13.4) |
| *IssueNow* | 0.003‡ | 0.003‡ | 0.002‡ | 0.002‡ |
| | (5.94) | (5.65) | (4.11) | (3.85) |
| *IssueNext* | 0.009‡ | 0.009‡ | 0.009‡ | 0.009‡ |
| | (16.8) | (16.3) | (16.6) | (16.3) |
| *BM* | −0.001‡ | −0.001‡ | −0.0005‡ | −0.0006‡ |
| | (−15.8) | (−17.8) | (−6.2) | (−7.5) |
| *MV* (*logSize*) | 0.0001‡ | 0.0002‡ | 0.0002‡ | 0.0002‡ |
| | (7.5) | (13.6) | (9.8) | (14.1) |
| *Profit* | 0.013‡ | 0.013‡ | 0.012‡ | 0.012‡ |
| | (158.9) | (158.8) | (132.5) | (132.4) |
| *Year* | 0.0001‡ | 0.0002‡ | 0.0002‡ | 0.0002‡ |
| | (29.7) | (27.5) | (28.4) | (26.8) |
| *Horizon* | 0.00054‡ | 0.0005‡ | 0.0006‡ | 0.0006‡ |
| | (19.1) | (18.8) | (20.7) | (20.6) |
| *RD* | | | 0.028‡ | 0.029‡ |
| | | | (26.8) | (27.3) |
| *LITIG* | | | −0.0005‡ | −0.0005‡ |
| | | | (−8.5) | (−7.6) |
| *IMPLICIT* | | | 0.00002‡ | 0.0001 |
| | | | (0.3) | (1.72) |
| *CHEARN* | | | 0.004‡ | 0.004‡ |
| | | | (63.2) | (64.5) |
| *LABINT* | | | −0.0006‡ | −0.0006‡ |
| | | | (−6.4) | (−6.3) |
| *LT_CHEARN* | | | 0.015‡ | 0.015‡ |
| | | | (29.2) | (29.1) |
| Model $R^2$ | 16.0% | 15.7% | 19.7% | 19.5% |
| $F$-value | 3,764.7‡ | 3,677.2‡ | 2,668.4‡ | 2,637.1‡ |

(The table is continued on the next page.)

TABLE 3 (Continued)

**Panel B:** Pessimism indicator variable (*PESS*)

$$PESS = \beta_0 + \beta_1{}^*InsiderSale + \beta_2{}^*IssueNow + \beta_3{}^*IssueNext + \beta_4{}^*BM + \beta_5^*MV + \beta_6^*Profit + \beta_7{}^*Year + \beta_8{}^*Horizon + \gamma_1{}^*RD + \gamma_2^*LITIG + \gamma_3^*IMPLICIT + \gamma_4^*CHEARN + \gamma_5^*LABINT + \gamma_6^*LT\_CHEARN + \varepsilon \quad (2b)$$

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| Variable | *Insider Sale Dummy*† | *% Shares Sold*† | *Insider Sale Dummy*† | *% Shares Sold*† |
| Intercept | −1.64‡ | −1.53‡ | −2.56‡ | −2.51‡ |
| | (2,378.6) | (2,123.2) | (3,818.0) | (3,688.7) |
| *InsiderSale* | 0.48‡ | 52.19‡ | 0.35‡ | 37.89‡ |
| | (1,751.4) | (1,012.7) | (828.2) | (491.3) |
| *IssueNow* | 1.10‡ | 1.05‡ | 0.87‡ | 0.82‡ |
| | (113.2) | (102.2) | (60.7) | (54.2) |
| *IssueNext* | 0.60‡ | 0.51‡ | 0.65‡ | 0.58‡ |
| | (26.8) | (19.1) | (26.9) | (21.5) |
| *BM* | −0.17‡ | −0.20‡ | 0.13‡ | 0.12‡ |
| | (113.5) | (145.5) | (54.9) | (46.7) |
| *MV* (*logSize*) | −0.01§ | 0.02‡ | 0.02‡ | 0.05‡ |
| | (4.7) | (49.8) | (37.1) | (157.2) |
| *Profit* | 1.3266‡ | 1.32‡ | 0.92‡ | 0.92‡ |
| | (5,718.2) | (5,675.9) | (2,137.0) | (2,123.3) |
| *Year* | 0.0739‡ | 0.07‡ | 0.08‡ | 0.07‡ |
| | (3,244.3) | (2,924.5) | (3,093.3) | (2,889.9) |
| *Horizon* | 0.18‡ | 0.17‡ | 0.21‡ | 0.21‡ |
| | (925.7) | (898.7) | (1,184.5) | (1,169.4) |
| *RD* | | | 4.55‡ | 4.70‡ |
| | | | (289.2) | (305.5) |
| *LITIG* | | | 0.11‡ | 0.12‡ |
| | | | (63.7) | (72.6) |
| *IMPLICIT* | | | 0.04§ | 0.06‡ |
| | | | (8.3) | (19.8) |
| *CHEARN* | | | 1.24‡ | 1.25‡ |
| | | | (9,161.6) | (9,352.1) |
| *LABINT* | | | 0.18‡ | 0.17‡ |
| | | | (74.3) | (69.8) |
| *LT_CHEARN* | | | 0.97‡ | 0.96‡ |
| | | | (69.8) | (68.5) |
| Model $\chi^2$ | 12,257.8‡ | 11,624.0‡ | 22,870.0‡ | 22,567.2‡ |
| *p*-value | (<0.001) | (<0.001) | (<0.001) | (<0.001) |

(The table is continued on the next page.)

TABLE 3 (Continued)

**Notes:**

Variables are defined as follows:

*FESC* is the price-scaled median earnings forecast error for analysts covering firm *i*, for fiscal quarter *q* for month *t* prior to the quarterly earnings announcement. It is defined as $(Actual\ EPS_{i,\,q} - Forecast\ EPS_{i,\,q,\,t})/P_{i,\,q-1}$, where $P_{i,\,q-1}$ is the stock price when the first forecast is available on I/B/E/S for firm *i* in quarter *q*.

*PESS* is an indicator variable equal to one if *FESC* is non-negative, and zero otherwise.

*InsiderSale* captures the extent of insider trading in the 20-day period following the quarterly earnings announcement. Insiders include the CEO, chair, vice-presidents, officers, and directors. We use the following relationship codes from the Thomson Financial data base: "CB", "D", "DO", "H", "OD", "VC", "AV", "CEO", "CFO", "CI", "CO", "CT", "EVP", "O", "OB", "OP", "OS", "OT", "OX", "P", "S", "SVP", "VP". We use two measures for insider trading. First, we use an indicator variable, *Insider Sale Dummy*. Second, we use a continuous measure, *% Shares Sold*, capturing the fraction of firm traded.

*Insider Sale Dummy* is an indicator variable equal to one if the insiders are net sellers of stock in the 20-day period after the quarterly earnings announcement, and zero otherwise.

*% Shares Sold*, *IssueNow*, *IssueNext*, and *BM* are as defined in Table 1.

*MV* is as defined in Table 2.

*Profit* is an indicator variable equal to one if EPS as reported on I/B/E/S for the fiscal quarter is positive, and zero otherwise.

*Year* captures the time trend in forecast errors. It is the year in which the forecast is made less 1984 (the first year in the sample).

*Horizon* captures the time between the forecast and the earnings announcement. It is calculated as the number of months prior to the quarterly earnings announcement. For example, a forecast made in February (April) for a fiscal quarter ending March 31 with an announcement date of April 14 corresponds to a value of −2 (0) for *Horizon*. *Horizon* is increasing in closeness to the earnings announcement.

*RD* is research and development expenditure (COMPUSTAT data item 4). It is scaled by average total assets (COMPUSTAT data item 44).

*LITIG* is an indicator variable equal to one for high litigation risk industries as defined by Matsumoto (2002), and zero otherwise. The industry four-digit SIC codes for high litigation industries include 2833, 2836, 3570, 3577, 3600–3674, 5200–5961, and 7370–7374.

*IMPLICIT* is an indicator variable equal to one for industries with a high degree of reliance on implicit claims by stakeholders as defined by Matsumoto 2002, and zero otherwise. The industry four-digit SIC codes for these industries include 150–179, 245, 250–259, 283, 301, 324–399.

(The table is continued on the next page.)

TABLE 3 (Continued)

**Notes:**

*CHEARN* is an indicator variable equal to one for a positive change in earnings from the same quarter in the prior year (COMPUSTAT data item 8), and zero otherwise. This variable is the same as in Matsumoto 2002.

*LABINT* is a measure of labor intensity. It is calculated as [1 – (*PPE*/*Gross Assets*)]. *PPE* is property, plant, and equipment (COMPUSTAT data item 118). *Gross Assets* is calculated as the sum of total assets (COMPUSTAT data item 44) and accumulated depreciation and amortization (COMPUSTAT data item 41). See also Matsumoto.

*LT_CHEARN* is a measure of long-term change in earnings. It is the change in earnings from four quarters prior to the forecast quarter to four quarters after the forecast quarter. The measure is scaled by the market capitalization of the firm four quarters prior to the forecast quarter.

* *t*-statistics are reported in parentheses.

† $\chi^2$ statistics are reported in parentheses below parameter estimates.

‡ Significant at the 1 percent level.

§ Significant at the 5 percent level.

set of control variables. The inclusion of these variables helps evaluate the incremental influence of insider trading and equity issuance incentives beyond the other incentives identified by Matsumoto 2002. The first regression model is

$$FESC \text{ or } PESS = \beta_0 + \beta_1 InsiderSale + \beta_2 IssueNow + \beta_3 IssueNext + \beta_4 BM + \beta_5 MV + \beta_6 Profit + \beta_7 Year + \beta_8 Horizon + \varepsilon \quad \text{(2a).}$$

Drawing from previous research (e.g., Brown 2001 and Matsumoto 2002), the control variables in model 1 include firm size, growth, and profitability. *Profit* is an indicator variable equal to one if EPS as reported on I/B/E/S for the fiscal quarter is positive, and zero otherwise. *MV* is the log of market capitalization as reported on COMPUSTAT at the start of the fiscal quarter (defined earlier). Because a high-growth firm would likely need new capital, and would also care about investor perceptions and want to avoid an earnings disappointment, we include a growth proxy, *BM*. It is calculated as the book value of common equity at the start of the fiscal quarter divided by market capitalization (*MV*) at the start of the fiscal quarter.

We use a pooled time-series cross-sectional regression framework, so we also include two additional variables to pick up possible changes in forecast pessimism over the calendar time as well as over the forecast horizon. *Year* captures the calendar time trend in forecast errors and is measured by the difference between the calendar year of the forecast and the base year 1984 (the first year in the sample). *Horizon* captures the time between the forecast and the earnings announcement. It is calculated as the number of months prior to the quarterly earnings announcement. For example, a forecast made in February (April) for a fiscal quarter ending March 31 with an announcement date of April 14 corresponds to a value of −2 (0) for *Horizon*. *Horizon* is increasing in closeness to the earnings announcement.

The second regression model is

$$FESC \text{ or } PESS = \beta_0 + \beta_1{}^*InsiderSale + \beta_2{}^*IssueNow + \beta_3{}^*IssueNext + \beta_4{}^*BM + \beta_5{}^*MV + \beta_6{}^*Profit + \beta_7{}^*Year + \beta_8{}^*Horizon + \gamma_1{}^*RD + \gamma_2^*LITIG + \gamma_3^*IMPLICIT + \gamma_4^*CHEARN + \gamma_5^*LABINT + \gamma_6^*LT\_CHEARN + \varepsilon \quad (2b).$$

In addition to the control variables in the first model, model 2 includes proxies for a firm's litigation risk, reliance of financial information by noninvestor stakeholders, and further proxies for a firm's future profitability prospects. Sivakumar and Vijaykumar (2001) and Matsumoto (2002) suggest that these factors affect a firm's ability to meet or beat forecasts.

We use an indicator variable, *LITIG*, equal to one for high litigation risk industries as defined by Matsumoto 2002, and zero otherwise; see notes to Table 3 for the four-digit SIC codes considered to be high litigation risk industries. We also use the three Matsumoto variables to control for the effects on forecast pessimism that is derived from a greater reliance of financial information for implicit claims by non-investor groups. *RD* is research and development expenditure (COMPUSTAT data item 4) scaled by average total assets (COMPUSTAT data item 44). *IMPLICIT* is an indicator variable equal to one for the durable goods industries, and zero otherwise; see notes to Table 3 for the four-digit SIC codes. *LABINT*, a measure of labor intensity, is calculated as [1 − (*PPE*/*Gross Assets*)] where *PPE* is property, plant, and equipment (COMPUSTAT data item 118), and *Gross Assets* is the sum of total assets (COMPUSTAT data item 44) and accumulated depreciation and amortization (COMPUSTAT data item 41).

The final two control variables are related to the firm's current and future profitability. *CHEARN*, is an indicator variable equal to one for a positive change in earnings (COMPUSTAT data item 8) from the same quarter in the prior year, and zero otherwise. This controls for possible contemporaneous unexpected shocks to earnings that may affect the firm's ability to meet or beat forecasts independent of the strategic behavior by the firm to guide forecasts.

*LT_CHEARN* is calculated as the change in earnings from four quarters prior to the forecast quarter to four quarters after the forecast quarter, scaled by the market capitalization of the firm four quarters prior to the forecast quarter. The long-term change in earnings, suggested by Sivakumar and Vijaykumar 2001, controls for the possibility that the firm's long-term prospects may influence the manager's trading behavior on the firm's or the manager's own behalf, as well as the firm's ability to beat or meet current forecasts.

The ordinary least squares (OLS) pooled cross-sectional regression is run when *FESC* is the dependent variable, and a logistic regression is run when *PESS* is the dependent variable.[18] The results reported in Table 3 are consistent with the predictions of Hypothesis 1. The three key test variables *InsiderSale*, *IssueNow*, and *IssueNext* are all highly statistically significant in the predicted direction, confirming that managerial and firm incentives to sell equity are significantly associated with whether firms meet or beat forecasts.

Taking *InsiderSale* first, Table 3 reports that greater forecast pessimism is found for firms with higher insider selling subsequent to the quarter when they beat or meet the quarterly consensus earnings forecast. In panel A, all else constant, a firm that had net insider selling after the earnings announcement and an average price–earnings (P/E) ratio of 30 would beat forecasts by an average of 5.34 percent (estimated coefficient for *InsiderSale* \$0.00178*30) more than a firm that had net insider purchase. A similar message is obtained when the dependent variable is an indicator variable of whether the firm beat or met forecasts.

The analysis in the first column of Table 3 (panel B) reports that the log odds ratio of beating or meeting increases by 48 percent when insiders are net sellers in the 20-day window following the earnings announcement. Alternatively stated, the probability of a pessimistic forecast error is 21 percent higher for a firm with net insider selling compared with a firm with net insider purchases (calculated using mean values for independent variables in the model 1 regression). The result of a positive association between forecast pessimism and insider selling is robust when insider selling is measured as a percentage of shares sold, and is also robust to the set of control variables included.

Turning to the equity issuance incentives, Table 3 reports that *IssueNow* and *IssueNext* representing equity issuance in the same quarter and in the future quarter respectively are associated with positive earnings surprises. For example, in panel A, a firm with an average P/E of 30 that issued an additional 10 percent of its market value in the quarter following the earnings announcement, on average, beat forecasts by about 2.8 percent (\$0.00929*0.1*30) more than a firm that did not issue new equity. In panel B, a firm that issues an additional 10 percent of its market value in the subsequent quarter experiences a 3 percent higher probability of beating or meeting forecasts than a firm that did not issue new equity (calculated as the marginal probability increase for an additional 10 percent of new equity in the following quarter, holding all variables at their mean values). As for *InsiderSale*, the results for the issuance variables are also robust with respect to the set of control variables included in the regression.

Furthermore, the evidence for quarterly forecasts in Table 3 further corroborates the pattern of annual forecast errors, consistent with a forecast walk-down illustrated in Figure 1. The significantly positive *Horizon* coefficient indicates that forecast pessimism increases as the forecast horizon shrinks toward the earnings announcement, consistent with a walk-down in forecasts. The significantly positive *Year* coefficient indicates that forecast pessimism has increased with calendar time from the 1980s to 2001.[19]

The results reported above are robust with respect to whether the measures of pessimism and insider selling are continuous or binary (*FESC* or *PESS*; *InsiderSale* or *% Shares Sold*), and whether a partial or full set of control variables is included in the regression. The first set of control variables includes firm size, growth opportunities, and profitability. Not surprisingly, ex post profitable firms tend to beat analysts' targets because the earnings realization turned out to be high. Similarly, growth firms as proxied by low book-to-market ratios also demonstrate a greater likelihood of the firm beating or meeting forecasts. With one exception, the results for firm size suggest that larger firms are more able to meet or beat forecasts.

Our results for the additional control variables are consistent with the findings in past studies. Consistent with Matsumoto (2002), the model 2 regression results in Table 3 indicate that firms with high litigation risk or a high reliance on implicit claims with stakeholders are more likely to meet or beat forecasts. Consistent with Sivakumar and Vijaykumar 2001, firms with past long-term growth in earnings are also more able to beat or meet forecasts. Consistent with the managerial guidance hypotheses, our key results here indicate that the equity-issuance and managerial insider-selling incentives exert an incremental influence on forecast pessimism over these additional explanatory variables.

The cross-sectional regressions presented in Table 3 are estimated using a pooled sample from 1984–2001 (some 158,089 firm-quarter-month observations). To examine the impact of forecast horizon, our pooled sample includes multiple firm observations for each firm-quarter. This may raise a concern of dependence in the data. Specifically, we have up to three observations for each firm-quarter. The inclusion of the fixed effects horizon variable may only partially address this dependence. Therefore, as an additional robustness check on the regression specification, we run regressions using only one (the final) forecast for each firm-quarter. We exclude the horizon variable from this specification (as we have only one record per firm-quarter). The results from this reduced sample of 53,653 firm-quarter observations yield similar results. With the exception of the *IssueNow* variable, which loses significance after inclusion of the Matsumoto 2002 control variables, we continue to find strong statistical (*t*-statistics range between 6.47 and 16.55 for the alternative specifications) and economic significance for *IssueNext* and the insider selling variable (both the indicator and continuous variables) in both the *FESC* and *PESS* regressions.

As a final sensitivity check, we also perform 60 quarterly cross-sectional regressions for the *FESC* dependent variable to obtain Fama-Macbeth 1973 *t*-statistics calculated from the time series of the estimated quarterly cross-sectional regression coefficients; results are not tabulated. *Year* and *Horizon* variables are not included in this specification. We include the three control variables for firm size, growth opportunities, and profitability. Both insider-selling variables remain highly statistically significant (*t*-statistics of 10.31 for the indicator variable and 5.70 for the continuous variable). The *IssueNow* and *IssueNext* variables are marginally significant in these specifications (*t*-statistics of between 1.72 and 1.96). The lower statistical significance from the Fama-Macbeth procedure reflects the lower power from equally weighting the time-series observations (e.g., Loughran and Ritter 2000).

***Determinants of the switch from initial forecast optimism to final pessimism***

The empirical findings reported in the previous section are consistent with the predictions of Hypothesis 1. However, we are careful to note that the observed association between pessimistic analyst forecast revisious and our trading measures may also be consistent with managers' ex post timing equity sales when price is relatively high (after truly unexpected good earnings). However, the univariate tests reported in Table 2 indicate that *Sellers* are more likely to experience a switch from forecast optimism to pessimism during the quarter than *Purchasers*. This switching behavior seems more consistent with opportunistic guidance. Therefore, to test the more restrictive predictions of Hypothesis 2, we estimate logistic cross-sectional regressions of the *Switch* indicator variable (described under the heading "Cross-sectional variation in forecast bias") using the key test variables and the same set of control variables as in Table 3 regressions.

$$\begin{aligned} SWITCH = {} & \beta_0 + \beta_1{}^*InsiderSale + \beta_2{}^*IssueNow + \beta_3{}^*IssueNext + \beta_4{}^*MB \\ & + \beta_5{}^*MV + \beta_6{}^*Profit + \beta_7{}^*Year + \gamma_1{}^*RD + \gamma_2{}^*LITIG + \gamma_3{}^*IMPLICIT \\ & + \gamma_4{}^*CHEARN + \gamma_5{}^*LABINT + \gamma_6{}^*LT\_CHEARN + \varepsilon \qquad (3). \end{aligned}$$

Given the definition of the *Switch* variable, the estimation of (3) is restricted to the sample of firms where the forecasts are initially optimistic.[20] The results are reported in Table 4. As in Table 3, *InsiderSale* in Table 4 is highly statistically significant, which is consistent with insiders timing their sales to follow immediately after a good news earnings surprise, and consequently after an increase in stock price. Relative to *Purchaser* firms, *Seller* firms experience a 21 percent higher probability of a switch from early optimism to final pessimism (calculated as the probability difference from comparing firms with net insider sales to firms with no net insider selling, holding all other variables at their mean values). Similarly, *IssueNow* and *IssueNext* are also highly statistically significant in model 1 regressions. An equity issuance equal to 10 percent of market capitalization in the subsequent quarter is associated with a 6 percent higher probability of a switch in early optimism to final pessimism, compared with a firm with no equity issuance in the following quarter. Although *IssueNext* remains highly significant in model 2 regressions, *IssueNow* does not, perhaps because of high correlation with the additional included variables. These results support the predictions of Hypothesis 2.

The statistically significant result for *Year* indicates that there is a greater likelihood of a switch from initial optimism to final pessimism in more recent calendar years, further confirming the predictions of Hypothesis 2. Institutional changes during the 1990s increased the firm's economic incentives to walk-down forecasts and then to beat or meet them at the earnings-announcement date.

The control variables have similar effects on the *SWITCH* indicator as on the *PESS* indicator described in Table 3. Larger firms that have more growth opportunities and that are profitable are more likely to have forecasts that switched from being optimistic to pessimistic over the forecast horizon. Finally, some of the implicit claims and litigation risk proxies are significant (*LITIG, IMPLICIT, CHEARN*), but others are not (*RD, LABINT, LT_CHEARN*).

TABLE 4
Relation of switching from initial optimism to final pessimism with new equity issuance and insider trading

Regression of a switch from forecast optimism to pessimism, on the sale of stock by the firm's CEO in the trading window after the earnings announcement. The data set is a pooled time-series cross-sectional sample of 25,414 firm-quarter observations for the period 1984–2001.

$$SWITCH = \beta_0 + \beta_1{}^*InsiderSale + \beta_2{}^*IssueNow + \beta_3{}^*IssueNext + \beta_4{}^*MB + \beta_5{}^*MV + \beta_6{}^*Profit + \beta_7{}^*Year + \gamma_1{}^*RD + \gamma_2{}^*LITIG + \gamma_3{}^*IMPLICIT + \gamma_4{}^*CHEARN + \gamma_5{}^*LABINT + \gamma_6{}^*LT\_CHEARN + \varepsilon \quad (3)$$

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| Variable | *Insider Sale Dummy** | *% Shares Sold** | *Insider Sale Dummy** | *% Shares Sold** |
| Intercept | −3.18† | −3.02† | −3.48† | −3.43† |
| | (1,142.3) | (1,112.4) | (990.5) | (973.0) |
| *InsiderSale* | 0.25† | 25.37† | 0.21† | 20.28† |
| | (62.0) | (33.3) | (40.0) | (19.5) |
| *IssueNow* | 0.77† | 0.78† | 0.65‡ | 0.65‡ |
| | (7.0) | (7.2) | (4.6) | (4.6) |
| *IssueNext* | 0.81† | 0.75‡ | 0.92† | 0.88† |
| | (6.7) | (5.7) | (7.7) | (7.0) |
| *BM* | −0.30† | −0.32† | −0.16† | −0.17† |
| | (35.8) | (40.2) | (8.9) | (10.3) |
| *MV (logSize)* | 0.10† | 0.11† | 0.10† | 0.12† |
| | (103.5) | (138.2) | (112.8) | (142.3) |
| *Profit* | 0.89† | 0.89† | 0.81† | 0.81† |
| | (334.6) | (331.8) | (235.1) | (233.5) |
| *Year* | 0.06† | 0.06† | 0.07† | 0.06† |
| | (300.5) | (279.4) | (303.4) | (287.3) |
| *RD* | | | 0.71 | 0.83 |
| | | | (1.1) | (1.5) |
| *LITIG* | | | 0.18† | 0.18† |
| | | | (23.5) | (24.5) |
| *IMPLICIT* | | | 0.12† | 0.13† |
| | | | (12.0) | (14.5) |
| *CHEARN* | | | 0.36† | 0.37† |
| | | | (112.7) | (118.8) |
| *LABINT* | | | −0.06 | −0.06 |
| | | | (1.2) | (1.2) |
| *LT_CHEARN* | | | −0.26 | −0.26 |
| | | | (0.6) | (0.6) |
| Model $\chi^2$ | 1,167.7† | 1,136.1† | 1,308.2† | 1,286.8† |
| $p$-value | (<0.001) | (<0.001) | (<0.001) | (<0.001) |

(The table is continued on the next page.)

TABLE 4 (Continued)

**Notes:**

This table uses only one observation for each firm-quarter. Therefore, the horizon variable is dropped from the analysis.

Variables are defined as follows:

*InsiderSale* captures the extent of insider trading in the 20-day period following the quarterly earnings announcement. This is measured using an indicator variable, *Insider Sale Dummy* (equal to one if the insiders are net sellers of stock in the 20-day period after the quarterly earnings announcement, and zero otherwise), or a continuous measure, *% Shares Sold* (the fraction of shares sold by insiders in the 20-day period after the quarterly earnings announcement). This variable is calculated as the net number of shares sold by insiders divided hy the number of shares outstanding at the end of the fiscal quarter. The variable is increasing in net sales (that is, negative numbers correspond to net acquisitions by insiders). Insiders include the CEO, chair, vice-presidents, officers, and directors. We use the following relationship codes from the Thomson Financial data base: "CB", "D", "O", "H", "OD", "VC", "AV", "CEO", "CFO", "CI", "CO", "CT", "EVP", "O", "OB", "OP", "OS", "OT", "OX", "P", "S", "SVP", "VP".

*IssueNew*, *IssueNext*, and *BM* are as defined in Table 1.

*Switch* and *MV* are as defined in Table 2.

All other variables are as defined in Table 3.

* $\chi^2$ statistics are reported in parentheses below parameter estimates.

† Significant at the 1 percent level.

‡ Significant at the 5 percent level.

In unreported tests, we find similar, if not stronger, results using annual forecast horizons in documenting the relation between equity issuance/insider selling and forecast pessimism and the switch from forecast optimism to pessimism. Taken together, the results from Tables 2, 3, and 4 are consistent with managers guiding analyst earnings targets to facilitate trading on favorable terms after an earnings announcement, on both the manager's and the firm's behalf. The potential for the manager or firm to benefit from these transactions is derived from the managers' ability to guide analysts over the forecast horizon prior to trading.

### *Robustness analysis and discussion of limitations*

In this section, we report two additional robustness checks and discuss some caveats concerning the interpretation of our results. The first robustness check examines whether analyst pessimism varies with analyst type. If bias differs across analysts, then firm variation in a forecast walk-down could result from the presence of different analyst types rather than from varying incentives of managers and firms to sell stock after the earnings announcement.

We compare the forecast errors and forecast pessimism between "lead" and "follower" analysts, where "lead" and "follower" types are identified using an approach analogous to Cooper, Day and Lewis (2001). Similar to Cooper et al., we ignore forecasts in the first 30 days of the quarter and focus instead on analyst forecasts issued in the last 30 days of the quarter, which are more likely to be revisions resulting from unobservable managerial guidance. Analysts who revise their earnings forecast first in the last 30 days of the quarter are identified as "lead" analysts. To ensure that a "lead" analyst is truly a first mover, we require a 10-day quiet window preceding forecast revision of the "lead" analyst. If multiple analysts revise their forecasts on the same day, the value of the "lead" forecast is calculated as the mean of the analyst forecasts issued on that day. "Follower" analysts are identified as those analysts who revise their forecasts in the days following the "lead" analysts, but before the actual earnings announcement. The sample consists of 12,157 firm-quarter observations.

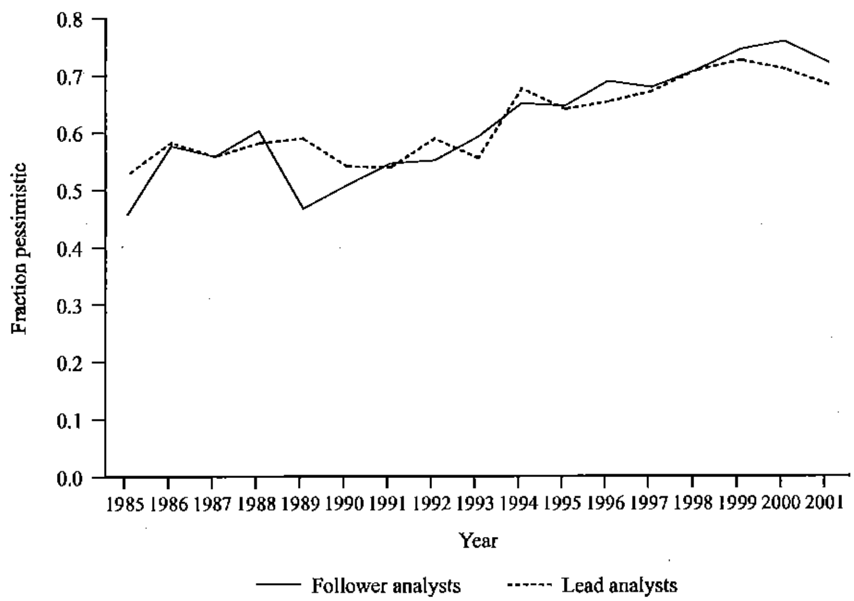
Our empirical results show no economic or statistical difference between the forecast bias properties of "lead" analysts and those of "follower" analysts. For example, the average pessimism ($PESS_{last}$) for "lead" analysts is 0.644 over the entire sample period while the average pessimism for "follower" analysts is nearly identical at 0.638, and the difference is not statistically significant. Figure 2 presents the temporal trend of pessimism in "lead" and "follower" analyst forecast revisions for the period 1985–2001. The graph shows increasing pessimism for both "lead" and "follower" analysts over the sample period, similar to the graph for the consensus forecasts in Figure 1. There is, however, no statistical difference between the two categories of analysts.

These findings are consistent with the notion that managers have strong incentives to manage the consensus of all analysts' earnings forecasts. While it may be important to first guide influential "lead" analysts, managers must ultimately guide the consensus of all analyst forecasts because the consensus earnings estimate is the benchmark used to evaluate subsequent reported earnings. Furthermore, the statistically indistinguishable difference between forecasts of lead and follower analysts is consistent with the analyst herding behavior reported in prior studies (see, for example, Hirshleifer and Teoh, 2003).

Our second robustness check examines the impact of different investor types — namely, institutional versus noninstitutional investors — on analyst forecast bias. We reestimate our main regressions using a subsample (140,906 firm-quarter-forecast month observations) with institutional holdings data available from the 2001 Spectrum data base. These regressions now include a variable measuring the fraction of shares held by institutional investors. Our main findings on the relation between insider sales and analyst forecast errors and pessimism remain robust for this subsample. Consistent with Matsumoto 2002, we also find a positive association between the fraction of institutional ownership and forecast pessimism. This finding is consistent with the argument that the increasingly short-term investment objectives of institutional investors may provide managers with additional pressures to beat short-term quarterly targets. The descriptive findings of Matsumoto also suggest that the effect is strongest for transient institutional investors.

While our empirical results are robust to a number of different specifications, as in all empirical research, caution is required in interpreting the findings. The focus of this paper is to identify determinants of (1) forecast pessimism at the end of the fiscal year, and (2) the switch from early optimism to final pessimism. In developing our hypotheses, we rely on the prior research of Bartov, Givoly, and Hayn 2002 to support our premise that analyst guidance leads to more favorable stock prices at the end of the fiscal period. This prior evidence suggests that the path by which forecasts come to be beaten is not as crucial as whether the forecast is beaten. Our finding that final pessimism and the switch from early optimism to final pessimism is concentrated in firms that are net issuers of equity or managers are net sellers of stock after an earnings announcement is consistent with these firms choosing to engage in such behavior because of managerial incentives. Therefore, our results should be interpreted as a joint test of (1) the hypothesis that the forecast path is less crucial than whether the forecast is beaten, and (2) our earnings-guidance hypothesis.

**Figure 2** Temporal trend of pessimistic lead and follower analysts*




**Notes:**

* To identify lead and following analysts we use a procedure similar to Cooper, Day, and Lewis 2001. We focus on analysts releasing forecasts in the last month of the fiscal quarter and require there be no forecasts in the first third of the last month (that is, days −30 to −21) to ensure there is no significant news event. We then divide the forecasts made in the last 20 days into the first forecast (lead analyst) and take the average of the remaining forecasts (followers).

In this paper, we investigate expectations management as one of several tools that management has available to achieve a desired level of earnings-surprise. It should be noted that our earnings-surprise measure compares analysts' earnings estimates with a firm's reported earnings. The reported earnings number can also be managed (for example, by manipulating accruals or changing earnings definitions) to achieve the desired earnings surprise (e.g., Teoh, Welch, and Wong 1998a, 1998b; and Bradshaw and Sloan 2002). Therefore, we view our results as providing complementary (and often inseparable) evidence on both earnings and expectations management.

Several recent U.S. regulatory reforms may limit the ability of analysts and managers to engage in future earnings guidance games. The enactment of Regulation FD (Fair Disclosure), in October 2000, may limit managers' hidden opportunities to guide analysts' forecasts. In addition, the enactment of Regulation AC (Analyst Certification) in 2003 requires analysts to certify that recommendations reflect their personal beliefs. However, to the extent that none of the current regulations require firms to disclose at the time of the earnings announcement the firm's or insiders' intention to sell the firm's stock shortly after the earnings announcement, these economic incentives may still be present to encourage continuation of the earnings-guidance game.

## 6. Conclusion

This paper examines the dynamic behavior of analyst earnings forecasts leading up to earnings announcements. We provide evidence that links the pattern of analyst pessimism in the 1990s to institutional and regulatory changes that create capital-market incentives for managers to guide and beat forecasts in order to boost stock prices. These systematic changes include greater use of stock option compensation for managers, restrictions on trading by insiders to post-earnings-announcement periods in response to the Insider Trading and Securities Fraud Enforcement Act of 1988, and the lifting of the short-swing rule for insiders in 1991 allowing insiders to exercise stock options and immediately sell company stock.

Our cross-sectional predictions are motivated by the tendency of managers and firms to sell shares after earnings announcements. This can create incentives to guide analysts to systematically pessimistic forecasts just prior to the earnings announcement, so that the salient news of a positive rather than a negative surprise arrives before the share sale.

Consistent with our hypotheses, we find that pre-announcement forecast pessimism is strongest in firms whose managers have the highest capital-market incentives to avoid earnings disappointments. We find that firms with managers that sell stock after an earnings announcement are more likely to have pessimistic analyst forecasts prior to the earnings announcement. The probability of forecast pessimism increases from 54 percent for an average firm without net insider selling to 66 percent for an average firm with subsequent net insider selling. Furthermore, firms in which the insiders are net sellers of the firm's stock are also more likely to have analysts switch from long-horizon optimism to short-horizon pessimism prior to the earnings announcement. The probability of a switch from optimism early in the quarter to pessimism closest to the earnings announcement increases from 21 percent in firms without net insider selling to 27 percent in firms with net insider selling.[21] This evidence is consistent with managers behaving opportunistically to guide analysts' expectations around earnings announcements to facilitate favorable insider trades after earnings announcements.

## Endnotes

1. Cotter, Tuna, and Wysocki (2004) examine analysts' forecast revisions in response to public managerial guidance as provided through management's earnings forecasts. However, prior to Regulation FD (SEC 2000), a large fraction of managerial guidance of analysts was not publicly observable.
2. For example, one might speculate that managers are just opportunistically taking advantage of unrelated changes in analyst forecast bias by selling shares or exercising options. However, we are not aware of any specific explanation for why their incentive to do so would cause them to behave in a way that explains our evidence.
3. Managers also care about the stock price performance because poor stock price performance encourages a hostile takeover and subsequent firing by the acquirer's board of directors. An active external labor market also rewards a manager with a reputation for maintaining good stock price performance. In addition, a manager is in a better position to bargain for higher future compensation if the stock price performance is good.
4. By reducing discretion in the timing of the insider trades, the blackout feature reduces the opportunity of the managers to profit from inside information at the expense of uninformed outside investors. Limiting insider trades to the period immediately after earnings announcements also reduces the adverse selection problem by minimizing the asymmetry of information between uninformed outsiders and the inside managers.
5. See http://www.sec.gov/rules/final/33-8193.htm for full details. Part A of the Final Rule indicates the following:

> A. Certifications in Connection with Research Reports: As adopted, Regulation Analyst Certification requires that brokers, dealers, and their associated persons that are "covered persons" that publish, circulate, or provide research reports include in those research reports:
>
> (A) a statement by the research analyst (or analysts) certifying that the views expressed in the research report accurately reflect such research analyst's personal views about the subject securities and issuers; and
>
> (B) a statement by the research analyst (or analysts) certifying either:
>
> (1) that no part of his or her compensation was, is, or will be directly or indirectly related to the specific recommendations or views contained in the research report; or
>
> (2) that part or all of his or her compensation was, is, or will be directly or indirectly related to the specific recommendations or views contained in the research report. If the analyst's compensation was, is, or will be directly or indirectly related to the specific recommendations or views contained in the research report, the statement must include the source, amount, and purpose of such compensation, and further disclose that it may influence the recommendation in the research report.

6. This does not require that investors be irrational in their evaluations of forecasts. Investors may properly discount for optimism, but firms nevertheless need to induce such analyst optimism because investors would still discount a defecting firm that failed to do so, causing that firm to be viewed as worse than it really is.
7. The increased use of stock options in the 1990s may have been, in part, an endogenous favorable response by firms to the reduced agency-related costs of stock option compensation that resulted from the heightened insider-trading restrictions (discussed above under the heading "Why and when managers care about short-term stock prices"). The findings in this study suggest that we may have substituted one agency-related cost for another. The new agency cost is one that resulted from an increased incentive to play the earnings-guidance game.
8. It is important to note that our analysis of the switch from early optimistic to pessimistic forecasts does not collapse to an analysis of final pessimism. In considering the optimism–pessimism switch we exclude firm-quarter observations where the initial forecast is pessimistic. More details on variable measurement are given in section 5.
9. Our results are not driven by use of this "constructed" consensus forecast. In unreported tests we replicate our empirical analysis using the median consensus forecast as reported by I/B/E/S.
10. The empirical findings documented in this section also exist for a broader sample of firms not restricted by COMPUSTAT data availability.
11. We also replicate the analysis using total assets per share as a deflator. The qualitative results are unchanged using this alternative deflator.
12. For example, an analyst forecasts $1.15 earnings per share (EPS) for a firm on November 1, 1995 for the fiscal year ending December 31, 1995. I/B/E/S reports an actual EPS of $1.20 on January 27, 1996. I/B/E/S also reports that the 1994 fiscal year earnings release date occurs during January 1995, and the stock price in February 1995 (the first month after the release of EPS for the previous fiscal year) is $15.10. Thus, *FE* for month −2 (73 days' lag between earnings release date and forecast date) is ($1.20 − $1.15)/$15.10 = 0.0033, or 0.33 percent. We use a calendar-year timing convention, so the *FE* is considered the forecast error for year 1996 because the actual earnings release date occurs in January 1996.
13. For example, absolute forecast errors (|forecast EPS − actual EPS|) greater than $3 per share for a company trading at $30 per share are removed from the sample. Data-coding errors for forecasts and extreme small prices likely contribute to such large outliers. The 10 percent deletion rule removed 2.1 percent of the sample. We find that the mean (median) numerator of *FESC* is −0.04 (0.00) for retained firms and −1.20 (−0.66) for deleted firms. Further, we find that the mean (median) denominator of *FESC* is 28.76 (19.25) for retained firms and 5.73 (3.50) for deleted firms. Deleted firms have much larger unscaled forecast errors and lower stock prices. As a robustness check, we apply a less stringent deletion cutoff of greater than 100 percent of price that removes only 0.2 percent of the sample. Our results are qualitatively unchanged in this specification and remain statistically significant.
14. Our empirical findings are stronger in tests (not reported) using annual horizons.
15. Givoly and Hayn (2000) report a loss frequency of about 34 percent in the 1990s based on net income. Our sample is skewed toward larger (more profitable) firms with analyst

following. In addition, we use I/B/E/S income numbers, which are typically based on operating earnings.

16. The empirical results are robust to the use of an equity-issuance indicator variable based on equity-sale cutoffs from 1 percent to 20 percent of equity market value. For the indicator variables, we exclude the smallest equity issuances because they relate to additional equity issued due to the exercise of managerial options. For the continuous variables, we note that the issuance variable may be correlated with the insider trade variable via stock options exercise. The Pearson (Spearman) correlation between the insider selling and equity-issuance variables is 0.18 (0.21).
17. Regression results for the second continuous measure of insider trading (dollar value of shares traded) are similar to the fraction of shares traded variable. We do not report these results for the sake of brevity.
18. In additional tests we also considered the robustness of the regression results in panel B of Table 3 to our definition of *PESS*. If we limit our categorization of firms who meet/beat (miss) to those firms who report earnings no more than 5 cents greater (lower) than the most recent consensus analyst estimate all of our explanatory variables retain their significance. This reinforces the earlier discussion that firms need only *just* beat analyst expectations. Managerial incentives to sell equity both on the firm's behalf and from their own personal accounts are a key determinant in the discontinuity of analyst forecast errors around the zero point.
19. In unreported tests, we also interact the equity-issuance and growth variables with the temporal trend. There is some indication that these effects are more pronounced in the latter part of our sample. In addition, our findings are robust to the inclusion of annual and quarterly fixed effect variables.
20. We reran the analysis in Table 3 using this restricted sample where the initial forecasts are optimistic. The results are essentially the same, and the key variables related to our hypotheses remain statistically significant using the reduced sample.
21. Although the economic magnitude of these quarterly forecast results is modest, the annual forecast results are more substantial. This is because there is a much larger fraction of optimistic forecasts at the beginning of the fiscal year (> 70 percent) than at the start of a fiscal quarter (< 50 percent); this difference has increased in the latter years in our sample period as firms appear to walk-down forecasts to beatable levels earlier and earlier in the fiscal period.

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# The Biggest Mistakes We Teach

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## I. Introduction

When I started to teach at the University of Pennsylvania's Wharton School over twenty years ago, I used the very first edition of the Brealey and Myers' textbook. The book had some mistakes in it, as almost all books do. For example, the first two editions had an incorrect formula for the valuation of warrants. I taught the incorrect formula for several years before a perceptive student asked a question that exposed the mistake. But I don't want to dwell on technical errors. Instead, I want to focus on some of the conceptual mistakes that dominate the received body of wisdom in the academic finance profession.

## II. The Relative Risk of Stocks and Bonds

Almost all finance textbooks prominently feature the historical returns provided by Ibbotson Associates. These numbers show that since 1926, stocks have produced higher average annual returns than bonds, and that stocks are riskier than bonds. This is consistent with equilibrium risk-return models. There are three problems with this evidence that stocks are riskier than bonds, however.

First, the use of annual holding periods. There is no theoretical reason why one year is the appropriate holding period. People are used to thinking of interest rates as a rate per year, so reporting annualized numbers makes it easy for people to focus on the numbers. But I can think of no reason other than convenience for the use of annual returns. If returns follow a random walk, then whether a one year holding period is used, or a shorter or longer period is used, makes no difference. But if there is mean reversion or mean aversion in the data, then the risk of one class of securities relative to another depends on the holding period.

Second, the use of arithmetic, rather than geometric returns. The relation between the arithmetic (simple) average and the geometric (compounded) average is given by the formula

$$r_{arith} = r_{geo} + 1/2\sigma^2$$

The higher is the variance rate, the larger will be the difference between the arithmetic and geometric returns. For stocks, the difference between the arithmetic and geometric averages is about 2% per year. For bonds, the difference is much smaller. As a result, the performance of stocks relative to bonds looks better when arithmetic averages are compared than when geometric averages are compared. Now, if stock and bond returns follow a random walk, the use of annual arithmetic returns is appropriate. But if there is mean reversion or mean aversion, then the use of arithmetic returns over longer time periods is not appropriate. With mean reversion, the multi-period arithmetic return will be closer to the geometric return.

Third, the use of nominal, rather than real returns. People are concerned about the consumption bundle that they can consume. The only reason that nominal returns, rather than real returns, should be reported in textbooks is simplicity. But this simplicity comes at a cost. If stocks are good short-term hedges against inflation, they could have a higher variance of nominal returns and yet offer a lower variance of real returns. In fact, stocks are bad short-term hedges against inflation. On theoretical grounds, it is the standard deviation of real returns that is relevant.

Figure 1 provides an updated version of Figure 2-4 in Jeremy Siegel's *Stocks for the Long Run*, showing the standard deviation of real returns for different holding periods, using data starting in 1802. For a one-year holding period, stocks are twice as risky as bonds. For holding periods of twenty or more years, however, stocks are less risky than bonds.

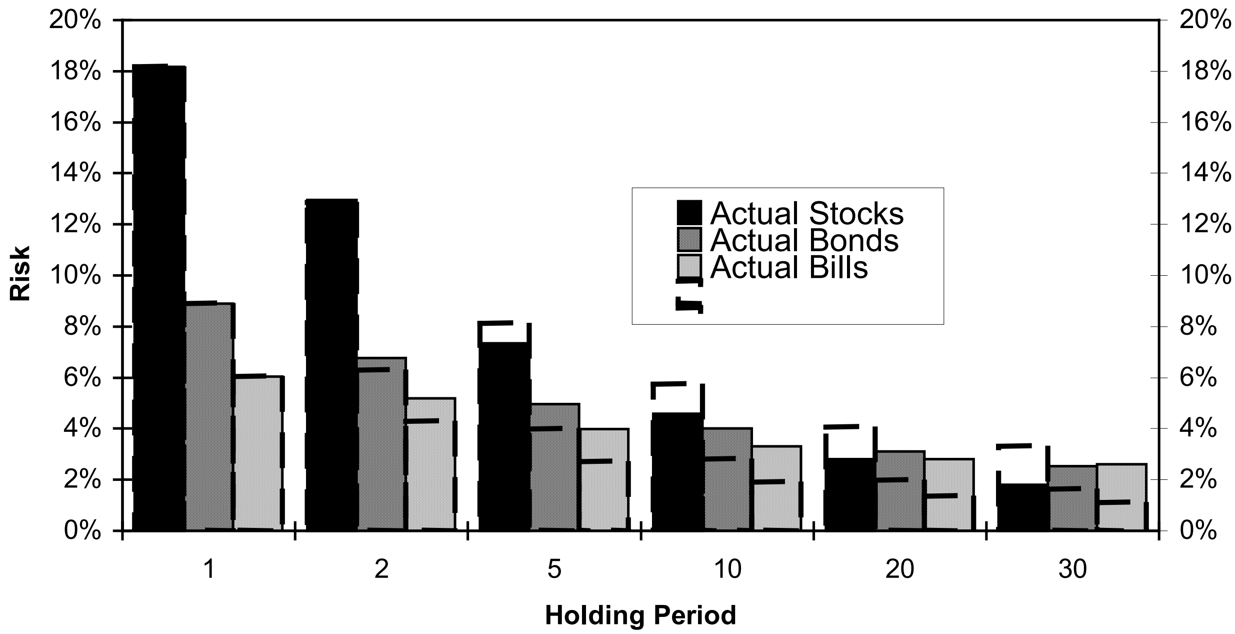




**Figure 1**: The annualized standard deviation of compounded real holding-period returns from Janaury 1802 to September 2001. For example, a two-year buy-and-hold real return of 21% would have an annualized compounded real return of 10%. For the sample period, there are 199 overlapping two-year returns, from which 199 annualized numbers are calculated. The bars represent these actual standard deviations. The dashed bars represent what the standard deviations would be if the one-year standard deviations are divided by the square root of the holding period, which is the random walk assumption. This is an updated version of Figure 2-4 from Siegel (1998), supplied by Jeremy Siegel.

Why is this so? Well, although stocks are a bad hedge against inflation in the short-run, they are a good hedge against inflation over a longer period of time, such as five years. This pattern is a major contributor to the negative autocorrelation of real stock returns that exists over a five-year horizon. In other words, real stock returns show a tendency towards mean-reversion. This makes stocks less risky over a T-year holding period than would be suggested by multiplying the annual variance by T. If there is no mean reversion, the T-period variance of returns, $\sigma^2_T$, is equal to T times the variance of single-period returns, $\sigma^2$. If one uses monthly returns data, however, researchers generally find that $\sigma^2_T < T\sigma^2$ when using a market index when T is greater than 24 months.

I can think of another reason why real stock returns are negatively autocorrelated at three-to-five year horizons. If individuals put too much weight on recent evidence, then they will put more money into stocks after stocks have done well, pushing up the prices even further. Similarly, after stocks have done poorly, they will pull money out of stocks, depressing prices further. This is an example of the representativeness heuristic. People put too much weight on recent evidence. This is also known as the fallacy of small numbers.

In contrast to stocks, the real returns on nominal bonds show no tendency towards mean reversion. In fact, there is a slight tendency towards mean-aversion, making them more risky the longer the holding period. But the big risk with nominal bonds comes from a hyper-inflation. Fortunately, the U.S. has never had a hyper-inflation, but other countries have. In a hyper-inflation, stocks typically have negative real returns, but then recover, at least partially. Bonds get wiped out in real terms, and once this occurs, you can never recover.

Stocks are riskier than bonds for short holding periods. But it is not at all obvious that this is true for long holding periods, either historically or in the future.

## III. Estimating the Future Equity Risk Premium

The equity risk premium is the difference in returns between stocks and safe assets, such as Treasury bills. There are three approaches to estimating the equity risk premium on a point-forward basis. The first approach is to extrapolate historical returns. The second approach is to use a theoretical model of what the equity premium should be, given plausible assumptions about risk aversion. The third approach is to use forward-looking information such as the current dividend yield and interest rates.

Many textbooks encourage students to use the historical arithmetic equity risk premium of 9% for computing the cost of equity capital. Ivo Welch's recent survey of financial economists indicates that most finance professors extrapolate the historical average, too, although many shade it down to about 7%, perhaps due to concerns about survivorship bias. The numbers that I am about to compute using forward-looking information suggest that 1% is a more defensible number.

Before doing so, let me point out how extrapolating historical numbers can result in numbers that are nonsensical. If one were estimating the equity risk premium for Japan at the end of 1989, using the historical data starting when the Japanese stock market reopened after World War II, one would produce an equity risk premium of more than 10%. But at the end of 1989, the Japanese economy was booming, corporate profits were high, and the market's price-earnings ratio was over 60. At the time, it was the conventional wisdom that the cost of equity capital for Japanese corporations was low. It *cannot* be the case that the cost of equity capital is low *and* the equity risk premium is high. But it *can* be the case that the historical equity premium is high, and the expected equity risk premium for the future is low.

If a theoretical model is used for what the equity risk premium should be, one comes up with a number in the vicinity of 2% if geometric returns are used, or 4% if arithmetic returns are used. This is the approach used by Mehra and Prescott (1985) in their famous paper.

The first forward-looking approach to estimate the future real return on equities is to look at the market's earnings yield. The earnings yield is just the reciprocal of the P/E ratio. Now, one must normalize earnings because earnings may be temporarily high or low due to business cycle effects. Historically, the earnings yield has averaged 7%. Not coincidentally, the average compounded real return on equities has averaged 7%. This historical average of 7% is composed of a dividend yield of 4.5% and a real capital gain of 2.5%.

Today, the earnings yield is in the vicinity of 4%, once one smoothes out business cycle effects. This generates a real return on equities, on a point-forward basis, of about 4%, which is below the historical average. The lower forecast today is because the P/E ratio is higher than the historical average of about 14. The higher P/E ratio today also results in a lower dividend yield. Today, the dividend yield is about 1.5%. The dividend yield is low both because the P/E ratio is high, and the payout ratio of dividends to earnings is relatively low. The dividend payout ratio is low partly because of the increase in share repurchases. Because of share repurchases, expected real capital gains have increased. But employee stock options have also become more popular, and this dilution partly offsets the effect of share repurchases. A 2.5% real capital gain per share plus a 1.5% dividend yield produces a 4% per year real return on equities.

The second forward-looking approach is to use the Gordon dividend growth model. Using this model, which is a rearrangement of the growing perpetuity formula $P_0 = Div_1/(r - g)$, one gets that

$$r = \text{the dividend yield} + g$$

where g is the growth rate of dividends per share. If the dividend yield stays constant over time, then the growth rate of dividends per share will be the same as the growth rate of the stock price.

What is a plausible estimate of g? If aggregate dividends grow at 2.5%, and the aggregate dividend/labor income ratio for the economy stays constant, this would imply that real labor income grows at 2.5%. If the population grows at 1%, this would imply that per capita income grows at 1.5% per year. This is equal to the historical average long-term growth rate of about 1.5% in developed countries, according to Prichett (1997). A 1.5% per year growth rate means that real per capita income will double every 47 years. If the net effect of share repurchases and option dilution adds 1% to per share growth, then a growth rate of real dividends per share of 2.5% can be justified. Adding a 1.5% dividend yield to this gives a 4% real return on equities in the future.

Since 1997, the U.S. Treasury has issued inflation-indexed bonds, commonly known as TIPS, for Treasury Inflation-Protected Securities. These bonds do offer protection against inflation risk. Many textbooks do not even acknowledge the existence of this important asset class.

The Ibbotson numbers show that the historical real return on bonds has been about 1%. But today, TIPs are yielding real returns of about 3.3%. If the expected real return on equities is 4% and the real return on inflation-indexed bonds is 3.3%, the equity risk premium is only 0.7%. In round numbers, 1%. The equity premium has gotten squeezed from the top (low future real returns on stocks) and the bottom (a higher real return on bonds).

I think that textbooks should present historical returns, but should focus on the Gordon dividend growth model for estimating the future equity risk premium. For predicting future dividend growth rates, all one has to do is assume an economy-wide growth rate and then assume that the ratio of labor income to capital income is a constant. Fama and French (2002) and Jagannathan, McGratton, and Scherbina (2000), among others, also adopt the Gordon dividend growth model framework and conclude that the equity risk premium is now in the vicinity of 1%, far below the historical average.

## IV. The Fed Model

The so-called Fed Model states that the stock market is fairly valued when the earnings yield on stocks is equal to the interest rate on bonds. This model for valuing stocks is based on the empirical regularity that is illustrated in Figure 2.

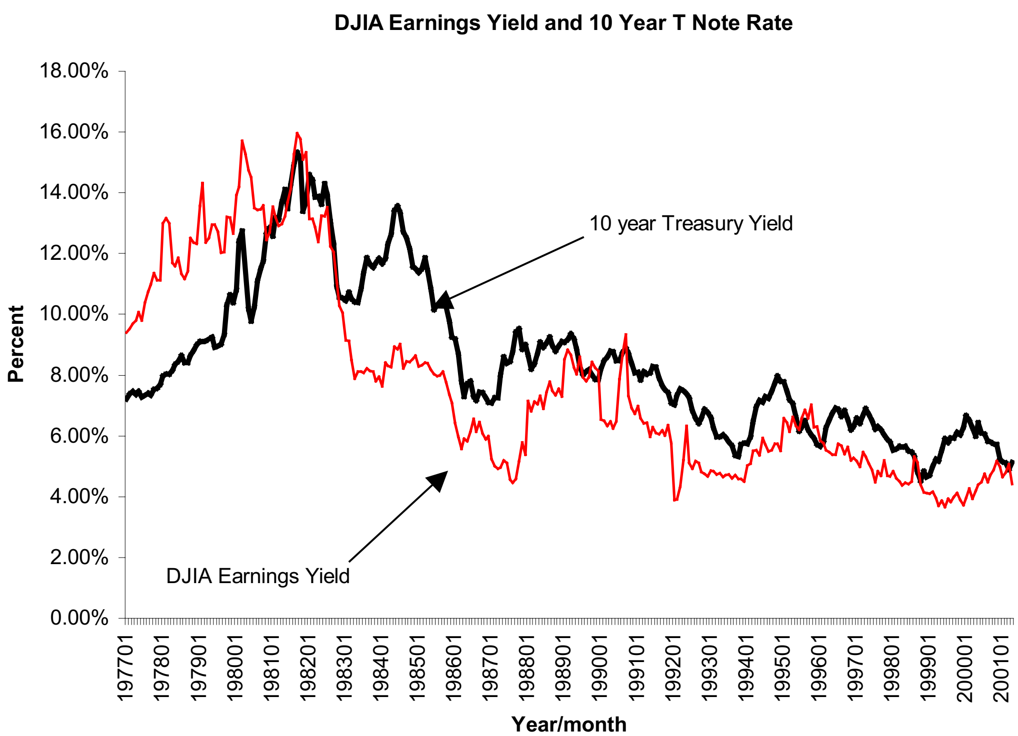


**Figure 2**: Monthly values of the earnings yield (last fiscal year's earnings) on the Dow Jones Industrial Average and the nominal yield on 10-year Treasury securities.

Empirically, this is a model that works very well. But on theoretical grounds, if most of the variation in nominal interest rates comes from changes in expected inflation rather than changes in real rates, the model should not work well. In fact, the strong positive correlation should theoretically be negative, in an efficient market. The logic was first pointed out by Modigliani and Cohn in their 1979 *FAJ* article, and is reiterated in my paper with Richard Warr in the March 2002 *JFQA*. The logic is that, for firms with debt in their capital structure, earnings are depressed by high nominal interest payments. The part of the nominal interest payment that goes to compensate bondholders for inflation reflects the decline in the real value of the liabilities of the firm. Accountants measure the cost to equityholders from the interest payments, but they don't measure the benefit to equityholders from the decline in the value of the firm's real liabilities. Thus, in an inflationary environment, accounting earnings underestimate the true economic earnings of a firm. Since accounting earnings are used to calculate the price-earning (P/E) ratio, the more economic earnings are understated, the higher should be the P/E ratio.

Now, inflation distorts accounting earnings in other ways, and the tax system is not inflation-neutral. But when Richard Warr and I adjust for these other effects, we conclude that the net impact is that P/E ratios should be higher, not lower, in periods of high inflation. This is exactly the opposite of the empirical evidence.

I think that there is a complacency in the profession. If we have an empirical pattern that is difficult to reconcile with theory, we shy away from saying that the market gets it wrong. Instead, we search for other explanations or just ignore the inconvenient facts.

The Fed model is typically not discussed in textbooks. But it is frequently discussed in the financial press, and there is never any discussion of why the empirical relation is inconsistent with rational valuation. Adjusted for business cycle effects, the earnings yield on stocks is an estimate of the expected real return on stocks.[1] The earnings yield is *not* an estimate of the expected *nominal* return on stocks. For the earnings yield to move one-for-one with the nominal bond yield, as the Fed model would have it, one has to assume that the nominal yield on bonds equals the real return on stocks. This is why the empirical success of the Fed model is inconsistent with rational valuation.

## V. The Limits to Arbitrage and Market Efficiency

Securities markets in the United States are very good at getting the little things right. It is incredibly difficult to find high-frequency arbitrage opportunities that persist. But in my opinion, the profession has made a serious error in jumping to the conclusion that if the market gets the little things right, it must get the big things right. Low-frequency events are not amenable to formal statistical tests. By definition, they don't repeat themselves frequently. What makes it difficult to separate out overreactions that slowly correct themselves from rational time-variation in equilibrium expected returns is that the market gets overvalued when there are legitimate grounds for optimism, and undervalued when there are legitimate grounds for pessimism.

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[1] Note that every textbook points out that the earnings yield on a stock is not the cost of equity capital for the firm, because earnings growth rates for firms vary all over the map. But the economy's growth rate of earnings does not vary much over time, once one accounts for business cycle effects. So the "normalized" earnings yield on the market is a good estimate of the cost of equity capital, in real terms, for the market as a whole.

By low-frequency events, I am referring to things like the October 1987 stock market crash, the Japanese bubble of the 1980s, and the TMT (technology, media, and telecom) bubble of the late 1990s.

Market efficiency does not just mean the lack of arbitrage profits. Just because it is difficult to design and implement strategies that will reliably make positive risk-adjusted profits does not mean that large misvaluations are not common. As Shleifer and Vishny (1997) have pointed out, taking positions in misvalued securities is extremely risky. For instance, if one shorted overvalued Japanese stocks at the beginning of 1988, one would have lost substantial money over the next two years. An investor who did this might not have had any capital left when the bubble finally burst starting in January of 1990.

Similarly, money managers that bet against overvalued internet stocks in early 1999 suffered huge losses before the TMT bubble burst starting in March 2000. Few of these investors had any capital left in March 2000. As with the Japanese bubble, unless one had the foresight to avoid taking a position when the misvaluations were large, and wait until the misvaluations became very large, you would have been wiped out. Being right in the long run is no consolation if you have lost everything in the short run.

But I am hard-pressed to find a discussion along these lines in most textbooks. Instead, the evidence on high-frequency efficiency is typically fallaciously applied to assert that low-frequency inefficiencies won't exist.

## VI. Dividend Policy

The chapter on dividend policy should be called payout policy. There are two distinct issues-- the form of payout, and the level of payout. In the days of M&M, these were pretty much one and the same. But since 1984, they have been very different. The typical textbook covers the Modigliani and Miller theorem, taxes, and signaling, and then at the end of the chapter adds a few paragraphs on share repurchases. Instead, I would suggest that the first half of the chapter should be devoted to what determines the level of cash payouts, and the second half should be devoted to the choice between share repurchases and dividends. The empirical evidence is that taxes are at best a second-order consideration in determining the form of payout. In particular, any tax-based model would predict that there should have been much more share repurchases prior to the 1986 tax reform act, because capital gains had been given preferential tax status. Shefrin and Statman's 1984 *Journal of Financial Economics* article giving behavioral reasons for cash dividends is barely mentioned, if it is mentioned at all, in most textbooks.

I suspect that if most of us were writing a textbook from scratch today, the chapter on payout policy would look very different than the one that appears in textbooks. There is a strong path-dependency involved. Even if a textbook author wants to make a major change, most professors don't want to have to revise their lecture notes.

## VII. Lease Finance

Most textbooks cover leasing before they cover options. Many leases give the lessee the right to buy the item that they have leased at the end of the lease, at a fixed exercise price. This option is valuable. But most textbooks ignore it, because they haven't covered option pricing theory yet.

Similarly, most textbooks cover issuing equity before options are covered. Many of these textbooks cover rights offerings in their chapter on issuing equity or raising capital. But because they haven't covered options yet, they don't note that a right is just a warrant. So they don't give the correct formula for valuing a right that is not deep in the money.

The deferral of the options chapter until late in the book has other costs. In one prominent textbook (I won't mention names, to protect the guilty), convertible bonds are covered before option pricing is covered. The gyrations that the textbook has to go through are funny, except that students don't get the humor.

## VIII. Conclusions

I've taken issue with the way we as a profession teach certain things, and the way that textbooks present them. These are some of my pet peeves. I'm sure that each of us could make up a list. But I have to concede that I find it a lot easier to criticize others than to do it right myself. I have no intention of writing a textbook. And even if I did, and got a lot of things right that other textbooks get wrong, I'm sure that I would introduce different mistakes.

About seven years ago I attended an NBER meeting where Michael Jensen was one of the speakers. Jensen received his Ph.D. from Chicago in 1968. I received my Ph.D. from Chicago in 1981, and by that time a number of Jensen's articles were on the reading lists. At the NBER meeting, Jensen said that he had come to realize that most of what he learned in graduate school was wrong. Well, I feel that way, too. Twenty years from now, I expect that my former doctoral students will be saying that a lot of what they learned in graduate school was wrong. I just wish that I knew now which things that I'm teaching are wrong, rather than having to wait twenty years to find out.

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# ON COMPUTING MEAN RETURNS AND THE SMALL FIRM PREMIUM

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The mean return computational method has a substantial effect on the estimated small firm premium. The buy-and-hold method, which best mimics actual investment experience, produces an estimated small-firm premium only one-half as large as the arithmetic and re-balanced methods which are often used in empirical studies. Similar biases can be expected in mean returns when securities are classified by any variable related to trading volume.

## 1. Introduction

There is a potentially serious problem in estimating expected return differences between small and large firms. Even with exactly the same sample observations, the method used to compute sample mean returns can have a substantial effect on the estimates.

With an arithmetic computational method, daily returns on individual stocks are averaged across both firms and days to obtain the mean daily return on an equally-weighted portfolio; then the portfolio's mean daily return is compounded to obtain an estimate of the expected return over a longer interval. With a buy-and-hold method, individual stock returns are first obtained for the longer interval by linking together the daily individual returns; then an equally-weighted portfolio's mean return is computed by averaging the longer-term (individual) returns.

Defining a 'longer interval' as one year, the arithmetic method produces an average annual return difference of 14.9 percent between AMEX and NYSE stocks[1] over the 19 complete calendar years, 1963–1981 inclusive. The buy-and-hold method gives an annual return difference of only 7.45 percent. Assuming that annual returns are statistically independent, the arithmetic

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[1]The effect of smallness can be measured by the difference in returns of stock listed on the American Exchange (AMEX) and the New York Exchange (NYSE) because AMEX issues are, on average, much smaller than NYSE issues. Most of the results presented here are based on the AMEX–NYSE differential because it is convenient and easy to use. Some confirmatory results based directly on measured size will also be presented.

method's return differential had an associated $t$-statistic of 3.07 while the buy-and-hold method yielded a $t$-statistic of 1.53.

Speculation on possible causes of the small firm premium has occupied the attention of many finance theorists over the past few years; but perhaps this attention has been premature. If the estimated small firm premium can be cut in half simply by compounding individual returns before averaging them, some consideration should be given to whether the magnitude of the true premium is really all that large. The various explanations for the premium offered so far would become more plausible if the premium is actually smaller than has been previously reported.

This paper investigates why the mean return computational method can be such a significant choice in some empirical research. The reason seems to be that individual asset returns are not as well-behaved as we might like. Individual assets do not trade continuously and there are significant trading costs. In some empirical studies, the effect of these factors might be safely ignored; but when the object of investigation is related to trading volume (and thus to trading frequency and trading costs), there can be measurement problems. Firm size is related to trading volume and it is used as an example throughout the paper. Other variables related to size and to trading, such as dividend yield, price/earnings ratio, and beta, could also present similar empirical difficulties. Section 2 gives a brief theoretical discussion of mean return computational methods and section 3 presents details of the empirical results for small firm premia.

## 2. Compounding and the bias in mean return calculation

### 2.1. *Formulae for computing mean returns*

To elucidate the differences in mean return computation and explain why they might produce different results, consider a sample of $N$ securities, each having returns observed for $T$ periods. Let $R_{it}$ be the value relative (1 + return), of security $i$ in period $t$. Suppose also that investment results are reviewed every $\tau$ periods. For example, if data were available daily but returns were to be reviewed every month, we would have $\tau \cong 21$ since there are usually about 21 trading days per month.

Two alternative methods of computing the mean equally-weighted return over the review period can be written algebraically as

$$\bar{R}_{\mathrm{AR}} = \left[\frac{1}{N \cdot \tau} \sum_{i} \sum_{t} R_{it}\right]^{\tau}, \tag{1}$$

$$\bar{R}_{\mathrm{BH}} = \frac{1}{N} \sum_{i} \left[\prod_{\tau} R_{it}\right], \tag{2}$$

where the subscripts 'AR' and 'BH' denote 'arithmetic' and 'buy-and-hold', respectively. These labels are intended to portray the sense of the computation method. The first method (1) is simply an arithmetic mean raised to the $\tau$th power while the second method gives the actual investment results an investor would achieve from buying equal dollar amounts of $N$ securities and holding the shares for $\tau$ periods.

There is also a third possible definition of mean return,

$$\bar{R}_{RB}=\prod_t\left[\frac{1}{N}\sum_i R_{it}\right], \tag{3}$$

where the subscript 'RB' stands for 'rebalanced'. This would be the actual investment return (ignoring transactions costs) on a portfolio which begins with equal investments in the $N$ securities and *maintains* equal investments by rebalancing at the end of each period, $t=1,\dots,\tau$.

To compare results over different review periods, we must choose some typical and familiar calendar interval, say a year, and express the results as percentage returns over that common calendar interval. In the tables below, annualization is accomplished and reported for 'linked' returns; the review period returns within each calendar year are simply multiplied together (or linked) in order to obtain an annual return.[2] Linked annualization includes *every* daily observation in some review period during the year. This assures that in any comparison of the results across review periods, the observed differences are due to review period alone and cannot be ascribed to slightly different sample observations.

The next two subsections investigate some properties of these sample mean returns. Subsection 2.2 derives their expected values under the assumption of temporally independent individual asset returns. Subsection 2.3 then examines the effect of intertemporal dependence.

[2]The exact formulae for linked returns can be written as follows. Let $\bar{R}_m(y,\tau)$ denote the mean annualized linked return for year $y$ $(y=1,\dots,Y)$ using a review period whose length is $\tau$ trading days and using method $(m=\text{BH},\text{AR},\text{RB})$, to compute the review period returns. Then,

$$\bar{R}_{BH}(y,\tau)=\prod_{j=(y-1)k_\tau+1}^{y\cdot k_\tau}\left[\frac{1}{N}\sum_i\prod_{t=(j-1)\tau+1}^{j\cdot\tau}(R_{it})\right],$$

$$\bar{R}_{AR}(y,\tau)=\prod_{j=(y-1)k_\tau+1}^{y\cdot k_\tau}\left[\frac{1}{N\cdot\tau}\sum_i\sum_{t=(j-1)\tau+1}^{j\cdot\tau}R_{it}\right]^\tau,$$

$$\bar{R}_{RB}(y,\tau)=\prod_{j=(y-1)k_\tau+1}^{y\cdot k_\tau}\left\{\prod_{t=(j-1)\tau+1}^{j\cdot\tau}\left[\frac{1}{N}\sum_i R_{it}\right]\right\},$$

where $k_\tau=T/(Y\cdot\tau)$ is the number of review periods per year and $T$ is the total number of trading days in the entire sample. When returns are reviewed in natural calendar intervals such as months, the review period cannot be a fixed number of trading days and thus $\tau$ in the formulae above varies slightly with the actual number of trading days.

### 2.2. Sample mean return biases with temporal independence

Following Blume (1974), assume that each individual asset return is drawn from a stationary distribution with temporally independent disturbances; that is,

$$\tilde{R}_{it} = \mu_i + \tilde{\varepsilon}_{it}, \quad \forall i, \tag{4}$$

with $E(\tilde{R}_{it}) = \mu_i$, a constant for all $t$, and where the unexpected return, $\tilde{\varepsilon}_{it}$, satisfies $\text{cov}(\tilde{\varepsilon}_{i,t}, \tilde{\varepsilon}_{i,t-j}) = 0$ for $j \neq 0$.

The expected value of the arithmetic mean (1) can be expressed as

$$E(\bar{R}_{AR}) = E\left[\left(\frac{1}{N}\sum_i \mu_i + \tilde{h}\right)^{\tau}\right], \tag{5}$$

where

$$\tilde{h} \equiv \frac{1}{N \cdot \tau} \sum_i \sum_t \tilde{\varepsilon}_{it}$$

is the average disturbance on the equally-weighted portfolio over the sample review period $\tau$.

The expected value of the buy-and-hold mean (2) is

$$E(\bar{R}_{BH}) = \frac{1}{N}\sum_i \left[E \prod_t (\mu_i + \tilde{\varepsilon}_{it})\right] = \frac{1}{N}\sum_i (\mu_i^{\tau}). \tag{6}$$

This follows since the expectation can be taken inside the product with independent returns and since $E(\tilde{\varepsilon}) = 0$, by definition.

The rebalancing method (3) produces a mean return whose expectation is

$$E(\bar{R}_{RB}) = \prod_t \left[\frac{1}{N}\sum_i \mu_i\right] = \left(\frac{1}{N}\sum_i \mu_i\right)^{\tau}, \tag{7}$$

where, again, the expectation can be taken inside the product because of time independence.

Expressions (5), (6) and (7) imply that the three different mean return definitions do not produce the same results. By Jensen's inequality,

$$E(\bar{R}_{AR}) \geqq E(\bar{R}_{RB}),^3$$

[3]Jensen's inequality for a random variable $\tilde{x}$ and a convex function $f(x)$ is $E[f(\tilde{x})] \geqq f[E(x)]$. Let $\tilde{x} \equiv (1/N)\sum_i \mu_i + \tilde{h}$; then $f(\tilde{x}) = \tilde{x}^{\tau}$ is convex since $\tau > 1$. $E(\bar{R}_{AR}) > E(\bar{R}_{RB})$ follows immediately from (5) and (7) since $E(\tilde{h}) = 0$.

with strict inequality if $\text{var}(\tilde{h})>0$, and

$$\text{E}(\bar{R}_{\text{BH}}) \geqq \text{E}(\bar{R}_{\text{RB}}),^4$$

with strict inequality if $N>1$ and at least two assets have different returns. Since we generally have some randomness $[\text{var}(\tilde{h})>0]$, and many securities, $(N>1)$, the rebalanced method generally should produce lower mean returns than either the arithmetic or the buy-and-hold method, provided that returns are temporally independent.

The relation between the buy-and-hold and arithmetic means is more complex; and, indeed, neither is invariably smaller than the other. The larger the cross-sectional dispersion of individual expected returns, the larger $\text{E}(\bar{R}_{\text{BH}})$ relative to $\text{E}(\bar{R}_{\text{AR}})$. But there is an offsetting influence: the larger the intertemporal dispersion of unexpected returns $(\tilde{h})$, the larger $\text{E}(\bar{R}_{\text{AR}})$ relative to $\text{E}(\bar{R}_{\text{BH}})$.[5] Their relation in a given sample depends, therefore, on the characteristics of the underlying individual returns.

### 2.3. *Time series dependence and its effect on estimated expected returns*

The effect of serial dependence is seen most easily by examining expected mean returns when the review period is doubled, say from daily to bi-daily or from bi-weekly to monthly. Assume first that returns are collected for the shorter review period and then let $\tau=2$ (a doubling of the period). Over the doubled review period, the three mean returns are

$$\bar{R}_{\text{AR}}=\left[\frac{1}{N}\sum_i\left(\mu_i+\frac{\varepsilon_{i1}+\varepsilon_{i2}}{2}\right)\right]^2, \tag{8}$$

[4]Define $f(\mu_i)=\mu_i^\tau$, a convex function for $\tau>1$. With $1/N$ used as a (pseudo) probability, $\text{E}(\bar{R}_{\text{BH}})\geqq\text{E}(\bar{R}_{\text{RB}})$ follows immediately from (6) and (7). (Cf. footnote 3.) Strict inequality holds if at least two $\mu_i$'s are different. [This result was noted by Cheng and Deets in (1971).]

The inequality above grows with the cross-sectional dispersion in $\mu_i$, ceteris paribus. To prove this, expand $\mu_i^\tau$ in a Taylor series about $\bar{\mu}\equiv(1/N)\sum_i\mu_i$; the second-order term is a positive function of the cross-sectional variance in $\mu_i$. If $\mu_i$ were cross-sectionally normally distributed, the variance *alone* would determine the size of the inequality.

[5]This can be confirmed by using a Taylor series expansion of $\text{E}(\bar{R}_{\text{AR}})$. Define $\bar{\mu}=(1/N)\sum_i\mu_i$; then

$$\text{E}(\bar{R}_{\text{AR}})=\bar{\mu}^\tau\,\text{E}\left[1+\frac{\tilde{h}^2}{2}(\tau)(\tau-1)\bar{\mu}^{-2}+\frac{\tilde{h}^3}{3!}(\tau)(\tau-1)(\tau-2)\bar{\mu}^{-3}+\ldots+\tilde{h}^\tau\bar{\mu}^{-\tau}\right].$$

Jensen's inequality (see footnote 4 above), implies that $\text{E}(\bar{R}_{\text{BH}})>\bar{\mu}^\tau$ with the inequality being larger the larger the cross-sectional variance in $\mu_i$. But the term in brackets just above shows that $\text{E}(\bar{R}_{\text{AR}})$ increases with the higher moments of $\tilde{h}$ (since $\bar{\mu}$ is strictly positive). For example, the second term in brackets involves the variance of $\tilde{h}$. Conceivably, this term could more than offset the cross-sectional variance in $\mu_i$. If the unexpected arithmetic portfolio return $h$ happens to be normally-distributed, the expression above simplifies to $\text{E}(\bar{R}_{\text{AR}})=\bar{\mu}^\tau[1+k\cdot\text{var}(\tilde{h})]$ with the constant $k>0$. In this case, there is a simple and direct tradeoff between the cross-sectional variance in expected return, $\mu_i$, and the variance of the unexpected portfolio return, $\tilde{h}$.

$$\bar{R}_{BH}=\frac{1}{N}\sum_i[(\mu_i+\varepsilon_{i1})(\mu_i+\varepsilon_{i2})], \tag{9}$$

$$\bar{R}_{RB}=\left[\frac{1}{N}\sum_i(\mu_i+\varepsilon_{i1})\right]\left[\frac{1}{N}\sum_i(\mu_i+\varepsilon_{i2})\right], \tag{10}$$

where $R_{it}=\mu_i+\varepsilon_{it}$ is the observed return on individual stock $i$ $(i=1,\ldots,N)$ in period $t$, and $\mu_i$ is $i$'s single-period (i.e., shorter review period) expected return.

For notational convenience, define the cross-sectional averages

$$\bar{\mu}=\frac{1}{N}\sum_i\mu_i \quad \text{and} \quad \bar{\varepsilon}_t=\frac{1}{N}\sum_i\varepsilon_{it}.$$

Then the three mean returns have expected values,

$$\mathrm{E}(\bar{R}_{AR})=\bar{\mu}^2+\tfrac{1}{2}(\sigma^2_{\bar{\varepsilon}}+\sigma_{\bar{\varepsilon}_1,\bar{\varepsilon}_2}), \tag{11}$$

$$\mathrm{E}(\bar{R}_{BH})=\frac{1}{N}\sum_i\mu_i^2+\frac{1}{N}\sum_i\sigma_{\varepsilon_{i1},\varepsilon_{i2}}, \tag{12}$$

$$\mathrm{E}(\bar{R}_{RB})=\bar{\mu}^2+\sigma_{\bar{\varepsilon}_1,\bar{\varepsilon}_2}, \tag{13}$$

where $\sigma^2_x$ is the variance of $x$ and $\sigma_{x,y}$ is the covariance of $x$ and $y$.

Even with serial dependence, the expected arithmetic mean still exceeds the expected rebalanced mean in all circumstances since,

$$\mathrm{E}(\bar{R}_{AR}-\bar{R}_{RB})=\tfrac{1}{2}(\sigma^2_{\bar{\varepsilon}}-\sigma_{\bar{\varepsilon}_1,\bar{\varepsilon}_2})>0. \tag{14}$$

Comparing the buy-and-hold means and the rebalanced means, we have

$$\mathrm{E}(\bar{R}_{BH}-\bar{R}_{RB})=\sigma^2_{\mu_i}+\left(\frac{1}{N}\sum_i\sigma_{\varepsilon_{i1},\varepsilon_{i2}}-\sigma_{\bar{\varepsilon}_1,\bar{\varepsilon}_2}\right).$$

With no serial dependence in the $\varepsilon$'s, the term in parentheses is zero and the BH mean would exceed the RB mean by the cross-sectional variance in expected individual returns.

However, with negative serial dependence in unexpected individual returns ($\varepsilon_{i1}$ and $\varepsilon_{i2}$) or positive dependence in portfolio returns ($\bar{\varepsilon}_1$ and $\bar{\varepsilon}_2$), the rebalanced mean would become larger; enough such dependence could conceivably render it larger that the buy-and-hold mean. Since the expected arithmetic mean exceeds the expected rebalanced mean, it too could be larger than the BH mean with enough serial dependence of the right type.

There is some reason to anticipate just this type of serial dependence because of the intertemporal characteristics of individual returns. Scholes and Williams (1977, pp. 313–314) explain that because of non-synchronous trading individual assets display first-order *negative* serial dependence while diversified portfolios display *positive* dependence. A difference in the sign of serial dependence between individual assets and portfolios is relevant here because buy-and-hold (BH) means are mainly affected by individual asset serial dependence [see (12)], while the arithmetic (AR) and rebalanced (RB) means are affected by portfolio serial dependence [see (11) and (13)]. The Scholes/Williams explanation implies that BH means would tend to fall as review period lengthens while the AR and RB means would tend to rise.

There is also negative serial dependence induced in very short-term returns because of the institutional arrangement of trading. Neiderhoffer and Osborne (1966) pointed out that negative serial dependence should be anticipated when a market maker is involved in most transactions (because successive transactions are conducted at either the bid or the asked price).[6]

First-order negative serial dependence in individual returns has the effect of widening the disparity between the buy-and-hold mean and the arithmetic and rebalanced means as the review period lengthens. This follows from the fact that a doubling of the review period introduces serial covariance terms in *addition* to those already present. However, the marginal effect of lengthening the review period should probably diminish as the review period becomes longer; the effect on measured mean return should be greater when changing from, say, a daily to a weekly review period than from a monthly to an annual period. The exact impact of serial dependence can, of course, only be determined empirically and we now turn to an examination of the data.

## 3. The empirical small firm premium

### *3.1. Results*

In the previous section, we found that the computational formula for sample mean returns can affect the estimated expected return. The buy-and-hold (BH) mean (2) gives an unbiased estimate of the holding period return on a realistic portfolio. The rebalanced (RB) mean (3), gives an unbiased estimate of return for its strategy but it is not realistic if the period is short since rebalancing is so costly. Except under a fortuitous combination of circumstances, the arithmetic (AR) mean (3) gives a biased estimate of *both* the rebalanced and the buy-and-hold investment returns.

[6]A paper by Blume and Stambaugh (1983), which came to my attention after the first version of this paper was written, investigates this explanation for serial dependence in detail. They find empirical results very similar to those reported here. See also Cohen et al. (1979).

Although the arithmetic and rebalanced methods of calculating the mean return probably do not portray realistic investment experience, the small-firm premium is calculated as the *difference* between the two mean returns and one might hope that the improper portrayal in these methods would cancel. Unfortunately, this is not likely for several reasons. The intertemporal variance in the portfolio disturbance, $\tilde{h}$, and the cross-sectional variance in individual security expected returns, $\mu_i$, will not be the same in samples of large and small firms. The disturbance, $\tilde{h}$, will almost certainly have a larger variance for portfolios of small firms while the cross-sectional variances of $\mu_i$ within large- and small-firm portfolios could conceivably differ in either direction. Furthermore, serial dependence has an effect which is stronger for stocks with lower trading volumes and thus with less synchronous trading and with larger bid/ask spreads.

Empirical evidence is reported in table 1. Small Firm Premia (AMEX–NYSE) are given for the 19 complete calendar years, 1963–1981, according to the method of computation and the 'review' period. As explained earlier, the 'review' period refers to the rebalancing interval for buy-and-hold returns. For example, with a monthly review period, an equal allocation is made to stocks listed on the first day of the month and the original positions are held until the end of the month. This is repeated for each calendar month of the sample. The daily rebalancing method uses the same available returns, but it re-initializes equal positions every day during the month. The arithmetic method simply averages the same available returns during the month.

In order to compare results across the different review periods, returns are annualized by linking together the review period returns obtained during the calendar year.[7] Thus, there are 19 annual observations (one for each calendar year, 1963–81), regardless of the review period.[8] Means and $t$-statistics are calculated from the 19 annual returns differences between exchanges; $t$-

[7]See footnote 2 for exact computational formulae.

[8]Daily and bi-daily returns are over trading day intervals, while weekly and longer returns use actual calendar intervals. In the weekly case, the first week of the year ends on the same day of the week as the last trading day of the previous year, say Thursday for a given year. Then weekly returns are computed from Thursday to Thursday during that year. If the year does not terminate on a Thursday trading day, the last 'weekly' return of the year is over the remaining fraction of a calendar week. This method of year-end padding was used to ensure that every daily return during a year was included, regardless of the review period. Only the bi-daily, weekly, and bi-weekly returns are subject to such padding because the other intervals are evenly divisible into years.

Weekly returns are not always for five trading day intervals. During 1968, the exchanges were closed on Wednesdays for part of the year so that a week was composed of only four trading days. Holidays are also a problem for weekly returns; if the calendar week ended on a holiday, the return was computed through the next trading day. Then the subsequent week's return covered four trading days. Bi-weekly returns were treated identically to weekly returns with respect to year-end padding, holidays, and exchange closings.

Table 1

The small firm premium as measured by the difference in returns between American Exchange and New York Exchange listed stocks, 1963–1981 (basic data are daily, January 2, 1963 — December 31, 1981).

| Review period[a] (number of review periods in sample) | Return computation method[b] | | |
|---|---|---|---|
| | Buy-and-hold (BH) | Arithmetic (AR) | Daily rebalancing (RB) |
| | AMEX–NYSE mean return differential (% per annum)[c] | | |
| Daily (4767) | 14.9 (3.16) [7.76] | 14.9 (3.16) [7.76] | 14.9 (3.16) [7.76] |
| Bi-daily (2389) | 12.3 (2.64) [5.58] | 14.9 (3.16) [7.06] | 14.8 (3.15) [7.01] |
| Weekly (992) | 9.81 (2.16) [3.35] | 14.8 (3.15) [5.64] | 14.7 (3.14) [5.62] |
| Bi-weekly (498) | 8.27 (1.84) [2.46] | 14.9 (3.14) [5.09] | 14.7 (3.13) [5.07] |
| Monthly (228) | 7.06 (1.58) [1.82] | 14.9 (3.14) [4.40] | 14.7 (3.11) [4.38] |
| Quarterly (76) | 6.42 (1.43) [1.67] | 15.0 (3.15) [3.88] | 14.8 (3.12) [3.85] |
| Annual (19) | 7.45 (1.53) [1.53] | 15.1 (3.10) [3.10] | 14.9 (3.07) [3.07] |

[a]For the daily and bi-daily cases, one- and two-trading-day intervals were used respectively. For all other cases, actual calendar intervals were used. (In the weekly and bi-weekly cases, a residual interval was necessary to fill out each calendar year). All returns were compounded to an annual basis by linking successive observations within each year (see footnote 2 of the text).

[b]The computation method follows expressions (1), (2) and (3) of the text. For interested readers, the author will gladly supply a mimeographed sheet containing details on the treatment of delisting and listing securities. The main feature of the treatment of new listings and delistings was to assure that all three mean return methods employed exactly the same sample observations.

[c]$t$-statistics based on the 19 annual (linked) observations are in parentheses; $t$-statistics based on the review period returns as independent observations are given in brackets. To understand the difference in the two reported $t$-statistics, consider the example of the daily review period of which there are 4767 in the sample. The $t$-statistic in brackets is calculated from these 4767 (daily) observations (mean *daily* return divided by standard error of mean daily return). The $t$-statistic in brackets is calculated from 19 annual observations; each annual observation having been calculated by linking together approximately 250 (4767/19) daily observations observed during that year. In calculating the review-period-based $t$-statistics for the weekly and bi-weekly cases, ten days were omitted; these ten days were the reminders of partial weeks at year end. It turned out that in 10 years of the 19, the year was exactly 52 weeks plus one trading day long. An earlier version of the paper, available on request, details the effect of omitting these single-day partial weeks. N.B. This is an issue only for the bracketed $t$-statistics. The linked annual returns include *every* sample day.

statistics are also given based on review period returns taken as independent observations.[9]

The results most like actual investment experience are those in the first column, buy-and-hold returns. Most actual portfolios pursue a buy-and-hold strategy within a given review period with only minor modifications induced by new information about particular individual issues. The results are frequently expressed on an annual percentage basis by comparing wealth levels at the ends of successive years, i.e., after linking sub-year results.

The review period seems to have little effect on the AR and RB means. The annual average difference in returns between AMEX and NYSE issues is about fifteen percent. But for the BH means, the review period has a large impact. Monthly and longer review periods give an AMEX–NYSE return differential of only around seven percent (and the $t$-statistic does not indicate an overwhelming probability that the differential is even positive). The drop in the BH mean with lengthening review period is statistically significant and so is the difference between the BH and the other means.[10]

[9]Note that the $t$-statistics in these tables are based on the assumption that the annual returns ($t$-statistics in parentheses) and review period returns ($t$-statistics in brackets) are temporally independent. The results indicate that the AR and RB returns are, in fact, close to independent while there is negative serial dependence in the BH returns. This implies that the $t$-statistics for the BH means are actually *understated*.

[10]A statistical test of the significance of the review period can be conducted by considering each year's mean difference, AMEX–NYSE, as an independent observation. Let $D_{m,y,\tau}$ be the difference for year $y$, review period $\tau$, and the method $m$ ($m$=BH, AR, RB). Then the time series mean of $D_{m,y,\tau}-D_{m,y,\tau'}$ ($\tau \neq \tau'$) can be tested for significance under the presumption that the years constitute independent observations. $t$-statistics for the AR and RB means, for all combinations of $\tau$ and $\tau'$, never indicated significance. Of the 42 combinations (21 for each mean AR and RB) none exceeded 2.0, five exceeded 1.5, and 28 were less than 1.0. In contrast, the $t$-statistics for the BH mean comparisons across review periods are given below:

| Review period $\tau'$ | Review period $\tau$ | | | | | |
|---|---|---|---|---|---|---|
| | Daily | Bi-daily | Weekly | Bi-weekly | Monthly | Quarterly |
| Bi-daily | 6.21 | | | | | |
| Weekly | 6.75 | 6.82 | | | | |
| Bi-weekly | 7.67 | 8.37 | 10.8 | | | |
| Monthly | 8.11 | 8.89 | 11.3 | 9.82 | | |
| Quarterly | 8.10 | 7.68 | 8.65 | 6.49 | 3.27 | |
| Annual | 5.08 | 4.42 | 2.81 | 1.04 | −0.532 | −1.67 |

All BH means are significantly different across-review periods except the annual mean versus the bi-weekly, monthly and quarterly means. Note that these table entries are not statistically independent of one another (they were all calculated from the same underlying data).

A similar procedure can be employed to test the statistical significance of mean computational method. The difference $D_{m,y,\tau}-D_{m',y,\tau}$ ($m \neq m'$) forms another time series across years. Based on 19 annual observations, $t$-statistics for the significance of this difference from zero are as follows:

Given that the BH results in table 1 are most likely to portray actual investment experience, we now turn to the interesting econometric question: What explains the observed pattern of means? To aid in answering this question, the mean returns for each exchange are presented separately in table 2. Notice that the pattern is not predicted by the expected values of the mean returns derived in section 2.2 under the assumption of temporally independent returns. With serial independence, the BH expected mean should be greater than the RB expected mean. The empirical results in table 2 show, however, that serial dependence must be present since $\bar{R}_{BH}$ falls below $\bar{R}_{RB}$ as the review period lengthens.

The arithmetic (AR) mean is larger than the rebalanced (RB) mean as was expected with or without serial dependence. However, these two means are very close and this suggests that serial dependence in *portfolio* returns is not much of an influence [Cf. eq. (14)]. Indeed, the strikingly different behavior of the BH means from the other two means indicates that negative serial dependence in individual securities is the dominant influence on the results.

In order to be certain that the AMEX–NYSE comparison measures the small firm effect properly, table 3 is presented. It contains results for the annual review period and for portfolios classified directly by size. Firm size was calculated as market capitalization (market price times number shares), at the end of each year, 1962–1980. Firms were assigned to fractiles based on market capitalization and their returns were calculated for the following year according to three mean return methods, BH, AR, and RB.

Not surprisingly, the results are consistent with the AMEX corresponding to lower size quintiles and the NYSE to higher quintiles. The overall implication is identical: viz., the estimated small firm premium is much smaller and less significant when mean returns are computed with the buy-

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| Review period $\tau$ | $m=$AR, $m'=$BH | $m=$RB, $m'=$BH | $m=$AR, $m'=$RB |
|---|---|---|---|
| | $t$-statistic for difference | | |
| Bi-daily | 6.82 | 6.30 | 1.47 |
| Weekly | 7.33 | 6.80 | 1.59 |
| Bi-weekly | 8.14 | 7.59 | 1.74 |
| Monthly | 8.44 | 7.90 | 2.17 |
| Quarterly | 8.21 | 7.69 | 2.72 |
| Annual | 5.85 | 5.48 | 3.16 |

No statistic was computed in the daily case because all three means are identical by construction in that case. Notice that the BH means are significantly smaller than the other two means for all review periods.

Although the difference between the AR and RB small firm premium is very small (cf. table 1), the AR mean premium is always larger and is significantly larger for monthly, quarterly and annual review periods. This is predicted by eq. (14); the AR mean grows with review period relative to the RB mean.

Table 2
Mean returns on NYSE and AMEX listed securities, 1963–1981.[a]

| Review period | Buy-and-hold (BH) | | Arithmetic (AR) | | Daily rebalancing (RB) | |
|---|---|---|---|---|---|---|
| | NYSE | AMEX | NYSE | AMEX | NYSE | AMEX |
| | Mean returns (% per Annum) | | | | | |
| Daily | 17.24 | 32.09 | 17.24 | 32.09 | 17.24 | 32.09 |
| | (2.94) | (3.29) | (2.94) | (3.29) | (2.94) | (3.29) |
| | [5.09] | [7.72] | [5.09] | [7.72] | [5.09] | [7.72] |
| Bi-daily | 16.93 | 29.23 | 17.53 | 32.42 | 17.24 | 32.09 |
| | (2.89) | (3.03) | (2.98) | (3.31) | (2.94) | (3.29) |
| | [4.59] | [6.25] | [4.76] | [6.96] | [4.68] | [6.88] |
| Weekly | 16.38 | 26.19 | 17.79 | 32.61 | 17.26 | 31.99 |
| | (2.80) | (2.78) | (3.02) | (3.34) | (2.94) | (3.28) |
| | [4.47] | [5.32] | [4.81] | [6.44] | [4.68] | [6.32] |
| Bi-weekly | 15.86 | 24.14 | 17.95 | 32.83 | 17.29 | 32.08 |
| | (2.72) | (2.58) | (3.05) | (3.36) | (2.95) | (3.28) |
| | [4.29] | [4.66] | [4.71] | [5.85] | [4.58] | [5.74] |
| Monthly | 15.34 | 22.39 | 18.07 | 32.96 | 17.34 | 32.08 |
| | (2.65) | (2.42) | (3.07) | (3.36) | (2.95) | (3.28) |
| | [3.11] | [3.08] | [3.67] | [4.54] | [3.51] | [4.41] |
| Quarterly | 15.01 | 21.42 | 18.17 | 33.17 | 17.38 | 32.19 |
| | (2.63) | (2.33) | (3.09) | (3.38) | (2.96) | (3.29) |
| | [2.73] | [2.62] | [3.22] | [3.84] | [3.09] | [3.73] |
| Annual | 15.18 | 22.63 | 17.96 | 33.07 | 17.16 | 32.03 |
| | (2.69) | (2.39) | (3.11) | (3.36) | (2.98) | (3.27) |
| | [2.69] | [2.39] | [3.11] | [3.36] | [2.98] | [3.27] |

[a]See footnotes to table 1.

and-hold method than when means are computed with the AR and RB methods.

### *3.2. Implications for previous research and for the 'risk-adjusted' small firm premium*

The implications of these findings for previously-published estimates of the small firm premium are: if the basic data were very short-term and arithmetic or rebalanced means were used, the estimated premium overstates the reward investors can expect from a buy-and-hold position in small firms. Papers by Reinganum (1981a, b, 1982) and Roll (1981) used daily data and arithmetic mean returns. Reinganum's (1982) paper gives monthly and quarterly returns but these were computed with the daily rebalancing method since the author states that '... these holding period returns are created by compounding the daily *portfolio* returns' (p. 34, emphasis added).

Table 3
Mean returns and small firm premia for portfolios classified by size[a] at year-end, 1963–1981, annual review period.

| Size quintile | Return computation method[b] | | |
|---|---|---|---|
| | Buy-and-hold (BH) | Arithmetic (AR) | Daily rebalancing (RB) |
| | Mean return (% per annum)[c] | | |
| Smallest | 27.9<br>(2.42) | 46.0<br>(3.68) | 44.9<br>(3.61) |
| 2 | 21.1<br>(2.51) | 27.6<br>(3.15) | 26.6<br>(3.04) |
| 3 | 17.1<br>(2.41) | 20.7<br>(2.86) | 19.7<br>(2.73) |
| 4 | 14.6<br>(2.53) | 16.9<br>(2.89) | 16.1<br>(2.75) |
| Largest | 10.8<br>(2.50) | 12.2<br>(2.85) | 11.5<br>(2.68) |
| | Small firm premium, smallest–largest quintile (% per annum) | | |
| | 17.1<br>(1.88) | 33.9<br>(3.47) | 33.4<br>(3.46) |
| | Small firm premium, smallest–largest decile (% per annum) | | |
| | 22.8<br>(2.07) | 49.1<br>(3.84) | 48.3<br>(3.83) |

[a]Firms are included in the $k$th size fractile if the closing price times the number of outstanding shares is ranked in that fractile among all listed AMEX and NYSE firms.

[b]The computation method follows expressions (1), (2) and (3) of the text. An unpublished appendix (available from the author) contains details on the treatment of listing and delisting.

[c]$t$-statistics based on 19 annual observations are in parentheses.

Papers with monthly returns are apparently much less subject to mean return estimation problems. Tables 1 and 2 show that there is little additional discrepancy between the BH and other means in going from monthly to annual data. The well-known paper by Banz (1981) used monthly data as did earlier papers on the closely-related stock price effect [Blume and Husic (1973), Bachrach and Galai (1979)]. Thus, it seems unlikely that the results presented in those papers will be much affected by the problem investigated here. In a more recent paper, Reinganum, (1983) used the buy-and-hold method and found results close to those reported above. Reinganum did not, however, contrast the buy-and-hold with other mean returns.

It is important to ascertain whether the *risk-adjusted* small firm premium is attributable solely to econometric problems. Is underestimation of risk for small firms [Roll (1981), Reinganum (1982)], combined with overestimation of expected returns, sufficient to induce the observed risk-adjusted premium; or is the premium really evidence of a misspecified capital asset pricing model (CAPM), perhaps because of omitted factors in the single index CAPM?

This is tantamount to asking whether the implicit CAPM market risk premium $\hat{p}$ ($\hat{p} \equiv \hat{E}(R_{\text{small}} - R_{\text{large}})/(\hat{\beta}_{\text{small}} - \hat{\beta}_{\text{large}})$), is in a reasonable range. $\hat{p}$ was computed by Reinganum (1983) as 37.5 percent per annum using (a) buy-and-hold means on the smallest and largest deciles of NYSE and AMEX stocks, (b) Dimson's (1979) aggregated coefficient betas, (c) the value-weighted C.R.S.P. index and (d) daily data for 1963–1980. The return on the value-weighted index during this period was only about 9.5 percent, so $\hat{p}$ is grossly too large, thereby indicating a substantial risk-adjusted small firm premium.

The main problem with such a test was described some time ago [Roll (1977)]. Even if we make the dubious assumption that the value-weighted C.R.S.P. index is ex-ante mean/variance efficient, there is no necessity in the generalized Black (1972) C.A.P.M. that $E(\hat{p}) = E(R_M - R_F)$. Instead, the model requires that $E(\hat{p}) = E(R_M - R_Z)$ where $Z$ is $M$'s 'zero-beta' portfolio. Depending upon $M$'s position on the efficient frontier, $E(R_Z)$ can be negative and large.

To illustrate the difference in inferences that can be obtained with a different index, I recomputed $\hat{p}$ using (a) buy-and-hold annual means on the smallest and largest deciles of NYSE and AMEX stocks, (b) simple OLS beta coefficients estimated from annual returns,[11] (c) the *equally*-weighted C.R.S.P. index, and (d) annual data for 1963–1981.

The beta estimates ($t$-statistics) were $\beta_{\text{small}} = 1.78$ (5.59), $\beta_{\text{large}} = 0.598$ (8.60). Using the estimated premium $E(R_{\text{small}} - R_{\text{large}}) = 22.8\%$ from table 3, we have $\hat{p} = 19.3$ percent. The actual ex post return on this market index was 15.3 percent, so $\hat{p}$ is still somewhat too high (thus indicating a risk-adjusted small-firm premium). Nevertheless, the discrepancy between a $\hat{p}$ of 19.3 and a market return of 15.3 is much less aberrant than the difference Reinganum (1983) reports between $\hat{p} = 37.5$ and $\bar{R}_M = 9.5$ percent.

It still seems that investigation of the observed small firm premium in the context of a more general asset pricing model would be a worthwhile endeavor; but estimation problems in expected returns and in simple risk parameters can explain much of the apparent anomaly.

[11]Instead of the Dimson aggregated coefficient betas, I used betas from annual data because of the now well-documented annual seasonal [Keim (1983), Roll (1983)], which has the potential to induce biases into any betas, including the Dimson type, when they are computed from non-yearly data.

## 5. Conclusion

Computing mean returns in order to estimate investment experience is not as easy as it sounds. Common stock data have serial dependence which, though seemingly slight, substantially affects the estimates obtained under alternate mean return computational methods. Investment experience is best portrayed by buy-and-hold portfolio returns but scholars often use arithmetic or rebalanced portfolio returns because they are easier to compute.

Perhaps this makes little difference for some studies; but if serial dependence differs systematically with the item being investigated, the computational method can be quite material.

For the small firm premium, as measured by the difference in mean returns of American Exchange and New York Exchange listed stocks, the buy-and-hold mean return difference is only about $7\frac{1}{2}$ percent per annum (for 1963–81) while the rebalanced and arithmetic methods produce annual return differences *with the same stocks and time periods* of over 14 percent. The annual difference in returns between the smallest and largest size quintiles (deciles) is about 34 (49.1) percent using the rebalanced and arithmetic methods and about 17 (22.8) percent using the buy-and-hold method.

The annual small-firm premium is only marginally significant at usual significance levels if mean returns are measured with the buy-and-hold method.

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# Predicting Long-term Earnings Growth: Comparisons of Expected Return Models, Submartingales and Value Line Analysts

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ABSTRACT

This paper derives four–five year predictions of growth rates of accounting earnings per share implicit in four expected return models commonly used in financial research. A comparison of such growth rates with those produced and reported by Value Line analysts and those generated by a submartingale model revealed the following: two expected return models—the Sharpe–Lintner–Mossin model and the Black model—were significantly more accurate than the submartingale model, though not significantly more accurate than the other return models. However, the growth rate forecasts provided by Value Line significantly outperformed all the other models tested—none of which relied on the direct input of a security analyst.

KEY WORDS Forecasting Earnings growth Comparisons Empirical study Analysts Value Line

An extensive body of literature evaluates the short-run (less than 15 months) earnings forecasts of security analysts and time-series models.[1] The importance of this subject to accounting and finance is that a variety of applications such as firm valuation, cost of capital, and event studies require the measurement of earnings expectations. However, except for a recent paper by Moyer *et al.* (1983), little work has been done to this point in studying long-run earnings forecasts. Moreover, a potential source of earnings forecasts—expected return models—has been overlooked.

This paper evaluates the accuracy of long-term forecasts of growth rates of annual earnings per share. Six sources of forecasts are used: a submartingale model, the *Value Line Investment Survey*, and four expected return models. Each expected return model is combined with the Gordon–Shapiro constant growth model. Further, certain expected return models use the beta coefficient and, as such, lend insight into the usefulness of beta in a forecasting context.

The paper comprises three sections. Section 1 describes the six forecasting sources and states the

[1] See Cragg and Malkiel (1968), Elton and Gruber (1972), Barefield and Comiskey (1975), Brown and Rozeff (1978), Abdel-khalik and Thompson (1977–78), Crichfield *et al.* (1978), Givoly and Lakonishok (1979), Collins and Hopwood (1980), Jaggi (1980), Elton *et al.* (1981), Hopwood *et al.* (1981), Fried and Givoly (1982) and Imhoff and Pare (1982) for studies of analyst forecasts and time-series models. See Ball and Watts (1972), Brooks and Buckmaster (1976), Albrecht *et al.* (1977), Watts and Leftwich (1977), Foster (1977), Griffin (1977), Brown and Rozeff (1979), Lorek (1979), Hopwood and McKeown (1981), Hopwood *et al.* (1981) and Manegold (1981) for studies of the time-series properties of earnings.

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hypotheses. Tests of the hypotheses are presented in Section 2. Section 3 offers tentative conclusions.

## 1. FORECASTING SOURCES AND HYPOTHESES

This section (1) describes how six sets of growth rate forecasts of earnings per share are derived and (2) discusses the formal hypotheses to be tested.

### Submartingale model

Evidence that measured annual accounting income is a submartingale or some similar process can be found in Ball and Watts (1972), Albrecht *et al.* (1977), and Watts and Leftwich (1977).[2] Although measured (reported) annual earnings per share may not be precisely a submartingale, a submartingale process is included because of its appearance in numerous studies as a benchmark forecasting technique. Another reason for including the submartingale model is to compare its forecasts to those reported in the *Value Line Investment Survey*. Such comparisons have been done for forecasts of three to fifteen months (Brown and Rozeff, 1978) but not forecasts of four to five years.

The submartingale model (SUB), as used here, estimates the expected annual growth rate of accounting earnings per share as the average compound annual rate of growth of earnings per share of the ten-year period preceding the test period. These historical growth data are obtained from various issues of the *Value Line Investment Survey*.

### Value Line forecasts

The *Value Line Investment Survey* (VL) contains forecasts of earnings per share made by the Value Line security analysts for time periods four to five years into the future. After adjustment for capital changes, these forecasts, in conjunction with actual earnings per share in the base period, are converted to VL forecasts of a compound annual growth rate for each firm in the sample.

The importance of testing analyst forecasts is explained by Brown and Rozeff (1978). They argue that since analyst forecasts are purchased in a free market they are likely to be informed forecasts with a marginal value exceeding that of less costly forecast alternatives. According to this reasoning, the VL forecasts should be more accurate than the SUB forecasts and those derived from the expected return models (stated next).

### Expected return model forecasts

A technique that has not previously been exploited to obtain earnings forecasts is to use expected stock rate of return models in conjunction with the Gordon–Shapiro (1956) constant growth model. This subsection shows how to extract earnings per share growth rate forecasts from these models. First, the four expected stock rate of return models are explained. Secondly, the paper proceeds to show how growth rate forecasts are obtained.

*Four expected return models*

The four models of how the market sets expected rates of return on securities are:

(1) the comparison returns (CMR) model (Masulis, 1980; Brown and Warner, 1980),
(2) the market adjusted returns (MAR) model (Latane and Jones, 1979; Brown and Warner, 1980),
(3) the Sharpe–Lintner–Mossin (SLM) model (Sharpe, 1964; Lintner, 1965; Mossin, 1966),
(4) the Black (BLK) model (Black, 1972).

[2] For example, Ball and Watts (1972, p. 680) conclude: 'Consequently, our conclusion ... is that income can be characterized on average as a submartingale or some similar process.'

The CMR model assumes that the expected return on stock $i$ at time $T$ ($E(R_{iT})$) is an expectation that is specific to each security. However, a risk parameter such as the beta coefficient is not explicitly included in the expected return calculation. Instead, the expected stock return at time $T$ is measured as the arithmetic mean of the realized returns of the stock in a prior period. To the extent that individual means of stock return distributions differ as a reflection of risk differences, the CMR model allows for individual differences in risk. This model (see Masulis, 1980) has been tested by Brown and Warner (1980) who found that it compared favourably with alternative expected return models in detecting abnormal performance.

The MAR model states that the expected return on stock $i$ at time $T$ equals the expected return on the market (denoted $E(R_{MT})$), which is the same for all stocks. As for the CMR model, no beta coefficient is used in calculating expected returns. However, unlike the CMR model, the MAR model does not allow for individual risk differences among stocks, since all stocks are assumed to have the same expected return, namely, the expected market return. To estimate expected market returns, an arithmetic average of past returns on the equally-weighted (Center for Research in Securities Prices) CRSP index is used.

The SLM model is infrequently referred to as the capital asset pricing model or CAPM. It is used in its *ex ante* form:

$$E(R_{iT}) = R_{fT} + [E(R_{MT}) - R_{fT}]\beta_i \tag{1}$$

where

$R_{fT}$ = interest rate on a U.S. Treasury security over the forecast horizon,
$\beta_i$ = beta coefficient of stock $i$ expected to prevail over the forecast horizon.

This study examines two annual growth rate forecasts over two non-overlapping horizons of five years and four years. The five year forecast period is 1968–1972 and its base year is 1967. The four year forecast period is 1973–1976 and its base year is 1972. In estimating expected returns using the SLM model, $R_{fT}$ for the forecast period 1968–1972 is taken as the yield-to-maturity on a five year U.S. Government security as of December 1967. Similarly, for the forecast period 1973–1976, $R_{fT}$ is the yield-to-maturity on a four year U.S. Government security as of December 1972.[3]

$E(R_{MT})$ is estimated precisely in the same manner as in the CMR model, namely, as an average over past realized market returns.

The beta coefficients of individual stocks were estimated in two ways. First, the expected beta was measured as the historical beta coefficient of the stock over the 84 months up to and including month $T$. This beta was simply the covariance of the stock's returns with the market divided by the variance of the market's returns over the sample period. Secondly, in an attempt to obtain a more accurate estimate of the future expected beta, the tendency of betas to regress towards the value 1.0 noted by Blume (1971) was taken into account. The method for doing this is Blume's method.[4]

The last expected return model is the BLK model. This can be stated in *ex ante* form (Black, 1972) as:

$$E(R_{iT}) = E(R_{ZT}) + [E(R_{MT}) - E(R_{ZT})]\beta_i \tag{2}$$

where $E(R_{ZT})$ is the expected return on the minimum variance portfolio whose return is

[3] Schaefer (1977) points out the pitfalls of using yield-to-maturity as a surrogate for the interest rate on a no-coupon bond. Livingston and Jain (1982) estimate the biases involved. Since for bonds of maturity four to five years, the coupon bias is confortably small (of the order of ten basis points), the effect is neglected in this paper.

[4] For example, to adjust the betas computed over the 1961–1967 time period, the betas of all stocks on the CRSP file from the 1954–1960 period were regressed on the betas of the same stocks from the 1947–1953 period. The resulting regression coefficients were then used to adjust linearly the 1961–1967 betas.

uncorrelated with the return on the market portfolio. Unlike $R_{fT}$ in the SLM model, $E(R_{ZT})$ is not observable at time $T$. Historical returns are frequently used to estimate this model (Black *et al.*, 1972). When this is done, the BLK model can be written

$$E(R_{iT}) = \bar{\gamma}_0 + \bar{\gamma}_1 \beta_i \tag{3}$$

$\bar{\gamma}_0$ and $\bar{\gamma}_1$ are arithmetic averages of monthly estimates of $E(R_{ZT})$ and $E(R_{MT}) - E(R_{ZT})$. The estimation method of Fama and Macbeth (1973) was used to obtain the gamma estimates.[5]

The forecasting model can now be formulated by obtaining $\bar{\gamma}_0$ and $\bar{\gamma}_1$ as of time $T$ and using these as estimates of future gammas. The procedure is legitimate since Fama and Macbeth have shown that the gamma variables are stationary and have autocorrelations that are essentially nil.

*Obtaining growth rate forecasts*

Suppressing the time subscript $T$ for simplicity, the expected return of security $i$ according to model $j$ is denoted $E(R_{ij})$. Given the expected rate of return of security $i$ from model $j$, each model's expected growth rate of earnings per share will be extracted by assuming that each firm possesses investment opportunities which are expected to provide a constant rate of growth of earnings in perpetuity. In other words, the 'constant growth' model is assumed to hold for each stock (Gordon and Shapiro, 1956, Miller and Modigliani, 1961).

Let $g_{ip}$ be firm $i$'s rate of price increase, $g_{id}$ be its rate of growth of dividends per share, and $g_{ie}$ be its rate of growth of earnings per share. In the constant growth model, the expected rate of return of security $i$ is given by:

$$E(R_i) = \frac{\tilde{P}_{i1} + \tilde{D}_{i1} - P_{i0}}{P_{i0}} = \frac{\tilde{D}_{i1}}{P_{i0}} + \frac{\tilde{P}_{i1} - P_{i0}}{P_{i0}} \tag{4}$$

where

$\tilde{P}_{i1}$ = random end-of-period price per share
$\tilde{D}_{i1}$ = random end-of-period dividend per share
$P_{i0}$ = current price per share
$D_{i0}$ = current dividend per share.

Hence:

$$\frac{\tilde{D}_{i1}}{P_{i0}} + \frac{\tilde{P}_{i1} - P_{i0}}{P_{i0}} = \frac{D_{i0}(1 + g_{id})}{P_{i0}} + g_{ip} \tag{5}$$

Assuming $g_{id} = g_{ip} = g_i$

$$E(R_i) = \frac{D_{i0}(1 + g_i)}{P_{i0}} + g_i \tag{6}$$

A key assumption to obtain the constant growth is that the firm's payout ratio of dividends from earnings is constant. This ensures the equality of the growth rates of dividends, earnings, and price per share. Violation of the constant payout ratio assumption occurs for a variety of reasons such as a change in the firm's investment opportunities or a change in its financing mix. To the extent that the constant growth model fails to describe the firm's expected rate of return, the derived estimates of $g_i$ will contain measurement error which will bias the tests against the expected return models.

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[5] I am grateful to Gary Schlarbaum for supplying these estimates.

Since each expected return model estimates $E(R_i)$ by $E(R_{ij})$, equation (6) can be solved to obtain model *j*'s implicit forecast of $g_i$, denoted $g_{ij}$ or:

$$g_{ij} = \frac{E(R_{ij}) - D_{i0}/P_{i0}}{1 + D_{i0}/P_{i0}} \tag{7}$$

Hence, by estimating $E(R_{ij})$ and observing the current dividend yield, a forecast by model *j* of the firm *i*'s growth rate of earning per share, $g_{ij}$, is extracted.

**Statement of hypotheses**

The empirical results in this paper will be interpreted with reference to several hypotheses, which are presented and discussed below:

> *Hypothesis* 1. Expected return models that use *ex ante* information on stock beta coefficients contain implicit earnings per share growth rate forecasts that are not more accurate than the implicit earnings per share growth rate forecasts of expected return models that do not use information on beta coefficients.

The SLM and BLK models include beta information whereas the CMR and MAR models do not. Rejection of Hypothesis 1 means that the beta-based expected return models can be employed to obtain forecasts of earnings per share which are superior to those obtained from the non-beta stock return models. Assuming that earnings growth rates observed for a future period reflect the prices and the expected returns established at the start of the period, rejection of Hypothesis 1 provides an indication that the market, in setting expected returns, uses betas or their informational equivalent as opposed to neglecting betas as the CMR and MAR do.

The forecasts of the expected return models can also be compared with the SUB model forecasts. These comparisons provide a natural check on whether the expected return models combined with the constant growth model are producing forecasts that are reasonably competitive with the process which, at least approximately, generates annual earnings.

> *Hypothesis* 2. Expected return models contain implicit earnings per share growth rate forecasts that are not more accurate than the forecasts of the growth rate of earnings per share derived using the submartingale model of earnings.

A third test compares the forecasting ability of the VL model with the expected return models. If the procedure used in this paper to extract forecasts from the expected return models was efficient enough to extract forecasts that reflected all information available to the market, then the VL model forecasts would not be more accurate than the expected return model forecasts. Since the procedure used is clearly crude compared to the information processing of analysts, it is anticipated that Hypothesis 3 will be rejected in favour of VL.

> *Hypothesis* 3. The VL forecasts of the growth rate of earnings per share are no more accurate than the earnings forecasts of the expected return models.

Finally, since the lengthy literature comparing analyst forecasts with those of time series models is confined to short forecast horizons (see footnote 1), it is of interest to compare the VL forecasts with the SUB forecasts over the long forecast horizons used in this paper.

> *Hypothesis* 4. The VL forecasts of the growth rate of earnings per share are no more accurate than the forecasts of the SUB model.

Rejection of Hypothesis 4 in favour of VL superiority would provide further evidence of analyst forecast superiority relative to time-series models.

## 2. TESTS OF HYPOTHESES

### Samples

Two replications of the experiment were conducted. In the first, time $T$ was year-end 1967 and forecasted earnings were for 1972. The first 253 firms (in alphabetical order) were selected from the CRSP tape which met the criteria: (1) return data available during 1961–1967; (2) covered by the *Value Line Investment Survey* as of December 1967; (3) December fiscal year; and (4) positive earnings per share in 1967 and 1972. The second replication set $T$ at December 1972. The sample size was 348. The criteria were similar with the corresponding changes in dates, namely, return data available during 1966–1972 and positive earnings per share in the base year 1972 and test year 1976.

The reasons for these criteria follow. The requirement that a sample firm have return data on the CRSP tape in the base period allowed computation of the firm's beta coefficient using this data source. The firm had to be covered by the *Value Line Investment Survey* to allow forecast comparisons to be made. Use of the December fiscal year-end ensured that all six model forecasts were based on comparable amounts of data relative to the fiscal year. Furthermore, the VL model forecasts had to be conditional only on annual earnings of the base year. The requirements of positive earnings per share in the base and test years allowed for positive growth rates. (The positive earnings criterion, as it turned out, was not binding in the first test period. In the second period, ten firms were eliminated because of this criterion.)

Although it is unlikely that the sample selection procedures materially affected the outcomes of the experiments, they did result in noticeably less risky sample firms than the market as a whole. The average beta for both samples was 0.85. As such, the test results may not generalize to the entire population of firms.

### Test procedures

Because January 1935 was the starting date for calculating the BLK model estimates, that date was the starting point for most of the other return calculations. Thus, in estimating the CMR model, a stock's mean monthly stock return was found by averaging its returns over the history of the stock available since January 1935. In estimating mean market returns, the average of monthly returns was found over the time period beginning in January 1935. The market index was the equally-weighted return index of all stocks on the CRSP tape. Finally, in estimating the gammas for the BLK model, the monthly averages were also taken over the period starting in 1935.[6]

The SLM model requires risk-free returns and, for this purpose, yields-to-maturity on U.S. Government Bonds of the relevant maturity were employed. The data source was *Moody's Municipal and Government Manual.*

Let $a_i$ = growth rate of actual earnings per share for firm $i$ and $g_{ij}$ = growth rate of forecasted earnings per share for firm $i$ by method $j$. In each test period, a vector of errors $|a_i - g_{ij}| = e_{ij}$ may be calculated for each method $j$, where $e_{ij}$ is the absolute value of the difference between the forecasted and realized growth rates. For hypothesis tests of two models, an appropriate design is a one-sample or matched-pairs case with self-pairing by firm. The members of each pair are errors, $e_{ij}$, from the two models, which are reduced to a single observation by taking the difference in the errors. The $t$-test is the usual parametric test of the mean difference and the Wilcoxon signed ranks test is an alternative non-parametric test of the median difference. Both tests were conducted. But since the results were similar, only the paired $t$-test results are reported.

[6] All tests were also conducted using mean returns calculated over the most recent 84 months. The results were essentially the same as those reported in the paper. If anything, the longer estimation period benefited the CMR model.

**Results**

Table 1 contains summary statistics of the error distributions generated by the models when regression-adjusted betas were employed.

The average of deviations, $a_i - g_{ij}$, was computed for all sample firms. Such deviations measure the average bias of the forecast models. It appears that, in period 1, all the models tended to overforecast earnings growth. In period 2, the average deviation of the return models was slight, whereas VL tended to overforecast on average. However, the fraction of firms overestimated by VL (58.0 per cent) was quite close to the fractions for the other models. This suggests that the sample average deviation for VL was heavily influenced by a few firms.

Table 1. Summary statistics of error distributions*†

| | Error measure | SUB | MAR | CMR | SLM | BLK | VL |
|---|---|---|---|---|---|---|---|
| | Average deviation | −0.001 | −0.062 | −0.051 | −0.049 | −0.051 | −0.046 |
| | MABE | 0.115 | 0.112 | 0.117 | 0.105 | 0.106 | 0.088 |
| Period 1, | MSE | 0.046 | 0.032 | 0.034 | 0.031 | 0.031 | 0.018 |
| 1967–1972 | RMSE | 0.213 | 0.178 | 0.184 | 0.176 | 0.177 | 0.135 |
| | % Forecasts overestimated | 56.1 | 81.8 | 72.7 | 72.3 | 73.5 | 64.0 |
| | Average deviation | 0.040 | −0.002 | 0.012 | 0.011 | 0.008 | −0.030 |
| | MABE | 0.146 | 0.140 | 0.147 | 0.137 | 0.137 | 0.118 |
| Period 2, | MSE | 0.071 | 0.067 | 0.070 | 0.066 | 0.066 | 0.031 |
| 1972–1976 | RMSE | 0.266 | 0.258 | 0.265 | 0.256 | 0.256 | 0.175 |
| | % Forecasts overestimated | 47.2 | 58.9 | 53.4 | 52.9 | 53.7 | 58.0 |

* MAR = Market adjusted return; SUB = Submartingale; CMR = Comparison return; SLM = Sharpe–Lintner–Mossin; BLK = Black; VL = Value Line.

† Based on adjusted betas for the SLM and BLK models.

The mean absolute error (MABE), defined as the sample average of $|a_i - g_{ij}|$, better reflects the overall forecasting performance of the models since it takes into account the average error size. In period 1, VL's MABE was lowest at 0.088, followed by SLM and BLK at 0.105 and 0.106, while the other three models had MABE's between 0.112 and 0.117. Two other summary error measures, which give greater weight to large deviations, are mean square error or MSE (the sample average of $(a_i - g_{ij})^2$) and root mean squared error or RSME (the square root of MSE). Using these measures of forecast accuracy, VL was most accurate followed by the four expected return models all of which were more accurate than SUB.

In time period 2, VL had the most accurate forecasts. Using MABE, it again appears that SLM and BLK had smaller errors than the CMR, MAR, and SUB models. Using MSE, all models other than VL appear to have approximately equal forecast accuracy.

Table 2 contains the $t$-statistics for all paired comparisons over both sample periods and using both the historical beta and the regression-adjusted beta. In reading this table, a positive $t$-statistic means that the model at the top has lower errors than the model at the side. Since the results are very similar for both beta estimation methods, the discussion concentrates on the regression-adjusted beta case.

In both sample periods, both the SLM and BLK models produced smaller errors at high levels of confidence than the two non-beta expected return models—MAR and CMR. Hypothesis 1 is thus rejected. If one were attempting to gauge the market's expectation of future earnings growth via

Table 2. Parametric *t*-statistics, comparisons of six model's earnings prediction errors for two time periods*†

| | | Historical beta | | | | | | | Regression-adjusted beta | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SUB | MAR | CMR | SLM | BLK | VL | | SUB | MAR | CMR | SLM | BLK | VL |
| Period 1, 1967–1972 | SUB | — | 0.59 | −0.50 | 1.32 | 1.17 | 2.69‡ | SUB | — | 0.59 | −0.50 | 1.76¶ | 1.58‡ | 2.69‡ |
| | MAR | — | — | −1.70¶ | 1.74¶ | 1.37 | 3.72‡ | MAR | — | — | −1.70¶ | 4.93‡ | 4.29‡ | 3.72‡ |
| | CMR | — | — | — | 3.32‡ | 3.00‡ | 4.50‡ | CMR | — | — | — | 4.35‡ | 3.96‡ | 4.50‡ |
| | SLM | — | — | — | — | −7.12‡ | 3.06‡ | SLM | — | — | — | — | −8.22‡ | 2.72‡ |
| | BLK | — | — | — | — | — | 3.21 | BLK | — | — | — | — | — | 2.88‡ |
| Period 2, 1972–1976 | SUB | — | 1.58 | −0.40 | 2.88‡ | 2.84‡ | 2.90‡ | SUB | — | 1.58 | −0.40 | 2.78‡ | 2.68‡ | 2.90‡ |
| | MAR | — | — | −2.25§ | 2.38§ | 2.48§ | 2.35§ | MAR | — | — | −2.25§ | 3.06‡ | 3.13‡ | 2.35§ |
| | CMR | — | — | — | 3.77‡ | 3.76‡ | 2.92‡ | CMR | — | — | — | 3.83‡ | 3.72‡ | 2.92‡ |
| | SLM | — | — | — | — | −0.59 | 1.86¶ | SLM | — | — | — | — | −1.60 | 1.93¶ |
| | BLK | — | — | — | — | — | 1.88¶ | BLK | — | — | — | — | — | 1.96§ |

* MAR = Market adjusted return; SUB = Submartingale; CMR = Comparison return; SLM = Sharpe–Lintner–Mossin; BLK = Black; VL = Value Line.

† A positive test statistic indicates superiority (lower forecast error) of model on top as compared with model on side; a negative test statistic indicates superiority of model on side. Forecast error is mean absolute error (MABE).

‡ Significant at the 1 per cent level, two-tailed test.

§ Significant at the 5 per cent level, two-tailed test.

¶ Significant at the 10 per cent level, two-tailed test.

the market's expected rate of return and the revealed dividend yield, then one would be better off employing either of the two models that use beta. The consistency of the results over the two test periods strengthens the conclusion that use of the beta coefficient enhances the predictability of expected rate of return and hence earnings growth.

To check on the efficacy of the procedure by which the expected return model forecasts were extracted, those models were compared with the SUB model. For the non-beta models, the $t$-statistics were less than ordinary conventional levels in both of the test periods. A comparison of MAR against SUB produced $t$-statistics of $-0.50$ and $-0.40$. These results indicate that Hypothesis 2 cannot be rejected for the non-beta models, although the MAR model provided slight indication of outperforming the SUB model.

For the SLM and BLK models, the $t$-statistics were positive and significant in both time periods. A comparison of SLM against SUB yielded $t$-statistics of 1.76 and 2.78, whereas in similar comparisons, BLK yielded 1.58 and 2.68. This is reasonable evidence for rejecting Hypothesis 2 in favour of the alternative hypothesis that SLM and BLK produce smaller errors than SUB. From another point of view, this result is impressive: a relatively simple manipulation of the expected return models, involving extrapolation of the expected market return and the stock's beta coefficient and subtraction of the stock's dividend yield, produced earnings forecasts that were more accurate than a well known time-series model of annual earnings. This interpretation indicates that the SLM and BLK expected return models appear to capture an important aspect of the market's return generating mechanism, and that the forecast extraction procedure has reasonable power.

The next hypothesis tests involve the VL forecasts. It is clear that Hypothesis 3 can be rejected at high levels of significance. By wide margins, VL produced lower forecast errors than all the expected return models, including the more accurate SLM and BLK models.

The last comparison, Hypothesis 4, evaluates VL against the TS model. In both samples, the forecasts of earnings per share growth were statistically superior to those of the TS model. This provides additional evidence that security analysts produce more accurate forecasts than time-series models.

The results of the tests were quite uniform in the two time periods. The average analyst error in forecasting the future annual growth rate for the following four to five year period tended to be about 1.7 per cent below the errors of the SLM and BLK expected return models, whereas the errors of the latter two models were about 0.7–1.2 per cent below the errors of the remaining models, including the SUB model.

## 3. CONCLUSIONS

This paper has shown that expected return models commonly used in the finance literature contain implicit forecasts of the growth rate of accounting earnings per share. For the comparison returns model (CMR) and the market-adjusted returns model (MAR), the resulting forecasts were no less accurate than a submartingale model. On the other hand, for the Sharpe–Lintner–Mossin (SLM) and Black (BLK) models, the forecasts were significantly more accurate than those generated by the submartingale model.

Evidence that security analysts forecasts are more accurate than those of less costly alternatives is also provided. The forecasts of four to five year growth rates of earnings per share produced and reported in the *Value Line Investment Survey* were shown to be more accurate than *all* of the other models tested—none of which required the direct input of a security analyst.

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# Quantitative Structuring
# vs
# the Equity Premium Puzzle

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Quantitative Structuring is a rational framework for manufacturing financial products. It shares many of its components with mainstream economics. The Equity Premium Puzzle is a well known quantitative challenge which has been defying mainstream economics for the last 30 years. Does Quantitative Structuring face a similar challenge? We find Quantitative Structuring to be in remarkable harmony with the observed equity premium. Observed values for the equity premium (both expected and realized) appear to be a real and transparent phenomenon which should persist for as long as equities continue to make sense as an investment asset. Encouraged by this finding, we suggest a certain modification of mainstream economics.

## 1 Quantitative Structuring

Each and every financial product is completely defined by its payoff function $F$ which states how the benefits (usually cash flows) depend on the underlying variables. In order to price a product, defined by its payoff $F$, we compute a quantity of the form

$$\text{Price}(F) \propto \sum_x F(x)Q(x)\,, \tag{1}$$

where the summation is taken over all possible values of the underlying variables and where $Q$ is given by a mathematical model for the variables. Equation (1) is probably the most famous formula in the whole of mathematical finance. It shows, among other things, that the value of a product is determined by its payoff structure $F$ and the model $Q$ in a nearly symmetric way.

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Product design clearly deserves as much technical attention and respect as modeling. In fact, one can argue that products are much more important than modeling for they define the very nature of a business. Quantitative Structuring recognizes the importance of financial products and provides a technical framework for their design [1].

Within Quantitative Structuring all investments begin with research. Ahead of any proposals, a minimum of two learning steps must happen. The investor needs to form an opinion on the market and to learn their own preferences (risk aversion). Mathematically these two steps are described by two equations:

$$b = f\,m \tag{2}$$

$$\frac{d\,\ln F}{d\,\ln f} = \frac{1}{R}\,. \tag{3}$$

These equations can be introduced by making just a couple of observations. Firstly, we observe that each and every investment is an exercise in optimization. Secondly, we note that the above equations are obeyed by a payoff function $F(x)$ which solves the following optimization problem [2]

$$\max_F \int b(x)\,U(F(x))\,dx \quad \text{subject to budget constraint} \quad \int F(x)\,m(x)\,dx = 1\,. \tag{4}$$

The risk aversion coefficient $R$ is connected to the utility $U$ through the standard Arrow-Pratt formula: $R = -FU''_{FF}/U'_F$. The economic meaning of the market-implied and investor-believed distributions $m(x)$ and $b(x)$ follows from the above optimization.

For further explanations of these equations, including motivation, derivations, intuitive illustrations as well as concrete numerical examples, we refer the reader to [1], [2], [3], [4] and [5].

# 2 Confronting the Equity Premium Puzzle

In 1985 Mehra and Prescott investigated historical data on the excess returns achieved by equities over government bonds [6]. These excess returns, known as the equity premium, appeared to be surprisingly high. Mehra and Prescott concluded that the equity premium was an order of magnitude greater than could be rationalized within the standard utility-based theories of asset prices.

Given the importance of the challenge, proposals to resolve the puzzle quickly snowballed. More than two decades later Mehra and Prescott revisited the progress on the problem only to reinforce their original conclusions [7]. They estimated the equity premium to be 2-8% in arithmetic terms or up to 6% in terms of geometric (compound) returns and reiterated the Equity Premium Puzzle as a standing challenge to explain these values.

The work on understanding the equity premium continues. Many insightful observations have been made. The scope of proposals has widened enormously. It now ranges from plausible denials of the puzzle to behavioral explanations. The complexity of individual proposals also increased. With some proposals still awaiting adequate independent analysis, it would be fair to say that no single explanation of the puzzle has yet received general acceptance and the search for a clear dominant explanation continues.

A balanced review of the 30 year history of the puzzle is a major task in its own right which would lead us away from the main focus of this paper. For our purposes we need to know only one historical fact. We need to note that the puzzle has posed a major challenge to utility-based economic models. This makes the Equity Premium Puzzle a perfect challenge to Quantitative Structuring which, as we can see from the optimization (4), heavily relies on the expected utility theory.

How would we know if Quantitative Structuring survived the challenge? Of course, it would have to explain the numerical premium of 6% annualized compounded returns. Mehra and Prescott set additional guidelines in their most recent review [7]. They urge clear differentiation between expected and realized returns. They emphasize long-time historical horizons. Furthermore, they set an expectation that any theory which takes on the puzzle must be able to say something about the future of the puzzle. In other words, are the equity returns real and likely to persist or were they a statistical fluke with no material probability of re-occurring?

We accept the challenge with all of the above conditions. We investigate separately the expected and the realized returns. We use long-time horizons when talking about realized returns. Within Quantitative Structuring the observed numerical values of the equity premium appear to be absolutely real and natural. In fact, if these numerical values were somehow not known, Quantitative Structuring would have predicted them.

## 3 Expected premiums

Using the notation of (4), we can write the investor-expected continuously-compounded rate of return as

$$\mathrm{ER} = \int b(x) \ln F(x)\, dx\,. \tag{5}$$

This quantity is determined by two things – the structure of the investment $F(x)$, and the investor-believed distribution $b(x)$.

As we focus on equity investments, we describe the investment structure as:

$$F(x) = x, \tag{6}$$

where $x$ is a total return on one unit of wealth invested in the equity.

To get the believed distribution we need to know the investor's risk aversion. For example, in the case of a growth-optimizing investor $R = 1$, equation (3) becomes redundant, i.e. $F(x) = f(x)$, and Eq. (2) gives us the believed distribution

$$b_{\mathrm{GO}}(x) = F(x)\, m(x) = x\, m(x)\,. \tag{7}$$

The corresponding expected return becomes

$$\mathrm{ER} \to \mathrm{ER}_{\mathrm{GO}} = \int \big( x \ln x \big)\, m(x)\, dx\,. \tag{8}$$

As an example, consider a log-normal market-implied distribution

$$\frac{m(x)}{\mathrm{DF}} = \frac{1}{x\sigma\sqrt{2\pi}} \exp\Big\{ -\frac{(\ln x - \mu)^2}{2\sigma^2} \Big\}, \quad \mu = r - \sigma^2/2\,, \tag{9}$$

where DF is the discount factor, $r$ is the risk free return and $\sigma$ is the volatility. In this case the integral in Eq. (8) can be computed analytically with the result:

$$\mathrm{ER}_{\mathrm{GO}} \to \mathrm{ER}_{\mathrm{GO}}^{\mathrm{LN}} = r + \sigma^2/2\,. \tag{10}$$

Mehra and Prescott considered an investor with arbitrary constant relative risk aversion. Generalization of the above calculations to this case is very easy. All we have to do is to bring into play Eq. (3) with a constant value of $R$. Equation (10) is then replaced by a slightly more general quantity (see Eq. (33) in the Appendix):

$$\mathrm{ER}_{\mathrm{R}}^{\mathrm{LN}} = r + (R - 1/2)\sigma^2\,. \tag{11}$$

This gives us the expected premium of

$$\mathrm{EP}_{\mathrm{R}}^{\mathrm{LN}} \stackrel{\mathrm{def}}{=} \mathrm{ER}_{\mathrm{R}}^{\mathrm{LN}} - r = (R - 1/2)\sigma^2\,. \tag{12}$$

In their pioneering paper [6], Mehra and Prescott argue that the acceptable values for $R$ must be below 10. In fact, all of the actual estimates of $R$ which they cite to support their argument were below 3. Even staying within this tight range below 3 and making the standard assumption of 20% for typical equity volatility we can easily explain premia as high as 10% in terms of continuously compounded annual returns. This ball-park range is in remarkable agreement with the values observed by Mehra and Prescott.

In the remainder of this section we are going to examine independent quotes for the expected risk premia and see what values of $R$ they imply. Before we do that, let us restore the generality of our arguments by removing the above made assumption of log-normality. In the case of arbitrary market-implied distributions, Eq. (12) is replaced by the expression (see Eq. (30) in the Appendix):

$$\mathrm{EP}_{\mathrm{R}} \stackrel{\mathrm{def}}{=} \mathrm{ER}_{R} - r = \frac{1}{\mathrm{Price}(x^R)} \frac{\partial \mathrm{Price}\big(x^R\big)}{\partial R} - r\,. \tag{13}$$

Implying the value of $R$ from this expression is considerably less convenient than using Eq. (12). Nevertheless, it is a simple root-finding problem which can be solved. In terms of technology, we just need the ability to price power payoffs, $x^R$, which can be done by replication with vanillas.

In terms of independent quotes for the equity premium we reach out to the field of equity valuations where the expected premium is a very important factor. On Fig. 1 we display expected equity premia as reported by Damodaran [8] using SPX data. It is important to note that these values are just as large as noted by Mehra and Prescott – at least an order of magnitude above 0.35%.

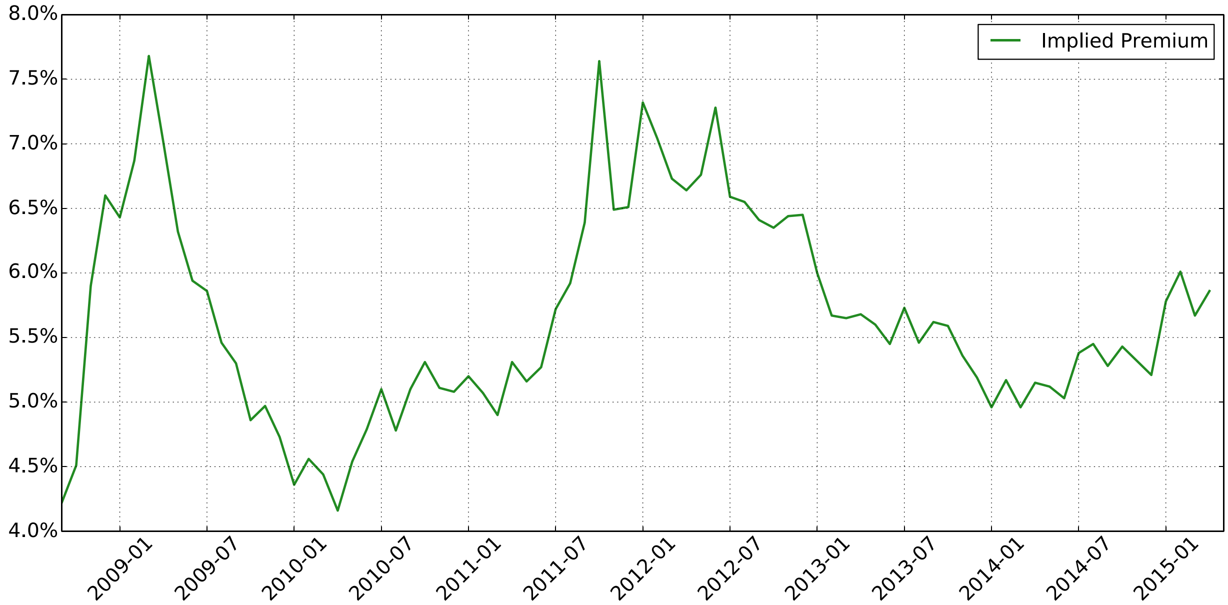


Figure 1: Implied Equity Premia as reported by Damodaran [8]. The records are updated on a monthly basis starting from September 2008. The quoted values refer to the beginning of each month. In our calculations we interpreted this as the first business day of each month.

There are always limits to how far in the future one can look using available market data. According to Damodaran [8], his quotes for the premia accurately reflect detailed market information (such as market-implied dividends) of up to five years into the future.

At five year horizons, equity skew is quite flat. This makes Eq. (12) useful as a test calculation which requires very little access to market data. On Fig. 2 we compute relative risk aversion from the quoted premia using both the exact Eq. (13) and the test Eq. (12).

In the former case we made no simplifying assumptions and used complete historical records of 5-year volatility curves. In the latter case we used 5-year at-the-money-forward implied volatilities (displayed for convenience on Fig. 3). The graphs for the two cases show good agreement.

All computed values of risk aversion are comfortably within the realistic range. We conclude that, in terms of investors' expectations, Quantitative Structuring is consistent with the observed equity premia.

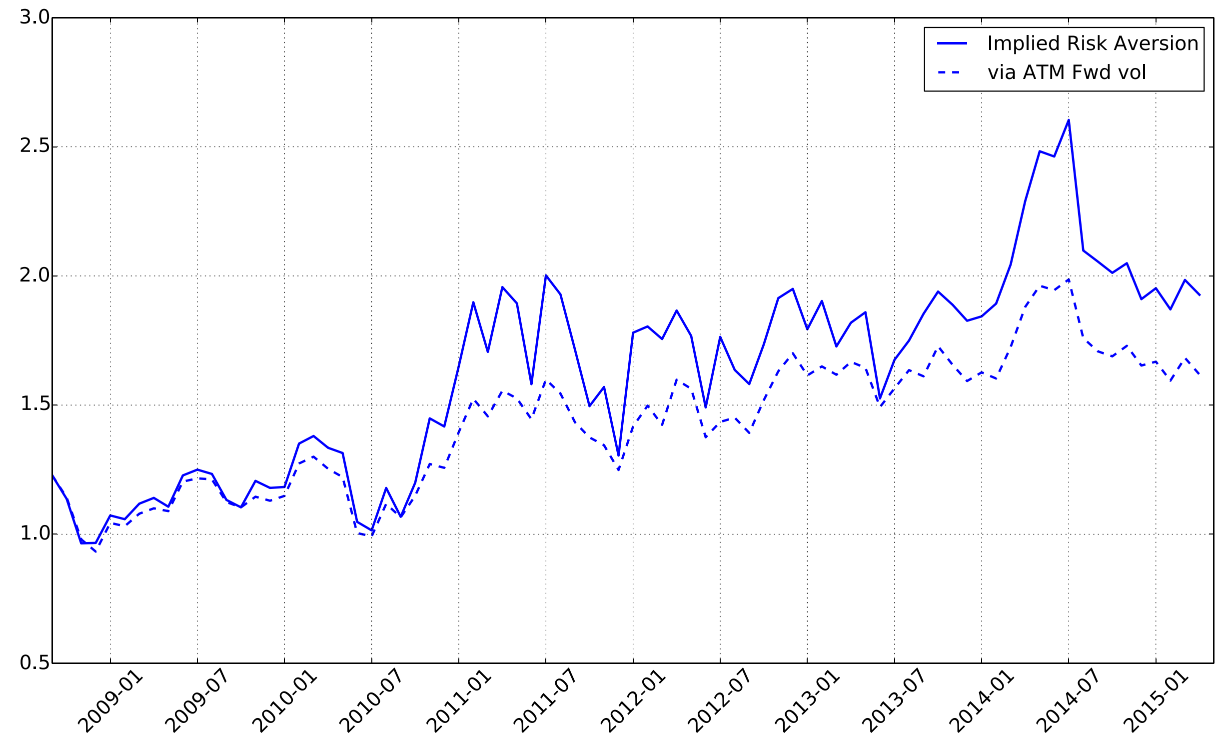


Figure 2: Implied risk aversion. Solid and dashed lines correspond to Eqs. (13) and (12) respectively. In both cases the timing of investments is chosen consistently with the quoted values of implied risk premia, i.e. they are assumed to mature in five years starting on the first business day of each month.

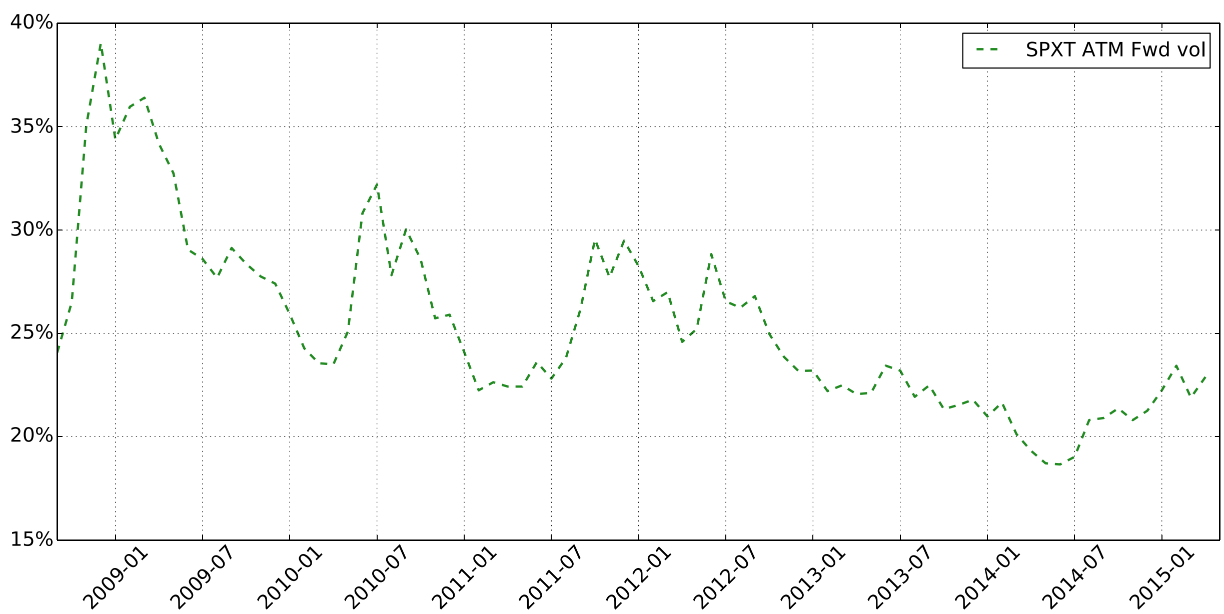


Figure 3: SPXT 5-year at-the-money-forward values of implied volatility.

## 4 Realized premiums

In the above section we managed to reconcile rational expectations of equity premiums. In terms of numerical values, these expectations were just as high as reported by Mehra and Prescott [6]. In this section we would like to understand how such expectations materialize, with investors doing no more than just keeping their money in the equity.

Let $S_t$ be the value of the total return version of some equity index at time $t$. The return on the equity investment can be partitioned arbitrarily into $N$ imaginary reinvestment steps:

$$S_N = S_0 \cdot \frac{S_1}{S_0} \cdot \frac{S_2}{S_1} \cdots \frac{S_N}{S_{N-1}}\,. \tag{14}$$

Defining $x_i = S_i/S_{i-1}$ we compute

$$S_N = S_0 \prod_{i=1}^{N} x_i = S_0 e^{\sum_{i=1}^{N} \ln x_i} = S_0 e^{N \cdot \mathrm{Rate}}\,, \tag{15}$$

where

$$\mathrm{Rate} = \frac{1}{N} \sum_{i=1}^{N} \ln x_i\,. \tag{16}$$

Let us now look at the time series $x_1, \ldots, x_N$ using the standard statistical approach. In this approach the individual elements $\{x_i\}$ are viewed as realizations of a random variable $X$ with some (possibly unknown) distribution $P(X)$. For the basic statistical concepts, like the average, to make practical sense, the law of large numbers is assumed to hold.[1] In this framework, as $N$ increases, the average (16) converges almost surely to the expectation

$$\mathrm{Rate} \xrightarrow{\text{a.s.}} \int P(x) \ln x \, dx\,. \tag{17}$$

Let us compare this equation with Eq. (5) (remember $F(x) = x$ for equity investments). We see that the investor-expected returns can be achieved provided that the time series is long enough (i.e. $N$ is sufficiently large) and, crucially, that the investor correctly determines the probabilities, i.e. $b(x) \approx P(x)$. This gives us some information about equity investors. Our task now is to understand enough detail to see if it is realistic.

Mehra and Prescott describe the Equity Premium Puzzle as a long-term phenomenon. This discourages us from considering very short reinvestment periods. Ideally, we want to consider the case of smallest possible $N$ that is large enough to ensure noticeable convergence (17). The standard deviation of the sum (16) from its mean (17) scales as $N^{-1/2}$. For the first significant digit of the sum (16) to emerge with some reasonable probability, the convergence must reduce the standard deviation by an order of magnitude ($N^{-1/2} \sim 0.1$). This means that we must choose $N$ which is not much lower than 100.

We managed to find full market data, including volatility surfaces, for SPXT (total return version of SPX) going back to 17 May 2000. At the time of writing, this was about 15 years worth of data (daily records). Some researchers might argue the need for longer historical records. However, 15-year investments are already at the limit of what many

[1] This can be ensured if the individual values are sufficiently independent.

people would consider practical, so we choose to accept it. Viewing 15 years of the entire investment history (14) as if it was a sequence of bi-monthly reinvestments we get $N = 90$ reinvestment periods.

We need access to the distribution $P(x)$. One way of defining a probability distribution is to imagine a source of numbers distributed according to this distribution. Given such a source one can estimate expectations using the Monte-Carlo method. In terms of such a definition for the distribution of the actual realized returns, $P(x)$, all we have is a set of $N = 90$ values $\{x_i\}_{i=1}^{N}$. As discussed above, this is just enough to talk about expectations like (16).

Consider an investor whose original belief happened to coincide with the actual realized distribution, $b(x) = P(x)$. For this investor, the expected return is given by equation (16) which, by construction, evaluates to the actual realized returns exactly. The analysis of the realized equity premium boils down to the analysis of whether such an investor is realistic. Following Mehra and Prescott, this means computing and examining the investor's risk aversion.

Using Eqs. (2 - 3) and recalling that for the simple equity investment $F(x) = x$ we compute

$$R = \frac{d\ln f}{d\ln F} = \frac{d\ln(b/m)}{d\ln x} = \frac{m}{b}\left(\frac{b}{m}\right)'_x x\,. \tag{18}$$

Theoretically, this gives us the complete risk-aversion profile for the investor in question. Right now, however, we have a bare minimum of statistical information regarding $b$. So, as many other researchers before us have done, we choose to focus on the overall level of risk aversion and defer the very interesting topic of the shape of risk-aversion profiles to further research. As a measure of the overall risk aversion we consider the investor's own expectation of it

$$\langle R\rangle_b \stackrel{\text{def}}{=} \int R(x)\,b(x)\,dx\,. \tag{19}$$

Put together, the above two equations give

$$\langle R\rangle_b \;=\; \int m\Big(\frac{b}{m}\Big)'_x x\,dx \;=\; \int xm\,d\Big(\frac{b}{m}\Big)\,. \tag{20}$$

Integrating by parts and noticing that $xb\,\Big|_0^\infty = 0$, we obtain

$$\langle R\rangle_b \;=\; -\int \frac{b}{m}\,d\,(xm) \;=\; -\int \frac{b}{m}\,(m\,dx + x\,dm) \;=\; -1-\int b\,x\,\frac{dm}{m}\,. \tag{21}$$

Finally, using the notation of (19) we derive

$$\langle R\rangle_b = -1 - \langle\, x(\ln m)'_x\,\rangle_b\,. \tag{22}$$

This formula does not look very intuitive so, before using it, let us spend a few lines understanding it. To this end, let us see what it implies for a log-normal market-implied distribution. From Eq. (9) we derive

$$(\ln m)'_x \;\stackrel{\text{LN}}{=}\; \Big(-\ln x - \frac{(\ln x-\mu)^2}{2\sigma^2} + \text{const}\Big)'_x \;=\; -\frac{1}{x} - \frac{\ln x - \mu}{\sigma^2 x}\,. \tag{23}$$

Substitution into Eq. (22) gives

$$\langle R \rangle_b \overset{\text{LN}}{=} \frac{\langle \ln x \rangle_b - \mu}{\sigma^2} = \frac{1}{2} + \frac{\langle \ln x \rangle_b - r}{\sigma^2} \,. \tag{24}$$

Compare this to Eq. (12) which we studied above. We recognize Eq. (22) as a generalized analog of Eq. (12). The extent of generalization is very substantial: the market can have any implied distribution, and the investor can have an arbitrary profile of risk-aversion.

As discussed above, we now substitute $b(x) = P(x)$ into Eq. (22) and obtain the formula for the expected risk aversion for the equity investor who correctly expressed an accurate long-term view on the market

$$\langle R \rangle_P = -1 - \frac{1}{N} \sum_{i=1}^{N} x_i \Big( \ln m(x_i) \Big)'_{x_i} \,. \tag{25}$$

We are now in a position to compute $\langle R \rangle_P$ as of any day for which we have market information, $m$. We should remember, however, that our investor took a 15-year view and is completely ignoring all intermediate updates from the markets. The level of risk aversion for such an investor should be measured in a way that represents most of the actual investment period and is not sensitive to daily market fluctuations. Below we report two kinds of experiments which achieve this. In the first kind we look at the averaged value of $\langle R \rangle_P$ across the entire 15-year investment period. In the second type we get a glimpse of the term structure of risk aversion by looking at a 10-year moving average.

Above we explained our choice to partition historical investments into bi-monthly reinvestment periods. This choice has a useful side effect. A single experiment would skip most of the available market data using only what it needs at bi-monthly intervals. The skipped market data can be used to repeat the experiment (42 times in total) – we just need to start the bi-monthly sequence on a different business day within the first two months for which we have data.

The horizontal green lines on Fig. 4 report the levels of $\langle R \rangle_P$ averaged across the entire (∼15-year) investment period. Different lines correspond to the 42 different runs of the experiment. The red line on Fig. 4 is a bi-monthly report of the 10-year moving average of $\langle R \rangle_P$ for the investment which started on the 17th of May 2000 – the first day for which we have market data. The 42 runs of this experiment are plotted by faint hashed lines across the same graph.

As in the case of the expected equity premia considered in the previous section, we see completely normal levels of risk aversion. Even our attempt to glimpse the term structure, which misaligned investment horizon with the measurement of risk aversion, returned reasonable values.

Speaking about historical premia, we must mention that the performance of equities over the last 15 years has been rather patchy. This has reduced the magnitude of the relevant historical equity premia.[2] However, the reduction was not strong or persistent enough to remove large equity premia across the entire data set used in this paper. Out of the 42

[2]This might be partially responsible for the slight dip of risk aversion below zero on Fig. 4, although the confidently positive values for the averages (represented by the green lines) indicate that this is probably just noise.

investments represented by the green lines on Fig. 4, the worst and the best-performing ones delivered around 2% and 2.6% per annum in terms of the annualized equity premium. All of these values are well above the threshold of 0.35% reported by Mehra and Presott [6].

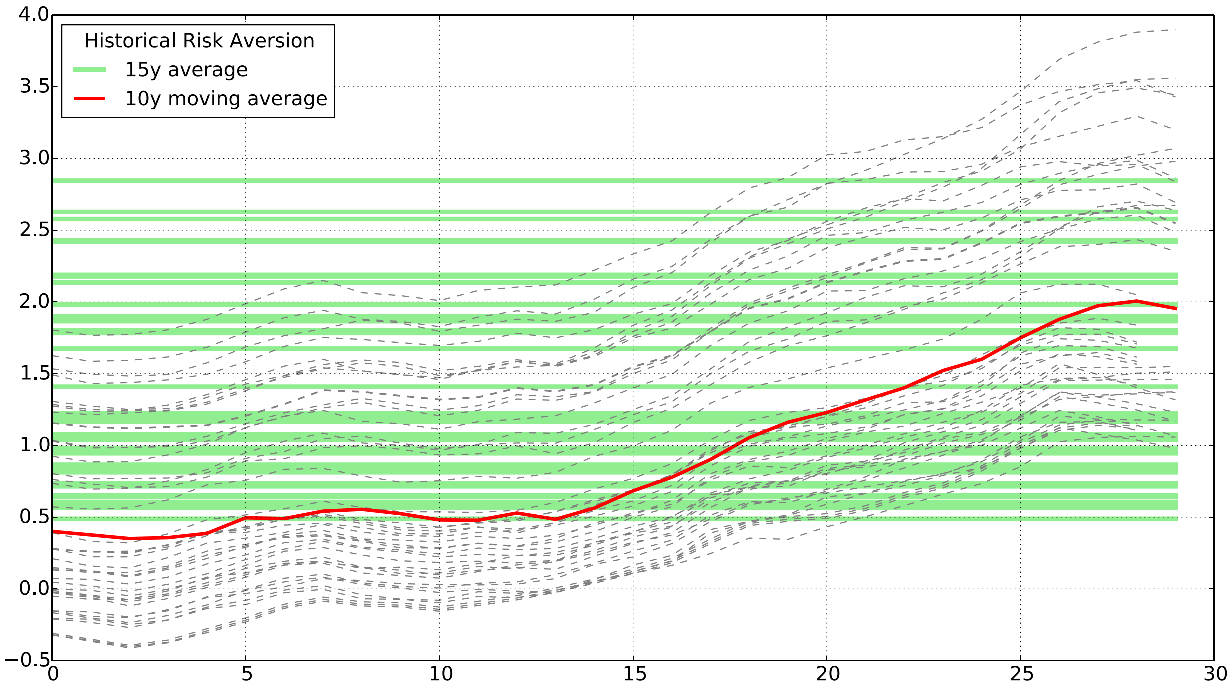


Figure 4: Historical risk aversion. 10-year moving averages are computed on the bi-monthly grid as described in the main text. Within the 15-years of history this produces sequences of 30 (or 29) values (depending on the availability of data for the last period).

As a final remark, we would like to point the reader back to the discussion around Eqs. (22-24) which brings together the separate investigations of the expected and the realized premia. The two types of premia are different in terms of their precise interpretations. They also come with their own inherent challenges such as high levels of statistical noise in the case of realized premia. Yet, whether we talk about expected or realized equity premia, it is important to note that the underlying mathematics addressing the equity premium puzzle is basically identical.

# 5 Epilogue

Quantitative Structuring successfully survives the challenge from the Equity Premium Puzzle. In fact, it shows how the puzzle can be resolved. Indeed, given realistic values of risk aversion, Quantitative Structuring predicts the correct expected premia and shows how such expectations materialize over long time horizons. We expect the equity premia to stay at the levels given by our formulae (Eq. (12), or more generally, Eq. (13)) for as long as investing in equities makes rational sense.

Our analysis is highly generalizable. In this paper we focused on equity investments, which happened to have a linear payoff function $F(x) = x$, but just as easily we could have examined any other investment strategy with a very different payoff function.

This is interesting because economic environments emerge from the successes and failures of individual strategies. It is not unreasonable to think that we might understand an economy by understanding the performance of its key strategies. Due to the potential importance of this line of thinking, let us conclude this paper with a few paragraphs articulating what our approach can offer to the wider subject of economics.

**Detailed economics**
Investments thrive on information. The information content of an investment is compressed into its economic structure – the payoff function. In the field of economics it has been a popular custom to replace the detailed payoff structure of an investment by simpler ad-hoc representations such as a point on a mean-variance diagram. The resulting loss of information is hard to quantify and even harder to compensate for, even with the most reasonable of assumptions.

Ideally, economic theories should mirror the reality and consider investors as individuals: each one with their own views and goals. Every attempt to get closer to this ideal inevitably faces the formidable challenge of practicality. More detailed models need more detailed information. Quantitative Structuring fulfills this need by providing access to the deep information content of payoff functions.

This is how we escaped the Equity Premium Puzzle. We consider investors as individuals which are allowed to hold any views they want. At the same time we leave no room for speculation about what these views actually are. It is crucial that the views are not assumed, they are derived using the knowledge of payoff functions (see Eqs. (7) and (28)).

Equity investors express strong directional views. Investment premia of over 6% per annum are not unusual in such circumstances. Similar premia can be seen in much more subtle investment strategies [5]. The expected premia are achieved in the long term, provided, of course, that the views are correct.

# 6 Appendix

Equation (3) can be rewritten as

$$d\ln f = R\, d\ln F\,. \tag{26}$$

For the case of constant but otherwise arbitrary $R$ the above equation is immediately integrated to obtain

$$f(x) \propto e^{R\,\ln F(x)} = F^R(x)\,. \tag{27}$$

This result together with Eq. (2) give us the investor-believed distribution

$$\begin{aligned} b(x) &= f(x)\,m(x) \\ &= \frac{e^{R\,\ln F(x)}m(x)}{\int e^{R\,\ln F(y)}m(y)\,dy}\,, \end{aligned} \tag{28}$$

where we used the fact that $b(x)$ is normalized. For the expected logarithmic return we compute

$$\mathrm{ER}_R = \int b(x)\,\ln F(x)\,dx \tag{29}$$

$$= \frac{1}{Z}\frac{\partial Z}{\partial R}\,, \tag{30}$$

where

$$Z = \int F^R(x)\,m(x)\,dx\,. \tag{31}$$

In this paper we focus on the straightforward equity investment. In this case $F(x) = x$, and $Z$ becomes essentially the $R$th moment of $m$. In the special case of log-normal market-implied distribution, this can be computed analytically (see Eq. (9) for notation)

$$Z = \int x^R\,m(x)\,dx = \mathrm{DF}\cdot\exp\left\{R\mu + \frac{1}{2}\,R^2\sigma^2\right\}, \tag{32}$$

and therefore

$$\mathrm{ER}_R \to \mathrm{ER}_R^{\mathrm{LN}} = \mu + R\sigma^2\,. \tag{33}$$

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U.S. Securities and Exchange Commission

# Final Rule: Disclosure of Mutual Fund After-Tax Returns

SECURITIES AND EXCHANGE COMMISSION

17 CFR Parts 230, 239, 270, and 274

[Release Nos. 33-7941; 34-43857; IC-24832; File No. S7-09-00]

RIN 3235-AH77

Disclosure of Mutual Fund After-Tax Returns

AGENCY: Securities and Exchange Commission

ACTION: Final rule

**SUMMARY:** The Securities and Exchange Commission is adopting rule and form amendments under the Securities Act of 1933 and the Investment Company Act of 1940 to improve disclosure to investors of the effect of taxes on the performance of open-end management investment companies ("mutual funds" or "funds"). These amendments require mutual funds to disclose in their prospectuses after-tax returns based on standardized formulas comparable to the formula currently used to calculate before-tax average annual total returns. The amendments also require certain funds to include standardized after-tax returns in advertisements and other sales materials. Disclosure of standardized mutual fund after-tax returns will help investors to understand the magnitude of tax costs and compare the impact of taxes on the performance of different funds.

**EFFECTIVE DATE:** April 16, 2001. Section II. J. of this release contains information on compliance dates.

**FOR FURTHER INFORMATION CONTACT:** Vincent J. Di Stefano, Senior Counsel, Peter M. Hong, Special Counsel, Martha B. Peterson, Special Counsel, or Kimberly Dopkin Rasevic, Assistant Director, (202) 942-0721, Office of Disclosure Regulation, Division of Investment Management, Securities and Exchange Commission, 450 5th Street, N.W., Washington, D.C. 20549-0506.

**SUPPLEMENTARY INFORMATION:** The Securities and Exchange Commission ("Commission") is adopting amendments to Form N-1A [17 CFR 239.15A and 274.11A], the registration form used by mutual funds to register under the Investment Company Act of 1940 [15 U.S.C. 80a-1 *et seq*.] ("Investment Company Act" or "Act") and to offer their shares under the Securities Act of 1933 [15 U.S.C. 77a *et seq*.] ("Securities Act"). The Commission also is adopting amendments to rule 482 under the Securities Act [17 CFR 230.482] and rule 34b-1 under the Investment Company Act [17 CFR 270.34b-1].

## Table of Contents

## I. Introduction

We are adopting rule and form amendments that require a mutual fund to disclose after-tax returns.[1] Taxes are one of the most significant costs of investing in mutual funds through taxable accounts. In 1999, mutual funds distributed approximately $238 billion in capital gains and $159 billion in taxable dividends.[2] Shareholders investing in stock and bond funds paid an estimated $39 billion in taxes in 1998 on distributions by their funds.[3] Recent estimates suggest that more than two and one-half percentage points of the average stock fund's total return is lost each year to taxes.[4] Moreover, it is estimated that, between 1994 and 1999, investors in diversified U.S. stock funds surrendered an average of 15 percent of their annual gains to taxes.[5]

Despite the tax dollars at stake, many investors lack a clear understanding of the impact of taxes on their mutual fund investments.[6] Generally, a mutual fund shareholder is taxed when he or she receives income or capital gains distributions from the fund and when the shareholder redeems fund shares at a gain.[7] The tax consequences of distributions are a particular source of surprise to many investors when they discover that they can owe substantial taxes on their mutual fund investments that appear to be unrelated to the performance of the fund. Even if the value of a fund has declined during the year, a shareholder can owe taxes on capital gains distributions if the portfolio manager sold some of the fund's underlying portfolio securities at a gain.[8]

The tax impact of mutual funds on investors can vary significantly from fund to fund. For example, the amount and character of a fund's taxable distributions are affected by its investment strategies, including the extent of a fund's investments in securities that generate dividend and other current income, the rate of portfolio turnover and the extent to which portfolio trading results in realized gains, and the degree to which portfolio losses are used to offset realized gains. One recent study reported that the annual impact of taxes on the performance of stock funds varied from zero, for the most tax-efficient funds, to 5.6 percentage points, for the least tax-efficient.[9] While the tax-efficiency of a mutual fund is of little consequence to investors in 401(k) plans or other tax-deferred vehicles, it can be very important to an investor in a taxable account, particularly a long-term investor whose tax position may be significantly enhanced by minimizing current distributions of income and capital gains.

Recently, there have been increasing calls for improvement in the disclosure of the tax consequences of mutual fund investments. Mutual funds, as well as third party providers that furnish information to mutual fund shareholders, are responding to this growing investor demand by providing after-tax returns, calculators that investors can use to compute after-tax returns, and other tax information.[10] In addition, several fund groups have created new funds promoting the use of more tax-efficient portfolio management strategies.[11] Moreover, in April 2000, a bill that would require the Commission to revise its regulations to require improved disclosure of mutual fund after-tax returns was passed by the U.S. House of Representatives and referred to the Senate.[12] Many press commenters also have highlighted the need for improvements in mutual fund tax disclosure.[13]

Currently, the Commission requires mutual funds to disclose significant information about taxes to investors.[14] While we believe that this disclosure is useful, we are persuaded that funds can more effectively communicate to investors the tax consequences of investing. As a result, last March we proposed for public comment amendments to our rules and to Form N-1A, the registration form for mutual funds, that would require disclosure of standardized mutual fund after-tax returns.[15]

Today we adopt rule and form amendments that require a fund to disclose its standardized after-tax returns for 1-, 5-, and 10-year periods. After-tax returns, which will accompany before-tax returns in fund prospectuses, will be presented in two ways: (i) after taxes on fund distributions only; and (ii) after taxes on fund distributions and a redemption of fund shares. Although after-tax returns will not generally be required in fund advertisements and sales literature, any fund that either includes after-tax returns in these materials or includes other performance information together with representations that the fund is managed to limit taxes will be required to include after-tax returns computed according to our standardized formulas.

While the Commission recognizes that a significant amount of mutual fund assets are held through tax-deferred arrangements, such as 401(k) plans or individual retirement accounts ("IRAs"), almost forty percent of non-money market fund assets held by individuals are held in taxable accounts.[16] We are concerned that the millions of mutual fund investors who are subject to current taxation may not fully appreciate the impact of taxes on their fund investments because mutual funds are required to report their performance on a before-tax basis only.[17] Although performance is only one of many factors that an investor should consider in deciding whether to invest in a particular fund, many investors consider performance one of the most significant factors when selecting or evaluating a fund.[18] As a result, we believe it would be beneficial for funds to provide their after-tax performance in order to allow investors to make better-informed decisions.

This is the latest Commission action in our continuing effort to improve fund disclosure of costs. Since 1988, we have required mutual funds to include a uniform fee table in the prospectus.[19] More recently, we have increased our efforts to educate investors about mutual fund costs and how those costs affect performance.[20] In 1999, we introduced a "Mutual Fund Cost Calculator" to assist investors in determining how fund fees and charges affect their mutual fund returns.[21] Moreover, we are currently considering recommendations made in separate reports by the United States General Accounting Office and the Commission's Division of Investment Management on ways to improve fund disclosure of fees and costs.[22]

The amendments we adopt today represent another significant step in these efforts. Taxes are one of the largest costs associated with a mutual fund investment, having a dramatic impact on the return an investor realizes from a fund. Disclosure of standardized mutual fund after-tax returns will help investors to understand the magnitude of tax costs and compare the impact of taxes on the performance of different funds.

## II. Discussion

The Commission received 235 letters commenting on the Proposing Release.[23] One hundred ninety-five of the letters were from individual investors or investor advocacy groups. The individual investors and investor advocacy groups overwhelmingly supported the Commission's proposal to require disclosure of after-tax returns. The remaining 40 letters were from industry participants, who were divided in their views. Many generally supported the proposal, while expressing concerns regarding specific disclosure requirements. Others opposed the proposal. Many commenters offered recommendations for improving portions of the proposal.

The Commission is adopting the proposed rule and form amendments with the modifications described below that address commenters' concerns.

**A. Required Disclosure of After-Tax Returns**

The Commission is adopting, with modifications, the requirement that mutual funds disclose after-tax return, a measure of a fund's performance adjusted to reflect taxes that would be paid by an investor in the fund. As discussed more fully below, funds will be required to include after-tax return information in the risk/return summary of the prospectus.[24] Funds will not generally be required to include after-tax returns in advertisements or other sales materials. Funds will, however, be required to include after-tax returns computed according to a standardized formula in sales materials that either include after-tax returns or include any other performance information together with representations that the fund is managed to limit taxes.[25]

Individual commenters overwhelmingly supported the required disclosure of after-tax returns. Many of these individuals stated that after-tax returns would help them compare funds and make better-informed investment decisions. Industry comments, however, were mixed regarding whether funds should be required to disclose this information. Industry commenters supporting after-tax return disclosure noted that the disclosure would give investors a clearer understanding of fund performance and assist them in evaluating the impact of taxes on the performance of various funds. Industry commenters opposing after-tax return disclosure argued, among other things, that the disclosure would overwhelm investors, be irrelevant to investors in tax-deferred accounts such as 401(k) plans, be inaccurate because the returns are not tailored to individual investors' specific tax situation, place funds at a competitive disadvantage, and be unduly burdensome to compute. A few of these commenters suggested that, instead of requiring the disclosure of after-tax returns, the Commission should encourage the development of web-based personalized after-tax return calculators.

After careful consideration of these comments, we continue to believe that requiring funds to provide standardized after-tax returns will be beneficial to investors, allowing them to make better-informed investment decisions. We believe that after-tax return disclosure is useful to, and understandable by, investors, as evidenced by the overwhelming support of individual commenters. Moreover, in recognition of the fact that after-tax returns would not be relevant for investors who hold fund shares through tax-deferred arrangements, we are requiring that after-tax returns be accompanied by narrative disclosure to that effect, and we are exempting prospectuses used exclusively to offer fund shares as investment options for tax-deferred arrangements from the after-tax return disclosure requirement.[26]

We recognize that the computation of after-tax return depends on assumed tax rates, which vary from investor to investor. Standardized after-tax returns will, however, serve as useful guides to understanding the effect of taxes on a fund's performance and allow investors to compare funds' after-tax returns. The presentation of standardized after-tax returns, coupled with the presentation of before-tax returns, will provide investors with a more complete and accurate picture of a fund's performance than before-tax returns standing alone.

We strongly encourage funds to develop web-based calculators and other tools that investors may use to compute their individualized after-tax return for a fund. This information will be very useful to investors in assessing how a particular fund has performed for them. We believe, however, that after-tax returns should be made available to all investors, not only to those who have the ability to access and use these web-based programs. In addition, personalized after-tax calculators often do not facilitate ready comparisons of different funds' after-tax performance.

We do not believe that requiring funds to disclose after-tax returns will place them at a competitive disadvantage vis-à-vis other investments. Investors choose funds over other investment products because they offer advantages unavailable with most other investment products, *e.g.,* access to professional portfolio management and diversification with a relatively small investment. In addition, we are exempting money market funds from the after-tax return disclosure requirement, in part because of our concern that they would be disadvantaged vis-à-vis very similar, competing products.

Finally, we believe that the burden to funds of computing and disclosing after-tax returns is justified by the benefits to investors from receiving this information. While we acknowledge that funds will incur a one-time cost to modify their systems to compute after-tax returns, the computation thereafter should be straightforward to perform using readily available data.

**B. Types of Return to Be Disclosed**

As proposed, funds will be required to calculate after-tax returns using a standardized formula similar to the formula presently used to calculate before-tax average annual total return.[27] We proposed to require funds to disclose after-tax return for 1-, 5-, and 10-year periods on both a "pre-liquidation" and "post-liquidation" basis, and we are adopting that requirement. Pre-liquidation after-tax return assumes that the investor continued to hold fund shares at the end of the measurement period, and, as a result, reflects the effect of taxable distributions by a fund to its shareholders but not any taxable gain or loss that would have been realized by a shareholder upon the sale of fund shares.[28] Post-liquidation after-tax return assumes that the investor sold his or her fund shares at the end of the measurement period, and, as a result, reflects the effect of both taxable distributions by a fund to its shareholders and any taxable gain or loss realized by the shareholder upon the sale of fund shares.[29] Pre-liquidation after-tax return reflects the tax effects on shareholders of the portfolio manager's purchases and sales of portfolio securities, while post-liquidation after-tax return also reflects the tax effects of a shareholder's individual decision to sell fund shares.

Most commenters addressing the issue of whether we should require pre- and post-liquidation after-tax returns supported disclosure of both types of after-tax returns. A few commenters argued that pre-liquidation after-tax return should be eliminated because the addition of another performance figure could overwhelm and confuse investors and, if provided without post-liquidation after-tax return, would tend to suggest to shareholders that taxation could be deferred indefinitely. A few commenters recommended that only pre-liquidation after-tax returns be required because post-liquidation returns reflect the action of a specific shareholder (*i.e.,* the decision to sell fund shares), rather than the tax-efficiency of the fund's portfolio management.

The Commission is adopting, as proposed, the requirement that funds present both pre- and post-liquidation after-tax returns in order to provide investors with a more complete understanding of the impact of taxes on a fund's performance.[30] We believe that pre-liquidation after-tax return is important because it provides information about the tax-efficiency of portfolio management decisions. We also believe, however, that it is important for shareholders, many of whom hold shares for a relatively brief period, to understand the full impact that taxes have on a mutual fund investment that has been sold.[31]

In response to commenters' concerns about investor confusion, we are streamlining the returns required to be disclosed. Most commenters recommended that we revise the proposed pre-liquidation after-tax return figure to deduct fees and charges payable upon a redemption of fund shares, such as sales charges or redemption fees. This would make the pre-liquidation after-tax return figure comparable to currently required standardized before-tax returns, which also deduct fees and charges payable upon sale, and would result in comparable disclosure by funds that impose sales charges upon purchase and those that impose sales charges upon redemption.[32] Commenters also argued that this modification would eliminate the need for the proposed pre-liquidation before-tax return figure with no deduction of fees and charges payable upon sale, thereby simplifying the presentation of before- and after-tax returns.

We agree and have eliminated pre-liquidation before-tax returns. This will result in three, rather than four, types of return, all of which are net of all fees and charges: before-tax return; return after taxes on distributions (pre-liquidation); and return after taxes on distributions and redemption (post-liquidation).[33] To address concerns that investors could be confused by a pre-liquidation after-tax return measure that assumes no sale of fund shares for purposes of computing tax consequences but nonetheless reflects fees and charges payable upon a sale of fund shares, we have modified the captions in the performance table to focus investor attention on the taxes that are deducted, rather than whether or not the shareholder held or sold his shares.[34]

**C. Location of Required Disclosure**

We are requiring, as proposed, that funds disclose after-tax returns in the performance table contained in the risk/return summary of the prospectus.[35] The amendments also will have the effect of requiring that after-tax returns be included in any fund profile because a profile must include the prospectus risk/return summary.[36] We proposed, but are not adopting, a requirement that after-tax returns be included in Management's Discussion of Fund Performance ("MDFP"), which is typically contained in the annual report.[37] Funds will, however, be required to state in the MDFP that the performance table and graph do not reflect the deduction of taxes that a shareholder would pay on fund distributions or the redemption of fund shares.[38]

We are requiring that after-tax returns be included in the prospectus and profile because, for the overwhelming majority of prospective investors who base their investment decision, in part, on past performance, after-tax returns can be useful in understanding past performance.[39] Most commenters that addressed the issue of the appropriate location for after-tax return disclosure supported requiring disclosure of after-tax returns in fund prospectuses.

Several commenters recommended that after-tax returns not be included in fund profiles. Commenters were concerned that the length and complexity of the disclosure could overwhelm the remaining information in the profile, defeating the purpose of the summary disclosure document. We continue to believe, however, that after-tax returns should be included in the fund profile because of the importance of past performance in many investors' investment decisions. We have, however, addressed the concerns expressed by commenters by simplifying the presentation of required after-tax returns.[40]

Some commenters supported inclusion of after-tax returns in the risk/return summary, but others recommended that after-tax returns be disclosed in the section of the prospectus describing the tax consequences to investors of buying, holding, exchanging, and selling fund shares.[41] These commenters argued that the required disclosure is too lengthy and technical for inclusion in the risk/return summary. We believe that it is critical that after-tax returns be disclosed in the same location as before-tax returns, so that after-tax returns will be easy for investors to find and compare with before-tax returns. Therefore, we are adopting, as proposed, the requirement that after-tax returns be presented in the risk/return summary. In addition, in response to commenters' concerns that the proposed disclosure would be too lengthy or complex for inclusion in the risk/return summary, we have simplified the presentation of returns in the table, as well as the accompanying narrative.[42]

We have decided not to require funds to include after-tax returns in the MDFP, which is typically contained in the annual report. Many commenters who addressed the issue of the appropriate location for disclosing after-tax returns recommended that after-tax returns not be included in the MDFP. As commenters observed, existing shareholders already receive detailed information that allows them to determine the tax impact of their investment in the fund.[43] They also typically receive on an annual basis an updated prospectus that will contain after-tax performance information.[44] Moreover, commenters pointed out that, because after-tax returns in the MDFP would have been calculated on a fiscal year basis, they would not be comparable from fund to fund, and use of fiscal year results could enable funds to time distributions in order to artificially enhance after-tax returns. We have therefore decided not to require disclosure of after-tax returns in the MDFP.

We are concerned, however, that investors may be confused about whether the returns included in the performance table and graph in the MDFP have been calculated on a before- or after-tax basis. Therefore, funds will be required to include a statement in the MDFP that accompanies the performance table and graph to the effect that the returns shown do not reflect the deduction of taxes that a shareholder would pay on fund distributions or the redemption of fund shares.[45]

**D. Format of Disclosure**

We are requiring, as proposed, that before and after-tax returns be presented in a standardized tabular format. Consistent with the modifications to the types of returns required, funds must present before- and after-tax returns as follows:[46]

**AVERAGE ANNUAL TOTAL RETURNS**

*(For the periods ended December 31, _____)*

| | 1 year | 5 years [or Life of Fund] | 10 years [or Life of Fund] |
|---|---|---|---|
| **Return Before Taxes** | ___% | ___% | ___% |
| **Return After Taxes on Distributions** | ___% | ___% | ___% |
| **Return After Taxes on Distributions and Sale of Fund Shares** | ___% | ___% | ___% |
| ***Index*** **(reflects no deduction for [fees, expenses, or taxes])** | ___% | ___% | ___% |

Before- and after-tax returns must be presented in the order specified, using the captions provided by Form N-1A. When more than one fund or series is offered in a prospectus, the before- and after-tax returns of each fund or series must be adjacent to one another. A prospectus may not, for example, present the before-tax returns for all funds, followed by the after-tax returns for all funds.[47] We believe that this presentation will help investors to compare funds and to understand the differences among the different measures of return for any particular fund.

We have modified the captions in the performance table to focus investor attention on the taxes that are deducted, rather than whether or not the shareholder held or sold his shares. We have also modified the captions to clarify that returns are shown for the life of the fund, if shorter than the 5- or 10-year measurement periods, and that the language following the caption for the index may be modified, as appropriate, to be consistent with the index selected by the fund.

We have also simplified the presentation for funds that offer multiple classes of a fund in a single prospectus. We were persuaded by several commenters who argued that requiring after-tax returns for all classes of a fund, as proposed, could result in overwhelming or confusing disclosure to investors, and that, with the exception of expense ratio differences, which affect the level of dividend distributions, the tax burden of the various share classes will be similar. We have modified the amendments to require that a fund offering multiple classes in a single prospectus present the after-tax returns of only one class.[48] The class selected must be offered to investors who hold their shares through taxable accounts and have returns for at least 10 years, or, if no such class has 10 years of return, be the class with the returns for the longest period.

A fund that offers multiple classes in a single prospectus must explain in the narrative that accompanies the performance table that the after-tax returns are for only one class offered by the prospectus and that the after-tax returns for other classes will vary.[49] In addition, in order to facilitate comparisons among the returns shown, after-tax returns for the one class presented must be adjacent to the before-tax returns for that class and not interspersed with the before-tax returns of the other classes, returns of other funds, or with the return of the broad-based securities market index.[50] The return of the broad-based securities index may either precede or follow the returns for the fund.[51]

**E. Exemptions from the Disclosure Requirement**

We are exempting money market funds from the requirement to disclose after-tax returns, as proposed.[52] We are also adopting, with modifications, our proposal to permit a fund to omit the after-tax return information in a prospectus used exclusively to offer fund shares as investment options for defined contribution plans and similar arrangements.[53]

Specifically, we are permitting a fund to omit the after-tax return information in a prospectus used exclusively to offer fund shares as investment options to one or more of the following:

- a defined contribution plan that meets the requirements for qualification under section 401(k) of the Internal Revenue Code ("Code");
- a tax-deferred arrangement under section 403(b) or 457 of the Code;
- a variable contract as defined in section 817(d) of the Code;
- a similar plan or arrangement pursuant to which an investor is not taxed on his or her investment in the fund until the investment is sold;[54] or
- entities that are not subject to the individual federal income tax.

The proposed after-tax return information would largely be irrelevant in these circumstances because the affected investors either are not subject to current taxation on fund distributions or are not subject to current taxation at the individual federal income tax rates, and their tax consequences on a sale of fund shares are different from those experienced by individual investors in taxable accounts.[55]

In response to the recommendations of several commenters, we have expanded the exemption to include prospectuses used to offer fund shares to entities that are not subject to individual taxation (*e.g.,* tax-exempt foundations, colleges, and corporations). We agree that the after-tax return information is not relevant to these investors. A fund may not, however, rely on this exemption if the prospectus is used indirectly to offer shares to persons that are subject to individual taxation, such as an offer to a partnership whose individual partners are taxed on a pass-through basis.[56]

The Commission carefully considered whether to exclude bond funds, generally, or tax-exempt funds, specifically, from the requirement to disclose after-tax returns. A number of commenters argued that bond funds should be exempt from disclosing after-tax returns because investors in bond funds are generally aware of the tax consequences of investing in these funds, the funds do not usually make unexpected distributions of capital gains, and the funds are bought for their yield and not their growth potential. Other commenters argued that bond funds should not be exempt because such funds may have significant capital gains or losses in volatile markets, certain types of bond funds commonly realize significant capital gains, and some managers of bond funds seek to avoid making capital gains distributions by using various tax management strategies.

Having considered the views expressed by commenters, we have decided not to exempt bond funds from disclosing after-tax returns. While investors may more readily understand the tax impact of owning a bond fund that makes few, if any, capital gains distributions, than the tax impact of owning other funds, bond funds may have significant capital gains or losses, and we believe that it is important for after-tax return information to be available to their shareholders.

Similarly, while most, if not all, income distributed by a tax-exempt mutual fund generally will be tax-exempt, a tax-exempt mutual fund may also make capital gains distributions that are taxable and an investor is taxed on gains from the sale of fund shares.[57] As a result, the performance of a tax-exempt fund may be affected by taxes, and taxes may have a greater or lesser impact on different tax-exempt funds. Therefore, we have decided not to exempt tax-exempt funds from the required disclosure.[58]

**F. Advertisements and Other Sales Literature**

We are adopting, with modifications, amendments that require certain fund advertisements and sales literature to include after-tax performance that is calculated according to the standardized formulas prescribed in Form N-1A for computation of after-tax returns in the risk/return summary. As proposed, all fund advertisements and sales literature that include after-tax performance information will be required to include after-tax returns computed according to the standardized formulas.[59] Any quotation of non-standardized after-tax return also will be subject to the same conditions currently applicable to quotations of non-standardized performance that are included in fund advertisements and sales literature.[60] Requiring advertisements and sales literature that include after-tax performance information to include standardized after-tax returns will help to prevent misleading advertisements and sales literature and permit shareholders to compare claims about after-tax performance.

Commenters generally supported the proposal to require fund advertisements and sales literature that include after-tax performance information to include standardized after-tax returns, but several commenters recommended that we extend the requirement to advertisements and sales literature that claim that a fund is "tax-managed" or "tax-efficient" and that include any performance information. As noted by one commenter, a fund advertising 20 percent before-tax return and claiming 100 percent tax-efficiency could have significant unrealized gains that would result in tax liabilities when a shareholder redeems his or her shares. We are persuaded that, to help prevent such tax-efficiency claims from being misleading, such advertisements should include standardized after-tax returns, which will help an investor to assess the tax-efficiency of the fund more accurately. Therefore, we have modified the proposal to require the inclusion of standardized after-tax returns in any advertisement or sales literature that includes a quotation of performance and that represents or implies that the fund is managed to limit or control the effect of taxes on performance.[61]

This requirement does not apply to advertisements or sales literature for a fund that is eligible to use a name suggesting that the fund's distributions are exempt from federal income tax or from both federal and state income tax under our recently-adopted fund names rule.[62] Because these funds meet the strict standards of the names rule, we have concluded that the additional requirement for including standardized after-tax returns in advertisements or sales literature should not apply to them unless they voluntarily choose to include after-tax performance information.

One commenter recommended that we prohibit funds from publishing after-tax returns for periods of less than one year. The commenter argued that this would prevent funds from reporting year-to-date after-tax returns just before a large taxable distribution, wrongly suggesting to shareholders that the fund had been tax-efficient. While we have decided not to prohibit funds from publishing after-tax returns for periods of less than one year in all cases, we remind funds that sales materials are subject to the antifraud provisions of the federal securities laws and that compliance with the terms of rule 482 under the Securities Act or rule 34b-1 under the Investment Company Act is not a safe harbor from liability for fraud.[63] Therefore, any fund that publishes after-tax returns for periods shorter than one year should be extremely careful to ensure that the returns are not materially misleading, *e.g.,* because the returns incorrectly suggest that a fund has been more tax-efficient than has, in fact, been the case.

**G. Formulas for Computing After-Tax Return**

We are adopting, with the modifications discussed below, the requirement that funds compute after-tax returns using standardized formulas that are based largely on the current standardized formula for computing before-tax average annual total return.[64] After-tax returns will be computed assuming a hypothetical $1,000 one-time initial investment and the deduction of the maximum sales load and other charges from the initial $1,000 payment.[65] Also, after-tax returns will be calculated for 1-, 5-, and 10-year periods.[66]

**1. Tax Bracket**

We are requiring, as proposed, that standardized after-tax returns be calculated assuming that distributions by the fund and gains on a sale of fund shares are taxed at the highest applicable individual federal income tax rate.[67] Comment was divided on this issue. Some commenters supported the highest tax rate as providing investors with the full range of historical after-tax returns, as well as being the simplest rate to use to compute after-tax returns. Other commenters, however, recommended that we require funds to calculate after-tax returns using an intermediate tax rate in addition to, or in lieu of, the highest tax rate. These commenters observed that the typical mutual fund investor is not in the highest tax bracket, and argued that after-tax returns calculated using tax rates to which the typical mutual fund investor is subject would be more useful.

After careful consideration of these comments, we continue to believe that it is most appropriate to use the highest tax rate, rather than an intermediate rate. Computing after-tax returns with maximum tax rates will provide investors with the "worst-case" federal income tax scenario. Coupled with before-tax return, which reflects the imposition of taxes at a 0 percent rate, this "worst-case" scenario will effectively provide investors with the full range of historical after-tax returns. We believe that providing the full range of federal income tax outcomes provides investors the most complete information.

In addition, we concluded that any benefits of using an intermediate tax rate would be outweighed by the complexity of determining the appropriate intermediate rate from one year to the next as tax rates and the income of a typical mutual fund investor change. Most of the commenters who recommended that after-tax returns be calculated using an intermediate rate suggested that we either use a specific rate (*e.g.,* 28 percent) or select a specific income level (*e.g.,* $55,000) that would be used to identify the appropriate tax rate. If we were to adopt either of these approaches, we would be required to make ongoing modifications to respond to changes in tax rates and income levels. One commenter suggested that we determine the intermediate rate by reference to the median United States household income reported by the U.S. Census Bureau. This approach would be predicated on assumptions about the "typical" mutual fund investor and the past, present, and future income of that investor.

In any case, a requirement that funds calculate after-tax returns using an intermediate rate would effectively require that we continually monitor the changing demographics of mutual fund investors, as well as changing tax laws, and update our rules accordingly. The use of an intermediate rate also would require that funds include complex narrative disclosure in the risk/return summary about how the intermediate rate had been selected or what intermediate rate had been used from year to year. [68]

While we are not adopting a requirement that funds calculate after-tax returns using an intermediate rate, we encourage funds to provide their investors with additional information that is tailored to a particular fund's typical investor, or to make available to investors after-tax returns calculated using multiple tax rate assumptions. Funds can supply this information in a variety of ways (*e.g.,* calculators on their websites or disclosure elsewhere in the prospectus of returns calculated based on different tax rate assumptions).

### 2. Capital Gains and Losses Upon a Sale of Fund Shares

We are adopting, substantially as proposed, amendments requiring that return, after taxes on distributions and redemption, be computed assuming a complete sale of fund shares at the end of the 1-, 5-, or 10-year measurement period, resulting in capital gains taxes or a tax benefit from any resulting capital losses.[69] As proposed, a fund will be required to track the actual holding periods of reinvested distributions and may not assume that they have the same holding period as the initial $1,000 investment.[70] We have made technical changes to clarify that applicable federal tax law should be used to determine whether and how gains and losses from the sale of shares with different holding periods should be netted, as well as the tax character (*e.g.,* short-term or long-term) of any resulting gains or losses.[71]

Several commenters suggested that we permit funds to calculate taxes on gains realized upon a sale of shares at the end of the one-year period (*i.e.,* short-term capital gains) as if the shares had been held for one year and one day (*i.e.,* long-term capital gains).[72] These commenters argued that a reasonable shareholder would hold the shares for the extra day in order to qualify for the more advantageous tax treatment, and that it is inappropriate to assume that shares would be sold at the end of the one-year period. We are not modifying the proposal to reflect this comment. A shareholder who redeems his or her shares at any time during the one-year period is subject to taxation of gains at short-term rates. We believe that it is important for the after-tax return calculation to accurately reflect the fact that redeeming shares within the one-year period may have significant adverse tax consequences. In addition, we are providing that the tax consequences of a sale of fund shares should be determined in accordance with applicable federal tax law on the redemption date. If we were, instead, to prescribe a special rule for one-year returns, we would have to reevaluate this special rule in light of subsequent changes in tax law, such as increases to the holding period required for long-term gain treatment.

A number of commenters suggested other modifications to the proposal regarding the tracking of holding periods, such as treating the holding period of all reinvested distributions as beginning on the date of the original investment, and treating all gains on redemption as qualifying for long-term capital gains treatment. We are not adopting these recommended modifications, each of which would have the effect of reclassifying short-term gains as long-term gains, as they would minimize the impact of short-term gains on fund returns, in a manner inconsistent with federal tax law. One of our purposes in requiring the disclosure of after-tax returns is to provide investors with information about the differential impact that taxes have on the before-tax returns of various funds, and we believe that ignoring the effect of short-term gains would tend to minimize these differences inappropriately.

**3. Other Assumptions**

Commenters generally supported the other assumptions that the Commission proposed to require in the computation of after-tax returns, and we are adopting those requirements as proposed. Specifically, after-tax returns:

- Will be calculated using historical tax rates;[73]
- Will be based on calendar-year periods, consistent with the before-tax return disclosure that currently appears in the risk/return summary;[74]
- Will exclude state and local tax liability;[75]
- Will not take into account the effect of either the alternative minimum tax or phaseouts of certain tax credits, exemptions, and deductions for taxpayers whose adjusted gross income is above a specified amount;[76]
- Will assume that any taxes due on a distribution are paid out of that distribution at the time the distribution is reinvested and reduce the amount reinvested;[77] and
- Will be calculated assuming that the taxable amount and tax character (*e.g.,* ordinary income, short-term capital gain, long-term capital gain) of each distribution are as specified by the fund on the dividend declaration date, adjusted to reflect subsequent recharacterizations.[78]

*Tax Treatment of Distributions*

As proposed, we are not specifying in detail the tax consequences of fund distributions. Funds generally should determine the tax consequences of distributions by applying the tax law in effect on the date the distribution is reinvested. However, because a number of commenters expressed concern about whether a fund that has elected to pass through foreign tax credits to its shareholders may reflect the foreign tax credit in after-tax returns, we are providing that the effect of applicable tax credits, such as the foreign tax credit, should be taken into account in accordance with federal tax law.[79]

**H. Narrative Disclosure**

We are adopting, with modifications, the requirement that funds include a short, explanatory narrative adjacent to the performance table in the risk/return summary.[80] This is intended to facilitate investor understanding of the table. We are not mandating specific language for the narrative, but it must be in plain English.[81]

Commenters generally agreed that the proposed narrative disclosure would help investors understand information in the performance table. Several commenters, however, recommended streamlining the narrative by combining some of the proposed items with the narrative currently required for before-tax returns and by eliminating technical items unnecessary for investor understanding of performance information. We agree and have modified the narrative disclosure to require the following information:[82]

- After-tax returns are calculated using the historical highest individual federal marginal income tax rates, and do not reflect the impact of state and local taxes; and
- Actual after-tax returns depend on the investor's tax situation and may differ from those shown, and the after-tax returns shown are not relevant to investors who hold their fund shares through tax-deferred arrangements such as 401(k) plans or individual retirement accounts.[83]

In addition, a fund will be required to provide a statement to the effect that the fund's past performance, before and after taxes, is not necessarily an indication of how the fund will perform in the future.[84]

**I. Technical and Conforming Amendments**

We proposed to amend rule 482(e)(3) under the Securities Act in order to clarify that the average annual total returns that are required to be shown in any performance advertisement are before-tax returns net of fees and charges payable upon a sale of fund shares. This technical change is no longer necessary due to modifications we have made to the types of returns required. We are adopting, as proposed, amendments to rule 34b-1(b)(3) under the Investment Company Act to exclude after-tax performance information contained in periodic reports to shareholders from the updating requirements of the rule.

We proposed to delete an instruction contained in Form N-1A that provides that total return information in a mutual fund prospectus need only be current to the end of the fund's most recent fiscal year because the items of Form N-1A that require funds to include total returns in the prospectus have explicit instructions about how current the total return information must be. We have decided not to delete this instruction because it applies to returns that are not required by specific items of Form N-1A.[85]

**J. Effective Date; Compliance Dates**

**1. Effective Date**

The rule and form amendments that the Commission is adopting today will be effective April 16, 2001.

**2. Compliance Date for Prospectuses**

*February 15, 2002*. All post-effective amendments that are annual updates to effective registration statements and profiles filed on or after February 15, 2002, must comply with the amendments to Form N-1A. Based on the comments, we believe that this will provide funds with sufficient time to make the necessary changes to existing software and internal systems in order to compile after-tax returns and incorporate the new disclosure in their prospectuses. We would not object if existing funds file their first annual update complying with the amendments pursuant to rule 485(b), provided that the post-effective amendment otherwise meets the conditions for immediate effectiveness under the rule.[86]

### 3. Compliance Date for Advertisements and Other Sales Materials

*October 1, 2001*. All fund advertisements and sales materials must comply with the amendments to rules 482 and 34b-1 no later than October 1, 2001. These amendments apply only to those funds voluntarily choosing to include after-tax returns in advertisements or sales literature, or claiming to be managed to limit or control the effect of taxes on performance and including performance information in these materials. As these funds have made the decision to market themselves in this manner, we believe that they should be required to do so in a standardized fashion as soon as practicable.

## III. Cost/Benefit Analysis

In the Proposing Release, we analyzed the costs and benefits of our proposals and requested comments and data regarding the costs and benefits of the rule and form amendments. In response to our request for comments, a few commenters generally argued that the proposed amendments would increase costs for the funds and that such costs will be passed on to investors. None of the commenters, however, provided specific data quantifying additional costs.

The rule and form changes will require a fund to disclose its standardized after-tax returns for 1-, 5-, and 10-year periods. After-tax returns, which will accompany before-tax returns in fund prospectuses, will be presented in two ways: (i) after taxes on fund distributions only; and (ii) after taxes on fund distributions and a redemption of fund shares.[87] The before- and after-tax returns would be required to be presented in a standardized tabular format. Although after-tax returns will not generally be required in fund advertisements and sales literature, any fund that either includes after-tax returns in these materials or includes other performance information together with representations that the fund is managed to limit taxes will be required to include after-tax returns computed according to our standardized formulas.

### A. Benefits

As discussed above, taxes are one of the most significant costs of investing in mutual funds through taxable accounts. In 1999, mutual funds distributed approximately $238 billion in capital gains and $159 billion in taxable dividends.[88] Shareholders investing in stock and bond funds paid an estimated $39 billion in taxes in 1998 on distributions by their funds.[89] Recent estimates suggest that more than two and one-half percentage points of the average stock fund's total return is lost each year to taxes.[90] Moreover, it is estimated that, between 1994 and 1999, investors in diversified U.S. stock funds surrendered an average of 15 percent of their annual gains to taxes.[91]

Despite the tax dollars at stake, many investors lack a clear understanding of the impact of taxes on their mutual fund investments.[92] The tax consequences of distributions are a particular source of surprise to many investors when they discover that they can owe substantial taxes on their mutual fund investments that appear to be unrelated to the performance of the fund. Even if the value of a fund has declined during the year, a shareholder can owe taxes on capital gains distributions if the portfolio manager sold some of the fund's underlying portfolio securities at a gain.

There have been increasing calls for improvement in the disclosure of the tax consequences of mutual fund investments. Mutual funds, as well as third party providers that furnish information to mutual fund shareholders, are responding to this growing investor demand by providing after-tax returns, calculators that investors can use to compute after-tax returns, and other tax information.[93] Indeed, all but a few of the comment letters we received from individual investors supported the Commission's proposal to require standardized after-tax returns.

Currently, the Commission requires mutual funds to disclose significant information about taxes to investors.[94] While this disclosure is useful, we believe funds can more effectively communicate to investors the tax consequences of investing. Therefore, the Commission is adopting amendments to Form N-1A and rules 482 and 34b-1 that will require disclosure of standardized mutual fund after-tax returns.

By requiring all funds to report after-tax performance pursuant to a standardized formula, the amendments will allow investors to compare after-tax performance among funds, which is likely to affect investor decisions relating to the purchase or sale of fund shares. This could have indirect benefits, such as the creation of new funds designed to maximize after-tax performance or causing existing funds to alter their investment strategies to invest in a more tax-efficient manner. The changes in fund investment strategies and investor behavior resulting from this disclosure may also result in higher average after-tax returns for investors.[95]

Requiring standardized after-tax performance in the prospectus, fund advertisements, and sales literature also should help prevent confusing and misleading after-tax performance claims by funds. Currently, fund advertisements and sales literature may contain tax-adjusted performance calculated according to non-standardized methods. In addition to making it difficult to compare after-tax performance measures among different funds, the lack of a standardized method for computing after-tax returns creates the possibility that after-tax performance information as currently reported could be misleading or confusing to investors.

The amendments will also increase the amount of after-tax performance information available to investors. With the exception of the few funds that publish after-tax performance information, investors currently must rely on third-party providers to obtain information regarding a fund's after-tax performance.

Moreover, information regarding a fund's after-tax performance helps investors understand the magnitude of tax costs and how they affect fund performance. Increased understanding should have the beneficial effect of enhancing investor confidence in the fund industry.

**B. Costs**

The changes in fund investment strategies and investor behavior resulting from the after-tax requirements may have distributional effects among funds depending on their relative after-tax returns. Funds that have lower after-tax returns relative to other funds may experience loss of market share. We expect, however, that any reduction of market share for funds with lower after-tax returns will be offset by a commensurate increase in market share for funds with higher after-tax returns.

Funds affected by the after-tax requirements will incur costs in complying with the new disclosure. Funds will have to compute the after-tax returns using a standardized method prescribed by Form N-1A. The costs associated with computing the new after-tax performance will include the costs of purchasing or developing software, implementing a new system for computing the returns, analyzing data for inclusion in the standardized formula, and training fund employees. In addition, funds will incur costs in incorporating the new disclosure in their prospectuses, advertisements, and sales literature. Funds could also incur costs in responding to questions from investors regarding the after-tax returns.

We expect that the costs of implementing new systems to compute the standardized after-tax performance will largely consist of initial, one-time expenses. In addition, the software development and implementation costs may be reduced if software vendors begin to offer "off-the-shelf" programs for computing the standardized after-tax performance data. [96] Also, the costs of analyzing data for inclusion in the standardized formula will be substantially greater in connection with a fund's first-time compliance with the amendments than it will be in subsequent disclosures. Likewise, the costs of revising fund prospectuses, advertisements, and sales literature to incorporate the new disclosure should decrease after the first disclosures complying with the amendments have been made. We note that in response to concerns expressed by certain commenters regarding the burdens imposed on funds by the new requirements, we have simplified the presentation of after-tax returns.[97] Although the costs of updating the disclosure in fund prospectuses, advertisements, and sales literature will be ongoing, the costs incurred in subsequent disclosures should be less than the costs associated with the initial computations and disclosures because neither the formula for calculating performance nor the format for the disclosure will change from year to year.

Because funds filing initial registration statements will not have any performance information to report, the new after-tax performance requirements will not impose any additional costs on the preparation and filing of an initial registration statement on Form N-1A. The disclosure required by the amendments will appear in the first post-effective amendment that is required to include the after-tax return disclosure. The costs associated with including the disclosure in this first post-effective amendment will consist of the costs required for developing a system for performing the standardized calculations and the costs of revising the prospectus to incorporate the new disclosure. The costs incurred by funds choosing to include after-tax returns in fund advertisements and sales literature will be limited to the cost of revising the advertisements and sales literature to incorporate the same standardized after-tax returns that will be required to appear in fund prospectuses.

*Form N-1A*

The primary cost of complying with the amendments to Form N-1A is the cost of preparing and filing post-effective amendments to registration statements. We estimate that 4,500 post-effective amendments to registration statements are filed annually on Form N-1A, for 7,875 portfolios.

These post-effective amendments will contain performance figures and thus be affected by the amendments. For purposes of the Paperwork Reduction Act ("PRA"), we have estimated that the amendments will increase the hour burden per portfolio per filing of a post-effective amendment by 18 hours.[98] Of the 7,875 funds referenced in post-effective amendments, 1,040 are money market funds, which will be exempted from the after-tax disclosure requirements. An additional 1,575 funds are used as investment vehicles for variable insurance contracts, which will be permitted to omit the after-tax information. Thus, approximately 5,260 of the 7,875 funds referenced in post-effective amendments will be affected by the amendments.[99] We estimate that the cost for all funds to comply with the amendments discussed above is $6,059,520.[100]

The amendments to Form N-1A will impose other related costs on funds. Our current estimated cost of preparing a post-effective amendment to a previously effective registration statement is $7,500. We estimate that the additional cost imposed by the amendments to Form N-1A is $1,860 per portfolio/fund or a total cost of $9,783,600.[101] This estimate represents the cost of developing and implementing a computerized system for compiling tax data and computing after-tax returns and the costs of hiring outside counsel to assist in revising the prospectus to incorporate the new after-tax return disclosure.[102] Again, a portion of this cost burden will be comprised largely of initial, one-time costs.

*Rule 482*

Rule 482 is a safe harbor that permits a fund to advertise information the "substance of which" is contained in its statutory prospectus, subject to the requirements of the rule. Rule 482 limits performance information to standardized quotations of yield and total return and other measures of performance that reflect all elements of return.

Because rule 482 does not require funds to perform any computations not required by the amendments for Form N-1A, the primary cost of complying with the amendments is the cost of the additional hour burden that is outlined in our PRA analysis. As described above, there are approximately 5,260 funds filing post-effective amendments that will be affected by the amendments. The Commission further estimates that three percent of these funds will elect to use advertisements or sales literature that either include after-tax returns or include other performance information together with representations that the fund is managed to limit or control the effect of taxes on performance and therefore be required to comply with the amendments to rule 482.[103] For purposes of the PRA, we have estimated that the additional hour burden required to comply with the amendments to rule 482 is .5 hours.[104] The amendments to rule 482 will thus impose additional estimated costs of $5,506.[105]

*Rule 34b-1*

Rule 34b-1 governs sales material that is accompanied or preceded by the delivery of a statutory prospectus and requires the inclusion of standardized performance data and certain legend disclosure in sales material that includes performance data. As with the amendments to rule 482, these amendments will not require funds to perform any computations not required by the amendments to Form N-1A. Hence, the cost of complying with these amendments is primarily the cost associated with the burden estimate in our PRA analysis.

We estimate that approximately 8,495 respondents file approximately 4.35 responses annually pursuant to rule 34b-1.[106] Of these respondents, we estimate that 1,040 are money market funds that will be exempt from the amendments and that an additional 620 funds and unit investment trusts ("UITs") registered on Forms N-3 and N-4 will not be affected by the amendments. We estimate that an additional 1,575 funds registered on Form N-1A and subject to rule 34b-1 are used as underlying portfolios for variable insurance contracts and will not use advertisements or sales literature that include after-tax returns or include other performance information together with representations that the fund is managed to limit or control the effect of taxes on performance. Thus, 5,260 respondents subject to rule 34b-1 will also be subject to the after-tax disclosure.[107] We further estimate that three percent of respondents subject to rule 34b-1 or 157.8 respondents will elect to use advertisements or sales literature that either include after-tax returns or include other performance information together with representations that the fund is managed to limit or control the effect of taxes on performance and therefore be subject to the amendments.[108] For purposes of the PRA, we have estimated that the additional hour burden attributable to the amendments to rule 34b-1 is .5 hours, for a total of 78.9 annual burden hours or $5,049.60.[109]

## IV. Effects on Efficiency, Competition, and Capital Formation

Section 2(c) of the Investment Company Act, section 2(b) of the Securities Act, and section 3(f) of the Exchange Act require the Commission, when engaging in rulemaking that requires it to consider or determine whether an action is consistent with the public interest, to consider, in addition to the protection of investors, whether the action will promote efficiency, competition, and capital formation.[110] The Commission has considered these factors.

The Commission believes that the after-tax return requirements will help to increase investor understanding of a fund's after-tax performance. Increased understanding should enable investors to better evaluate various funds in determining which funds are most suitable for their investment needs. More educated investors should promote competition among funds as they seek to attract those investors interested in the impact of taxes on fund investments. On balance, the Commission believes that the after-tax return requirements will benefit investors, foster efficiency, and promote competition among mutual funds. While investors will be better equipped to make investment decisions, it is unclear whether these amendments will result in an increase in capital formation.

## V. Summary of Final Regulatory Flexibility Analysis

A Final Regulatory Flexibility Analysis ("FRFA") has been prepared in accordance with 5 U.S.C. 604. The Commission proposed amendments to Form N-1A [17 CFR 239.15A and 274.11A], the registration form used by mutual funds to register under the Act and to offer their shares under the Securities Act, and amendments to rule 482 under the Securities Act and rule 34b-1 under the Act in the Proposing Release. The Commission prepared an Initial Regulatory Flexibility Analysis ("IRFA") in accordance with 5 U.S.C. 603 in conjunction with the Proposing Release, which was made available to the public. The Proposing Release summarized the IRFA and solicited comments on it. No comments specifically addressed the IRFA.

### A. Need for the Rule and Form Amendments

As discussed above, taxes are one of the most significant costs of investing in mutual funds through taxable accounts. Despite the tax dollars at stake, many investors lack a clear understanding of the impact of taxes on their mutual fund investments.[111]

There have been increasing calls for improvement in the disclosure of the tax consequences of mutual fund investments. Mutual funds, as well as third party providers that furnish information to mutual fund shareholders, are responding to this growing investor demand by providing after-tax returns, calculators that investors can use to compute after-tax returns, and other tax information.[112] In addition, several fund groups have created new funds promoting the use of more tax-efficient portfolio management strategies.[113] Moreover, in April 2000, a bill that would require the Commission to revise its regulations to require improved disclosure of mutual fund after-tax returns was passed by the U.S. House of Representatives and was referred to the Senate.[114]

### B. Significant Issues Raised by Public Comment

The Commission requested comment on the IRFA, but we received no comments specifically addressing the analysis. One commenter, however, argued that the proposed amendments would have a greater impact on smaller entities while another commenter suggested a longer phase-in period for smaller funds to comply with the new requirements. Neither of the commenters provided any specific or quantifiable data.

### C. Small Entities Subject to the Rule

For purposes of the Regulatory Flexibility Act, a fund is a small entity if the fund, together with other funds in the same group of related funds, has net assets of $50 million or less as of the end of its most recent fiscal year.[115] As of December 1999, there were approximately 2,900 investment companies registered on Form N-1A that may be affected by the proposed amendments.[116] Of these 2,900, approximately 150 are investment companies that meet the Commission's definition of small entity for purposes of the Investment Company Act.[117] The amendments that require funds to provide after-tax returns in registration statements, advertisements, and sales literature will affect those small entities.

**D. Projected Reporting, Recordkeeping, and Other Compliance Requirements**

The amendments will require all funds subject to the amendments to provide after-tax return information in their prospectuses. Although after-tax returns will not generally be required in fund advertisements and sales literature, any fund that either includes after-tax returns in these materials or includes other performance information together with representations that the fund is managed to limit taxes will be required to include after-tax returns computed according to our standardized formulas.

After assessing the amendments in light of the current reporting requirements and consulting with representatives in the industry, the Commission has considered the potential effect that the amendments will have on the preparation of registration statements, advertisements, and sales literature. The Commission estimates that, as a result of the amendments, it will take approximately 18 additional hours per portfolio to prepare the first post-effective amendment to the registration statement on Form N-1A that is required to include the proposed after-tax return disclosure.[118] The Commission believes that this estimate represents an initial, one-time burden and that the hour burden will be reduced for subsequent post-effective amendments. For purposes of calculating the rule 482 hour burden relating to advertisements, the Commission estimates that the proposed amendments will impose approximately .5 additional hours per portfolio.[119] The Commission also estimates that the proposed amendments will impose approximately .5 additional hours per response for sales literature subject to rule 34b-1.[120]

**E. Agency Action to Minimize Effects on Small Entities**

The Commission believes that special compliance or reporting requirements for small entities would not be appropriate or consistent with investor protection. The disclosure amendments we are adopting will give prospective and existing shareholders greater access to information about the after-tax returns of mutual funds. Different disclosure requirements for small entities, such as reducing the level of disclosure that small entities would have to provide, would create the risk that investors would not receive adequate information about a fund's after-tax returns or would receive confusing, false, or misleading information. In addition, investors would not be able to easily compare each fund when making an investment decision if there were no uniform disclosure standards for after-tax performance information applicable to all funds. The Commission believes it is important for prospective and existing shareholders to receive this information about after-tax returns for all funds, not just for funds that are not considered small entities.

Investors in small funds should have information about the funds' after-tax returns and would benefit from this information as much as investors in larger funds. If we do not require certain information for small entities, this could create the risk that investors in small funds might not receive important information about a fund's after-tax returns. The Commission also notes that current disclosure requirements in registration statements do not distinguish between small entities and other funds. In addition, the Commission believes it would be inappropriate to impose a different timetable on small entities for complying with the requirements because investors would not have the ability to compare the after-tax returns of all funds when making an investment decision.

Further clarification, consolidation, or simplification of the proposals for funds that are small entities would be inconsistent with concerns for investor protection. Simplifying or otherwise reducing the regulatory requirements of the proposals for small entities could undercut the purpose of these proposals: to emphasize to investors the impact of taxes on a fund's return and to enable investors to make effective comparisons among various fund performance claims. For the same reasons, using performance standards to specify the requirements for small entities also would not be appropriate.

We note, however, that in response to concerns expressed by certain commenters regarding the burdens imposed on funds by the new requirements, we have simplified the presentation of after-tax returns.[121] We have also extended the date by which all post-effective amendments that are annual updates to effective registration statements and profiles must comply with the amendments to Form N-1A from the proposed six-month period to February 15, 2002, which will provide funds an additional four months to comply with the amendments. Overall, these amendments will not adversely affect small entities. We believe that the burden on funds of computing and disclosing after-tax returns is justified by the benefits to investors from receiving this information. While we acknowledge that funds will incur a one-time cost to modify their systems to compute after-tax returns, the computation thereafter should be straightforward to perform using readily available data.

The FRFA is available for public inspection in File No. S7-23-99, and a copy may be obtained by contacting Peter M. Hong, Special Counsel, at (202) 942-0721, Office of Disclosure Regulation, Division of Investment Management, Securities and Exchange Commission, 450 5th Street, N.W., Washington, D.C. 20549-0506.

## VI. Paperwork Reduction Act

As explained in the Proposing Release, certain provisions of the amendments contain "collection of information" requirements within the meaning of the Paperwork Reduction Act of 1995 [44 U.S.C. 3501, *et seq.*], and the Commission has submitted the proposed collections of information to the Office of Management and Budget ("OMB") for review in accordance with 44 U.S.C. 3507(d) and 5 CFR 1320.11. The titles for the collections of information are: (i) "Form N-1A under the Investment Company Act of 1940 and Securities Act of 1933, Registration Statement of Open-End Management Investment Companies"; (ii) "Registration Statements - Regulation C";[122] and (iii) "Rule 34b-1 of the Investment Company Act of 1940, Sales Literature Deemed to Be Misleading." An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid control number.[123]

Form N-1A (OMB Control No. 3235-0307) was adopted pursuant to section 8(a) of the Investment Company Act [15 U.S.C. 80a-8] and section 5 of the Securities Act [15 U.S.C. 77e]. Rule 30d-1 (OMB Control No. 3235-0025) was adopted pursuant to Section 30(e) of the Investment Company Act [15 U.S.C. 80a-2]. Rule 482 of Regulation C (OMB Control No. 3235-0074) was adopted pursuant to section 10(b) of the Securities Act [15 U.S.C. 77j(b)]. Rule 34b-1 (OMB Control No. 3235-0346) was adopted pursuant to section 34(b) of the Investment Company Act [15 U.S.C. 80a-33(b)].

As discussed above, the amendments will require a fund to disclose its standardized after-tax returns for 1-, 5-, and 10-year periods. After-tax return information is to be included in the risk/return summary of the prospectus. Funds are required to include a short, explanatory narrative adjacent to the performance table in the risk/return summary. After-tax returns, which will accompany before-tax returns in fund prospectuses, will be presented in two ways: (i) after taxes on fund distributions only; and (ii) after taxes on fund distributions and a redemption of fund shares. The before- and after-tax returns will be required to be presented in a standardized tabular format. Although after-tax returns will not generally be required in fund advertisements and sales literature, any fund that either includes after-tax returns in these materials or includes other performance information together with representations that the fund is managed to limit taxes will be required to include after-tax returns computed according to our standardized formulas.

The information required by the amendments is primarily for the use and benefit of investors. The Commission is concerned that mutual fund investors who are subject to current taxation may not fully appreciate the impact of taxes on their fund investments because mutual funds are currently required to report their performance on a before-tax basis only. Many investors consider performance one of the most significant factors when selecting or evaluating a fund, and we believe that requiring funds to disclose their after-tax performance would allow investors to make better-informed decisions. The information required to be filed with the Commission pursuant to the information collections also permits the verification of compliance with securities law requirements and assures the public availability and dissemination of the information.

In the Proposing Release, the Commission estimated the burden hours that would be necessary for the collection of information requirements under the proposed amendments. Although no commenters specifically addressed the burden estimates for the collection of information requirements, a few commenters raised concerns regarding the costs involved in complying with the disclosure requirements of the amendments. These commenters, however, did not provide an estimate of the burden hours associated with the proposed rule changes. We continue to believe that the estimates of the burden hours contained in the Proposing Release are appropriate.[124]

*Form N-1A*

Form N-1A, including the amendments, contains collection of information requirements. The purpose of Form N-1A is to meet the registration and disclosure requirements of the Securities Act and the Investment Company Act and to enable funds to provide investors with information necessary to evaluate an investment in the fund. The likely respondents to this information collection are open-end funds registering with the Commission on Form N-1A.

We estimate that 170 initial registration statements are filed annually on Form N-1A, registering 298 portfolios, and that the current hour burden per portfolio per filing is 824 hours, for a total annual hour burden of 245,552 hours.[125] We estimate that 4,500 post-effective amendments to registration statements are filed annually on Form N-1A, for 7,875 portfolios, and that the current hour burden per portfolio per post-effective amendment filing is 104 hours, for an annual burden of 819,000 hours.[126] Thus, we estimate a current total annual hour burden of 1,064,552 hours for the preparation and filing of Form N-1A and post-effective amendments on Form N-1A.

The proposed amendments will not affect the hour burden of an initial filing of a registration statement on Form N-1A since an investment company filing such an initial form will have no performance history to disclose. Post-effective amendments to such registration statements, however, will contain performance figures and thus be affected by the amendments. We estimate that the amendments will increase the hour burden per portfolio per filing of a post-effective amendment by 18 hours.[127] Of the 7,875 funds referenced in post-effective amendments, 1,040 are money market funds, which will be exempted from the after-tax return disclosure requirements. An additional 1,575 funds are used as investment vehicles for variable insurance contracts, which will be permitted to omit the after-tax information. Thus, approximately 5,260 of the 7,875 funds referenced in post-effective amendments will be affected by the proposed amendments.[128] The Commission estimates the total annual hour burden for all funds for preparation and filing of initial registration statements and post-effective amendments on Form N-1A will be 1,159,311 hours.[129]

Compliance with the disclosure requirements of Form N-1A is mandatory. Responses to the disclosure requirements will not be kept confidential.

*Rule 482*

Rule 482, including the amendments, contains collection of information requirements. The rule permits a fund to advertise information the "substance of which" is contained in its statutory prospectus, subject to the requirements of the rule. Rule 482 limits performance information to standardized quotations of yield and total return and other measures of performance that reflect all elements of return.

The increased burden associated with the amendments to rule 482 is included in Form N-1A.[130] Thus, the amendments to rule 482 will affect the burden hours for Form N-1A, the registration form for open-end investment companies that currently may advertise pursuant to rule 482. As described above, there are approximately 5,260 funds filing post-effective amendments that will be affected by the proposed amendments. The Commission further estimates that three percent of these funds will elect to use advertisements or sales literature that either include after-tax returns or include other performance information together with representations that the fund is managed to limit or control the effect of taxes on performance and therefore be required to comply with the proposed amendments to rule 482.[131] We estimate that the additional hour burden required to comply with the proposed amendments to rule 482 is .5 hours.[132]

Compliance with rule 482 is mandatory for every registered fund that issues advertisements. Responses to the disclosure requirements will not be kept confidential.

*Rule 34b-1*

Rule 34b-1, including the amendments, contains collection of information requirements. The rule governs sales material that is accompanied or preceded by the delivery of a statutory prospectus and requires the inclusion of standardized performance data and certain legend disclosure in sales material that includes performance data.

We estimate that approximately 8,495 respondents file approximately 4.35 responses annually pursuant to rule 34b-1.[133] Of these respondents, we estimate that 1,040 are money market funds that will be exempt from the amendments and that an additional 620 funds and unit investment trusts ("UITs") registered on Forms N-3 and N-4 will not be affected by the amendments. We estimate that an additional 1,575 funds registered on Form N-1A and subject to rule 34b-1 are used as underlying portfolios for variable insurance contracts and will not advertise after-tax returns or use advertisements that either include other performance information together with representations that the fund is managed to limit or control the effect of taxes on performance due to their unique tax-deferred nature. Thus, 5,260 respondents subject to rule 34b-1 will also be subject to the after-tax return disclosure.[134] We further estimate that three percent of respondents subject to rule 34b-1 will elect to use advertisements or sales literature that either include after-tax returns or include other performance information together with representations that the fund is managed to limit or control the effect of taxes on performance and therefore be subject to the proposed amendments.[135] The burden for rule 34b-1 requires approximately 2.4 hours per response resulting from creating the information required by rule 34b-1. We estimate that rule 34b-1 imposes a current total annual reporting burden of 88,800 hours on the industry.[136] We estimate that the additional hour burden required to comply with the proposed amendments to rule 34b-1 is .5 hours, for a total burden per response of 2.9 hours and a total annual burden on the industry of 89,143 hours.[137]

Compliance with rule 34b-1 is mandatory for every registered investment company that issues sales literature. Responses to the disclosure requirements will not be kept confidential.

## VII. Statutory Authority

The Commission is adopting amendments to Form N-1A pursuant to authority set forth in sections 5, 6, 7, 10, and 19(a) of the Securities Act [15 U.S.C. 77e, 77f, 77g, 77j, 77s(a)] and sections 8, 24(a), and 38 of the Investment Company Act [15 U.S.C. 80a-8, 80a-24(a), 80a-37]. The Commission is adopting amendments to rule 482 pursuant to authority set forth in sections 5, 10(b), and 19(a) of the Securities Act [15 U.S.C. 77e, 77j(b), and 77s(a)]. The Commission is adopting amendments to rule 34b-1 pursuant to authority set forth in sections 34(b) and 38(a) of the Investment Company Act [15 U.S.C. 80a-33(b) and 80a-37(a)].

**List of Subjects**

**17 CFR Part 230**

Advertising, Investment companies, Reporting and recordkeeping requirements, Securities.

**17 CFR Part 239**

Reporting and recordkeeping requirements, Securities.

**17 CFR Parts 270 and 274**

Investment companies, Reporting and recordkeeping requirements, Securities.

## Text of Rules and Forms

For the reasons set out in the preamble, Title 17, Chapter II of the Code of Federal Regulations is amended as follows:

**PART 230 -- GENERAL RULES AND REGULATIONS, SECURITIES ACT OF 1933**

1. The general authority citation for part 230 is revised to read as follows:

**Authority:** 15 U.S.C. 77b, 77c, 77d, 77f, 77g, 77h, 77j, 77r, 77sss, 77z-3, 78c, 78d, 78*l*, 78m, 78n, 78o, 78t, 78w, 78*ll*(d), 78mm, 79t, 80a-8, 80a-24, 80a-28, 80a-29, 80a-30, and 80a-37, unless otherwise noted.

2. Section 230.482 is amended by:

a. removing "; and" at the end of paragraph (e)(3)(iv) and in its place adding a period;

b. redesignating paragraph (e)(4) as paragraph (e)(5) and paragraph (f) as paragraph (g);

c. adding new paragraphs (e)(4) and (f); and

d. revising newly redesignated paragraph (e)(5) to read as follows:

**§ 230.482 Advertising by an investment company as satisfying requirements of section 10.**

* * * * *

(e) * * *

(4) For an open-end management investment company, average annual total return (after taxes on distributions) and average annual total return (after taxes on distributions and redemption) for one, five, and ten year periods; *Provided*, That if the company's registration statement under the Securities Act of 1933 (15 U.S.C. 77a *et seq.*) has been in effect for less than one, five, or ten years, the time period during which the registration statement was in effect is substituted for the period(s) otherwise prescribed; and *Provided further*, That such quotations:

(i) Are based on the methods of computation prescribed in Form N-1A;

(ii) Are current to the most recent calendar quarter ended prior to the submission of the advertisement for publication;

(iii) Are accompanied by quotations of total return as provided for in paragraph (e)(3) of this section;

(iv) Include both average annual total return (after taxes on distributions) and average annual total return (after taxes on distributions and redemption);

(v) Are set out with equal prominence and are set out in no greater prominence than the required quotations of total return; and

(vi) Identify the length of and the last day of the one, five, and ten year periods; and

(5) Any other historical measure of company performance (not subject to any prescribed method of computation) if such measurement:

(i) Reflects all elements of return;

(ii) Is accompanied by quotations of total return as provided for in paragraph (e)(3) of this section;

(iii) In the case of any measure of performance adjusted to reflect the effect of taxes, is accompanied by quotations of total return as provided for in paragraph (e)(4) of this section;

(iv) Is set out in no greater prominence than the required quotations of total return; and

(v) Identifies the length of and the last day of the period for which performance is measured.

(f) An advertisement for an open-end management investment company (other than a company that is permitted under § 270.35d-1(a)(4) of this chapter to use a name suggesting that the company's distributions are exempt from federal income tax or from both federal and state income tax) that represents or implies that the company is managed to limit or control the effect of taxes on company performance shall accompany any quotation of the company's performance permitted by paragraph (e) of this section with quotations of total return as provided for in paragraph (e)(4) of this section.

* * * * *

**PART 270 -- RULES AND REGULATIONS, INVESTMENT COMPANY ACT OF 1940**

3. The authority citation for part 270 continues to read in part as follows:

**Authority:** 15 U.S.C. 80a-1 *et seq*., 80a-34(d), 80a-37, 80a-39, unless otherwise noted;

4. Section 270.34b-1 is amended by:

a. redesignating paragraphs (b)(1)(iii)(B) and (C) as paragraphs (b)(1)(iii)(D)

and (E);

b. adding new paragraphs (b)(1)(iii)(B) and (C); and

c. revising paragraph (b)(3) before the note to read as follows:

**§ 270.34b-1 Sales literature deemed to be misleading.**

* * * * *

(b)(1) * * *

(iii) * * *

(B) Accompany any quotation of performance adjusted to reflect the effect of taxes (not including a quotation of tax equivalent yield or other similar quotation purporting to demonstrate the tax equivalent yield earned or distributions made by the company) with the quotations of total return specified by paragraph (e)(4) of § 230.482 of this chapter;

(C) If the sales literature (other than sales literature for a company that is permitted under § 270.35d-1(a)(4) to use a name suggesting that the company's distributions are exempt from federal income tax or from both federal and state income tax) represents or implies that the company is managed to limit or control the effect of taxes on company performance, include the quotations of total return specified by paragraph (e)(4) of § 230.482 of this chapter;

* * * * *

(3) The requirements specified in paragraph (b)(1) of this section shall not apply to any quarterly, semi-annual, or annual report to shareholders under Section 30 of the Act (15 U.S.C. 80a-29) containing performance data for a period commencing no earlier than the first day of the period covered by the report; nor shall the requirements of paragraphs (e)(3)(ii), (e)(4)(ii), and (g) of § 230.482 of this chapter apply to any such periodic report containing any other performance data.

* * * * *

**PART 239 -- FORMS PRESCRIBED UNDER THE SECURITIES ACT OF 1933**

5. The authority citation for part 239 continues to read, in part, as follows:

**Authority**: 15 U.S.C. 77f, 77g, 77h, 77j, 77s, 77z-2, 77sss, 78c, 78*l*, 78m, 78n, 78o(d), 78u-5, 78w(a), 78*ll*(d), 79e, 79f, 79g, 79j, 79*l*, 79m, 79n, 79q, 79t, 80a-8, 80a-24, 80a-29, 80a-30 and 80a-37, unless otherwise noted.

**PART 274 -- FORMS PRESCRIBED UNDER THE INVESTMENT COMPANY ACT OF 1940**

6. The authority citation for part 274 continues to read as follows:

**Authority**: 15 U.S.C. 77f, 77g, 77h, 77j, 77s, 78c(b), 78*l*, 78m, 78n, 78o(d),

80a-8, 80a-24, and 80a-29, unless otherwise noted.

Note: The text of Form N-1A does not and these amendments will not appear in the *Code of Federal Regulations.*

7. General Instruction C to Form N-1A (referenced in §§ 239.15A and 274.11A) is amended by adding paragraphs 3.(d)(iii) and (iv) to read as follows:

**Form N-1A**

*** * * * ***

**General Instructions**

* * * * *

**C. Preparation of the Registration Statement**

* * * * *

**3. Additional Matters:**

* * * * *

(d) * * *

(iii) A Fund may omit the information required by Items 2(c)(2)(iii)(B) and (C) and 2(c)(2)(iv) if the Fund's prospectus will be used exclusively to offer Fund shares as investment options for one or more of the following:

(A) a defined contribution plan that meets the requirements for qualification under section 401(k) of the Internal Revenue Code (26 U.S.C. 401(k)), a tax-deferred arrangement under section 403(b) or 457 of the Internal Revenue Code (26 U.S.C. 403(b) or 457), a variable contract as defined in section 817(d) of the Internal Revenue Code (26 U.S.C. 817(d)), or a similar plan or arrangement pursuant to which an investor is not taxed on his or her investment in the Fund until the investment is sold; or

(B) persons that are not subject to the federal income tax imposed under section 1 of the Internal Revenue Code (26 U.S.C. 1), or any successor to that section.

(iv) A Fund that omits information under Instruction (d)(iii) may alter the legend required on the back cover page by Item 1(b)(1) to state, as applicable, that the prospectus is intended for use in connection with a defined contribution plan, tax-deferred arrangement, variable contract, or similar plan or arrangement, or persons described in Instruction (d)(iii)(B).

* * * * *

8. Item 2 of Form N-1A (referenced in §§ 239.15A and 274.11A) is amended by:

a. revising paragraphs (c)(2)(i) and (c)(2)(iii);

b. adding paragraph (c)(2)(iv);

c. revising paragraph (a) of Instruction 2;

d. adding paragraph (e) to Instruction 2; and

e. revising paragraph (c) of Instruction 3 to read as follows:

**Form N-1A**

* * * * *

**Item 2. Risk/Return Summary: Investments, Risks, and Performance**

* * * * *

(c) * * *

(2) * * *

(i) Include the bar chart and table required by paragraphs (c)(2)(ii) and (iii) of this section. Provide a brief explanation of how the information illustrates the variability of the Fund's returns (*e.g.,* by stating that the information provides some indication of the risks of investing in the Fund by showing changes in the Fund's performance from year to year and by showing how the Fund's average annual returns for 1, 5, and 10 years compare with those of a broad measure of market performance). Provide a statement to the effect that the Fund's past performance (before and after taxes) is not necessarily an indication of how the Fund will perform in the future.

* * * * *

(iii) If the Fund has annual returns for at least one calendar year, provide a table showing the Fund's (A) average annual total return; (B) average annual total return (after taxes on distributions); and (C) average annual total return (after taxes on distributions and redemption). A Money Market Fund should show only the returns described in clause (A) of the preceding sentence. All returns should be shown for 1-, 5-, and 10- calendar year periods ending on the date of the most recently completed calendar year (or for the life of the Fund, if shorter), but only for periods subsequent to the effective date of the Fund's registration statement. The table also should show the returns of an appropriate broad-based securities market index as defined in Instruction 5 to Item 5(b) for the same periods. A Fund that has been in existence for more than 10 years also may include returns for the life of the Fund. A Money Market Fund may provide the Fund's 7-day yield ending on the date of the most recent calendar year or disclose a toll-free (or collect) telephone number that investors can use to obtain the Fund's current 7-day yield. For a Fund (other than a Money Market Fund or a Fund described in General Instruction C.3.(d)(iii)), provide the information in the following table with the specified captions:

**AVERAGE ANNUAL TOTAL RETURNS**

*(For the periods ended December 31, _____)*

| | 1 year | 5 years [or Life of Fund] | 10 years [or Life of Fund] |
|---|---|---|---|
| **Return Before Taxes** | ___% | ___% | ___% |
| **Return After Taxes on Distributions** | ___% | ___% | ___% |
| **Return After Taxes on Distributions and Sale of Fund Shares** | ___% | ___% | ___% |
| ***Index*** **(reflects no deduction for [fees, expenses, or taxes])** | ___% | ___% | ___% |

(iv) Adjacent to the table required by paragraph 2(c)(2)(iii), provide a brief explanation that:

(A) After-tax returns are calculated using the historical highest individual federal marginal income tax rates and do not reflect the impact of state and local taxes;

(B) Actual after-tax returns depend on an investor's tax situation and may differ from those shown, and after-tax returns shown are not relevant to investors who hold their Fund shares through tax-deferred arrangements, such as 401(k) plans or individual retirement accounts;

(C) If the Fund is a Multiple Class Fund that offers more than one Class in the prospectus, after-tax returns are shown for only one Class and after-tax returns for other Classes will vary; and

(D) If average annual total return (after taxes on distributions and redemption) is higher than average annual total return, the reason for this result may be explained.

*Instructions.*

* * * * *

*2. Table.*

(a) Calculate a Money Market Fund's 7-day yield under Item 21(a); the Fund's average annual total return under Item 21(b)(1); and the Fund's average annual total return (after taxes on distributions) and average annual total return (after taxes on distributions and redemption) under Items 21(b)(2) and (3), respectively.

* * *

(e) Returns required by paragraphs 2(c)(2)(iii)(A), (B), and (C) for a Fund or Series must be adjacent to one another and appear in that order. When more than one Fund or Series is offered in the prospectus, do not intersperse returns of one Fund or Series with returns of another Fund or Series. The returns for a broad-based securities market index, as required by paragraph 2(c)(2)(iii), must precede or follow all of the returns for a Fund or Series rather than be interspersed with the returns of the Fund or Series.

* * * * *

*3. Multiple Class Funds.*

* * * * *

(c) When a Multiple Class Fund offers more than one Class in the prospectus:

(i) Provide the returns required by paragraph 2(c)(2)(iii)(A) of this Item for each Class offered in the prospectus;

(ii) Provide the returns required by paragraphs 2(c)(2)(iii)(B) and (C) of this Item for only one of those Classes. The Fund may select the Class for which it provides the returns required by paragraphs 2(c)(2)(iii)(B) and (C) of this Item, provided that the Fund:

(A) Selects a Class that has been offered for use as an investment option for accounts other than those described in General Instruction C.3.(d)(iii)(A);

(B) Selects a Class described in paragraph (c)(ii)(A) of this instruction with 10 or more years of annual returns if other Classes described in paragraph (c)(ii)(A) of this instruction have fewer than 10 years of annual returns;

(C) Selects the Class described in paragraph (c)(ii)(A) of this instruction with the longest period of annual returns if the Classes described in paragraph (c)(ii)(A) of this instruction all have fewer than 10 years of returns; and

(D) If the Fund provides the returns required by paragraphs 2(c)(2)(iii)(B) and (C) of this Item for a Class that is different from the Class selected for the most immediately preceding period, explain in a footnote to the table the reasons for the selection of a different Class;

(iii) The returns required by paragraphs 2(c)(2)(iii)(A), (B), and (C) of this Item for the Class described in paragraph (c)(ii) of this instruction should be adjacent and should not be interspersed with the returns of other Classes; and

(iv) All returns shown should be identified by Class.

* * * * *

9. Item 5 of Form N-1A (referenced in §§ 239.15A and 274.11A) is amended by revising paragraph (b)(2) to read as follows:

**Form N-1A**

* * * * *

**Item 5. Management's Discussion of Fund Performance**

* * * * *

(b)(1) * * *

(2) In a table placed within or next to the graph, provide the Fund's average annual total returns for the 1-, 5-, and 10-year periods as of the end of the last day of the most recent fiscal year (or for the life of the Fund, if shorter), but only for periods

subsequent to the effective date of the Fund's registration statement. Average annual total returns should be computed in accordance with Item 21(b)(1). Include a statement accompanying the graph and table to the effect that past performance does not predict future performance and that the graph and table do not reflect the deduction of taxes that a shareholder would pay on fund distributions or the redemption of fund shares.

* * * * *

10. Item 21 of Form N-1A (referenced in §§ 239.15A and 274.11A) is amended by:

a. revising the phrase "(b)(1) - (4)" to read "(b)(1) - (6)" in the introductory text of paragraph (b);

b. redesignating paragraphs (b)(2), (3), (4), and (5) as paragraphs (b)(4), (5), (6), and (7), respectively;

c. adding new paragraphs (b)(2) and (b)(3); and

d. revising paragraph (b)(1) to read as follows:

**Form N-1A**

* * * * *

**Item 21. Calculation of Performance Data**

* * * * *

(b) * * *

(1) *Average Annual Total Return Quotation.* For the 1-, 5-, and 10-year periods ended on the date of the most recent balance sheet included in the registration statement (or for the periods the Fund has been in operation), calculate the Fund's average annual total return by finding the average annual compounded rates of return over the 1-, 5-, and 10-year periods (or for the periods of the Fund's operations) that would equate the initial amount invested to the ending redeemable value, according to the following formula:

$P(1+T)^n = ERV$

Where:

P = a hypothetical initial payment of $1,000.

T = average annual total return.

n = number of years.

ERV = ending redeemable value of a hypothetical $1,000 payment made at the beginning of the 1-, 5-, or 10-year periods at the end of the 1-, 5-, or 10-year periods (or fractional portion).

*Instructions.*

1. Assume the maximum sales load (or other charges deducted from payments) is

deducted from the initial $1,000 payment.

2. Assume all distributions by the Fund are reinvested at the price stated in the prospectus (including any sales load imposed upon reinvestment of dividends) on the reinvestment dates during the period.

3. Include all recurring fees that are charged to all shareholder accounts. For any account fees that vary with the size of the account, assume an account size equal to the Fund's mean (or median) account size. Reflect, as appropriate, any recurring fees charged to shareholder accounts that are paid other than by redemption of the Fund's shares.

4. Determine the ending redeemable value by assuming a complete redemption at the end of the 1-, 5-, or 10-year periods and the deduction of all nonrecurring charges deducted at the end of each period. If shareholders are assessed a deferred sales load, assume the maximum deferred sales load is deducted at the times, in the amounts, and under the terms disclosed in the prospectus.

5. State the average annual total return quotation to the nearest hundredth of one percent.

6. Total return information in the prospectus need only be current to the end of the Fund's most recent fiscal year.

(2) *Average Annual Total Return (After Taxes on Distributions) Quotation.*

For the 1-, 5-, and 10-year periods ended on the date of the most recent balance sheet included in the registration statement (or for the periods the Fund has been in operation), calculate the Fund's average annual total return (after taxes on distributions) by finding the average annual compounded rates of return over the 1-, 5-, and 10-year periods (or for the periods of the Fund's operations) that would equate the initial amount invested to the ending value, according to the following formula:

$P(1+T)^n = ATV_D$

Where:

P = a hypothetical initial payment of $1,000.

T = average annual total return (after taxes on distributions).

n = number of years.

$ATV_D$ = ending value of a hypothetical $1,000 payment made at the beginning of the 1-, 5-, or 10-year periods at the end of the 1-, 5-, or 10-year periods (or fractional portion), after taxes on fund distributions but not after taxes on redemption.

*Instructions.*

1. Assume the maximum sales load (or other charges deducted from payments) is deducted from the initial $1,000 payment.

2. Assume all distributions by the Fund, less the taxes due on such distributions, are reinvested at the price stated in the prospectus (including any sales load imposed upon reinvestment of dividends) on the reinvestment dates during the period.

3. Calculate the taxes due on any distributions by the Fund by applying the tax rates specified in Instruction 4 to each component of the distributions on the reinvestment date (*e.g.,* ordinary income, short-term capital gain, long-term capital gain).

The taxable amount and tax character of each distribution should be as specified by the Fund on the dividend declaration date, but may be adjusted to reflect subsequent recharacterizations of distributions. Distributions should be adjusted to reflect the federal tax impact the distribution would have on an individual taxpayer on the reinvestment date. For example, assume no taxes are due on the portion of any distribution that would not result in federal income tax on an individual, *e.g*., tax-exempt interest or non-taxable returns of capital. The effect of applicable tax credits, such as the foreign tax credit, should be taken into account in accordance with federal tax law.

4. Calculate the taxes due using the highest individual marginal federal income tax rates in effect on the reinvestment date. The rates used should correspond to the tax character of each component of the distributions (*e.g*., ordinary income rate for ordinary income distributions, short-term capital gain rate for short-term capital gain distributions, long-term capital gain rate for long-term capital gain distributions). Note that the required tax rates may vary over the measurement period. Disregard any potential tax liabilities other than federal tax liabilities (*e.g*., state and local taxes); the effect of phaseouts of certain exemptions, deductions, and credits at various income levels; and the impact of the federal alternative minimum tax.

5. Include all recurring fees that are charged to all shareholder accounts. For any account fees that vary with the size of the account, assume an account size equal to the Fund's mean (or median) account size. Assume that no additional taxes or tax credits result from any redemption of shares required to pay such fees. Reflect, as appropriate, any recurring fees charged to shareholder accounts that are paid other than by redemption of the Fund's shares.

6. Determine the ending value by assuming a complete redemption at the end of the 1-, 5-, or 10-year periods and the deduction of all nonrecurring charges deducted at the end of each period. If shareholders are assessed a deferred sales load, assume the maximum deferred sales load is deducted at the times, in the amounts, and under the terms disclosed in the prospectus. Assume that the redemption has no tax consequences.

7. State the average annual total return (after taxes on distributions) quotation to the nearest hundredth of one percent.

(3) *Average Annual Total Return (After Taxes on Distributions and Redemption) Quotation.* For the 1-, 5-, and 10-year periods ended on the date of the most recent balance sheet included in the registration statement (or for the periods the Fund has been in operation), calculate the Fund's average annual total return (after taxes on distributions and redemption) by finding the average annual compounded rates of return over the 1-, 5-, and 10-year periods (or for the periods of the Fund's operations) that would equate the initial amount invested to the ending value, according to the following formula:

$$P(1 + T)^n = ATV_{DR}$$

Where:

P = a hypothetical initial payment of $1,000.

T = average annual total return (after taxes on distributions and redemption).

n = number of years.

$ATV_{DR}$ = ending value of a hypothetical $1,000 payment made at the beginning of the 1-, 5-, or 10-year periods at the end of the 1-, 5-, or 10-year periods (or fractional portion), after taxes on fund distributions and redemption.

*Instructions.*

1. Assume the maximum sales load (or other charges deducted from payments) is deducted from the initial $1,000 payment.

2. Assume all distributions by the Fund, less the taxes due on such distributions, are reinvested at the price stated in the prospectus (including any sales load imposed upon reinvestment of dividends) on the reinvestment dates during the period.

3. Calculate the taxes due on any distributions by the Fund by applying the tax rates specified in Instruction 4 to each component of the distributions on the reinvestment date (*e.g.,* ordinary income, short-term capital gain, long-term capital gain). The taxable amount and tax character of each distribution should be as specified by the Fund on the dividend declaration date, but may be adjusted to reflect subsequent recharacterizations of distributions. Distributions should be adjusted to reflect the federal tax impact the distribution would have on an individual taxpayer on the reinvestment date. For example, assume no taxes are due on the portion of any distribution that would not result in federal income tax on an individual, *e.g.,* tax-exempt interest or non-taxable returns of capital. The effect of applicable tax credits, such as the foreign tax credit, should be taken into account in accordance with federal tax law.

4. Calculate the taxes due using the highest individual marginal federal income tax rates in effect on the reinvestment date. The rates used should correspond to the tax character of each component of the distributions (*e.g.,* ordinary income rate for ordinary income distributions, short-term capital gain rate for short-term capital gain distributions, long-term capital gain rate for long-term capital gain distributions). Note that the required tax rates may vary over the measurement period. Disregard any potential tax liabilities other than federal tax liabilities (*e.g.,* state and local taxes); the effect of phaseouts of certain exemptions, deductions, and credits at various income levels; and the impact of the federal alternative minimum tax.

5. Include all recurring fees that are charged to all shareholder accounts. For any account fees that vary with the size of the account, assume an account size equal to the Fund's mean (or median) account size. Assume that no additional taxes or tax credits result from any redemption of shares required to pay such fees. Reflect, as appropriate, any recurring fees charged to shareholder accounts that are paid other than by redemption of the Fund's shares.

6. Determine the ending value by assuming a complete redemption at the end of the 1-, 5-, or 10-year periods and the deduction of all nonrecurring charges deducted at the end of each period. If shareholders are assessed a deferred sales load, assume the maximum deferred sales load is deducted at the times, in the amounts, and under the terms disclosed in the prospectus.

7. Determine the ending value by subtracting capital gains taxes resulting from the redemption and adding the tax benefit from capital losses resulting from the redemption.

(a) Calculate the capital gain or loss upon redemption by subtracting the tax basis from the redemption proceeds (after deducting any nonrecurring charges as specified by Instruction 6).

(b) The Fund should separately track the basis of shares acquired through the $1,000 initial investment and each subsequent purchase through reinvested distributions. In determining the basis for a reinvested distribution, include the distribution net of taxes assumed paid from the distribution, but not net of any sales loads imposed upon reinvestment. Tax basis should be adjusted for any distributions representing returns of capital and any other tax basis adjustments that would apply to an individual taxpayer, as permitted by applicable federal tax law.

(c) The amount and character (*e.g.*, short-term or long-term) of capital gain or loss upon redemption should be separately determined for shares acquired through the $1,000 initial investment and each subsequent purchase through reinvested distributions. The Fund should not assume that shares acquired through reinvestment of distributions have the same holding period as the initial $1,000 investment. The tax character should be determined by the length of the measurement period in the case of the initial $1,000 investment and the length of the period between reinvestment and the end of the measurement period in the case of reinvested distributions.

(d) Calculate the capital gains taxes (or the benefit resulting from tax losses) using the highest federal individual capital gains tax rate for gains of the appropriate character in effect on the redemption date and in accordance with federal tax law applicable on the redemption date. For example, applicable federal tax law should be used to determine whether and how gains and losses from the sale of shares with different holding periods should be netted, as well as the tax character (*e.g.*, short-term or long-term) of any resulting gains or losses. Assume that a shareholder has sufficient capital gains of the same character from other investments to offset any capital losses from the redemption so that the taxpayer may deduct the capital losses in full.

8. State the average annual total return (after taxes on distributions and redemption) quotation to the nearest hundredth of one percent.

* * * * *

By the Commission.

Jonathan G. Katz
Secretary

January 18, 2001

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## Footnotes

1 *See* Disclosure of Mutual Fund After-Tax Returns, Investment Company Act Release No. 24339 (Mar. 15, 2000) [65 FR 15500 (Mar. 22, 2000)] ("Proposing Release").

2 Investment Company Institute ("ICI"), Mutual Fund Fact Book 56 (2000) ("2000 Mutual Fund Fact Book") (distributions of taxable dividends included $95.6 billion on equity, hybrid, and bond funds and $63.1 billion on money market funds).

3 Liberty Funds Distributor News Release, *Liberty Announces Annual Mutual Fund Tax Pain Index* (Apr. 12, 2000) http://www.libertyfunds.com (estimate of the tax burden based on net capital gains realized on mutual funds other than money market funds, and net investment income on equity, bond, and

income funds).

4 KPMG Peat Marwick LLP, An Educational Analysis of Tax-Managed Mutual Funds and the Taxable Investor ("KPMG Study"), at 14.

5 Jonathan Clements, *Fund Distributions are a Taxing Problem; How the Tax Man Dines on Your Funds,* The Wall Street Journal, Aug. 31, 1999, at C1.

6 In a recent telephone survey, 1,000 mutual fund investors were asked about their tax knowledge. Eighty-five percent of respondents claimed taxes play an important role in investment decisions, but only thirty-three percent felt that they were very knowledgeable about the tax implications of investing. Eighty-two percent were unable to identify the maximum rate for long-term capital gains. The Dreyfus Corporation, *Dreyfus' 1999 Tax Informed Investing Study* (visited Jan. 2, 2001) <http://www.dreyfus.com/>.

7 I.R.C. 61(a)(3) and (7) (providing that an individual's gross income includes dividends and gains derived from dealings in property); I.R.C. 852(b)(3)(8) (capital gain dividend from a mutual fund treated as gain from sale or exchange of capital asset held for more than one year); I.R.C. 1001 (gain from sale or other disposition of property is excess of amount realized over adjusted basis, and loss is excess of the adjusted basis over amount realized). *See* IRS Publication 564, *Mutual Fund Distributions* (2000), at 2-4 (explaining tax treatment of distributions of income and capital gains by mutual funds to their shareholders).

8 This is attributable, in part, to the fact that a mutual fund generally must distribute substantially all of its net investment income and realized capital gains to its shareholders in order to qualify for favorable tax treatment as a "regulated investment company" ("RIC"). I.R.C. 852 and 4982(b). As a RIC, a mutual fund is generally entitled to deduct dividends paid to shareholders, resulting in its shareholders being subject to only one level of taxation on the income and gains distributed to them. I.R.C. 851 (circumstances under which an investment company may be treated as a RIC) and 852(b)(2) (calculation of taxable income of a RIC).

S*ee, e.g., Year-End Tax Tips, Bob Edwards* (National Public Radio, Morning Edition radio broadcast, Dec. 28, 1999) (describing tax consequences of mutual fund distributions as a "shock" to investors).

9 KPMG study, *supra* note 3, at 14 (reporting the impact of taxes on performance of 496 stock funds for the ten-year period ending December 31, 1997).

10 For example, Eaton Vance Management reports after-tax returns and tax-efficiency ratios for certain of its tax-managed funds on its website. Eaton Vance, *Eaton Vance Mutual Funds* (visited December 19, 2000) http://www.eatonvance.com/mutual_ funds/ mutualfunds_A.asp. Online tax calculators are also available. The Vanguard Group, *After-Tax Returns Calculator* (visited December 19, 2000) http:// majestic5. vanguard.com/FP/DA/0.1.vgi_FundAfterTaxSim/ 079190348019134650? AFTER_TAX_CALC= SIMPLE (calculator that can be used to calculate after-tax returns for Vanguard funds); *Andrew Tobias' Mutual Fund Cost Calculator* (visited Dec. 22, 2000) http://www.personalfund.com/cgi-bin/cost.cgi? ticker=TWLBX (cost calculator includes a feature that calculates after-tax returns). Fidelity Investments and Charles Schwab & Co. offer Internet tools that feature after-tax returns of funds offered in their fund supermarkets. *E.g.,* Fidelity Investments, *Fidelity Funds* (visited December 19, 2000) http://personal100. fidelity.com/gen/mflfid/0/316145200.html; About Schwab, *Schwab Introduces New On-line Mutual Fund Selection and Screener Tools,* Dec. 22, 1999 (visited Dec. 19, 2000) http://www.prnewswire.com/ cgi-bin/micro_stories.pl? ACCT= 154881&TICK=SCH&STORY=/www/story/12-22- 1999/0001102424&E

DATE=Dec+22,+1999. Further, Morningstar, Inc., and *Forbes* report mutual fund after-tax returns. Morningstar, Mutual Fund 500 (2000 ed.); *Fund Survey,* Forbes, Feb. 7, 2000, at 166.

11 The fund groups offering funds labeled as "tax-managed," "tax-efficient," "tax-sensitive," or "tax-aware" include 59 Wall Street, American Century, Bernstein, Delaware Investments, DFA Investment Dimensions, Dresdner RCM Global Investors, Dreyfus, Eaton Vance, Evergreen, Fidelity, GMO, Golden Oak, ING, J.P. Morgan, Liberty Financial Funds, PaineWebber, PIMCO, Prudential, Putnam, Russell, Standish Ayer & Wood, STI Classic, SunAmerica, T. Rowe Price, USAA, and Vanguard. Morningstar, Inc., currently tracks 59 tax-managed funds, as compared to 12 such funds only four years ago. Morningstar, Principia Pro Plus (Dec. 2000) (reporting as of Nov. 30, 2000).

12 The Mutual Fund Tax Awareness Act of 2000, H. R. 1089, 106th Cong., 2nd Sess. (2000) (introduced by Congressman Paul Gillmor, passed by the House, as amended, on Apr. 3, 2000, by a vote of 358 to 2, and referred to the Senate on Apr. 4, 2000.). *See also* H.R. 1089: The Mutual Fund Tax-awareness Act of 1999: Hearings Before the Subcomm. on Finance and Hazardous Materials of the House Comm. on Commerce, 106th Cong., 1st Sess. (Oct. 29, 1999) (Statement of the U.S. Securities and Exchange Commission Concerning Disclosure of the Tax Consequences of Mutual Fund Investments and Charitable Contributions).

13 *See, e.g.,* Fred Barbash, *Facts Might Confuse Us? Excuse Me?,* The Washington Post, Nov. 19, 2000, at H1; Karen Damato, *Funds' Tally of IRS Bite Can Be Tricky,* The Wall Street Journal, Nov. 3, 1999, at C1; Paul J. Lim, *Your Money; Funds and 401(k)s; As Stock Market Returns Shrink, After-Tax Results Gain Importance,* Los Angeles Times, Oct. 17, 1999, at C3; Charles A. Jaffe, *Mutual Fund Gains Create Interesting Tax Issues Later*, The Kansas City Star, Mar. 23, 1999, at D19.

14 In its prospectus, a mutual fund is required to disclose (i) the tax consequences of buying, holding, exchanging, and selling fund shares, including the tax consequences of fund distributions; and (ii) whether the fund may engage in active and frequent portfolio trading to achieve its principal investment strategies, and, if so, the tax consequences of increased portfolio turnover and how this may affect fund performance. Item 7(e) of Form N-1A; Instruction 7 to Item 4 of Form N-1A. A fund also must disclose in its prospectus and annual report the portfolio turnover rate and dividends and capital gains distributions per share for each of the last five fiscal years. Items 9(a) and 22(b)(2) of Form N-1A. These items also require funds to show net realized and unrealized gain or loss on investments on a per share basis for each of the fund's last five fiscal years.

15 Proposing Release, *supra* note 1.

16 As of year end 1999, eighty-one percent of mutual fund assets ($5.5 trillion) were held by individuals. 2000 Mutual Fund Fact Book, *supra* note 2, at 41. At the end of 1999, mutual fund assets held in retirement accounts stood at $2.5 trillion. 2000 Mutual Fund Fact Book, at 49. Mutual fund assets held by individuals in money market funds stood at $885 billion. 2000 Mutual Fund Fact Book, at 103. Thus, almost 40 percent of non-money market fund assets held by individuals ($2.1 trillion) were held in taxable accounts.

An investor is not taxed on his or her investments in IRAs, 401(k) plans, and other qualified retirement plans until the investor receives a distribution from the plan.

I.R.C. 401 *et seq. See* IRS Publication 564, *Mutual Fund Distributions* (1999), at 2 (explaining tax treatment of mutual funds held in retirement vehicles).

*See* Items 2, 5, 9, and 22(b)(2) of Form N-1A.

17

18 Last year, we posted a bulletin for mutual fund investors on our website, in which we cautioned investors to look beyond performance when evaluating mutual funds and to consider the costs relating to a mutual fund investment, including fees, expenses, and the impact of taxes on their investment. Securities and Exchange Commission, *Mutual Fund Investing: Look at More Than a Fund's Past Performance* (last modified Jan. 24, 2000) http://www.sec.gov/consumer/mperf.htm.

*See* ICI, *Understanding Shareholders' Use of Information and Advisers* (Spring 1997), at 21 and 24 (Total return information was frequently considered by investors before a purchase, second only to the level of risk of the fund. Eighty-eight percent of fund investors surveyed said that they considered total return before their most recent purchase of a mutual fund. Eighty percent of fund owners surveyed reported that they followed a fund's rate of return at least four times per year.).

19 Item 3 of Form N-1A; Consolidated Disclosure of Mutual Fund Expenses, Investment Company Act Release No. 16244 (Feb. 1, 1988) [53 FR 3192 (Feb. 4, 1988)].

20 *See, e.g.,* Securities and Exchange Commission, *Mutual Fund Investing: Look at More Than a Fund's Past Performance* (last updated Jan. 24, 2000) http://www.sec.gov/ consumer/mperf.htm; Securities and Exchange Commission, *Invest Wisely: An Introduction To Mutual Funds* (last modified Oct. 21, 1996) http://www.sec.gov /consumer/inwsmf.htm; "Common Sense Investing in the 21st Century Marketplace," Remarks by Arthur Levitt, Chairman, SEC, Investors Town Meeting, Albuquerque, NM (Nov. 20, 1999); "Financial Self-Defense: Tips From an SEC Insider," Remarks by Arthur Levitt, Boston Globe "Moneymatters" Personal Finance Conference, Boston, MA (Oct. 16, 1999); Transparency in the United States Debt Market and Mutual Fund Fees and Expenses: Hearings Before the Subcomm. on Finance and Hazardous Materials of the House Comm. on Commerce, 105th Cong., 2nd Sess. (Sept. 29, 1998) (Statement of Arthur Levitt, Chairman, U.S. Securities and Exchange Commission).

21 Securities and Exchange Commission, *The SEC Mutual Fund Cost Calculator* (last modified Jul. 24, 2000) http://www.sec.gov/mfcc/get-started.html.

22 United States General Accounting Office, Mutual Fund Fees: Additional Disclosure Could Encourage Price Competition (June 2000) (recommending that the Commission require fund quarterly account statements to include the dollar amount of each investor's share of fund operating expenses); Division of Investment Management, Securities and Exchange Commission, Report on Mutual Fund Fees and Expenses (Dec. 2000) (recommending that the Commission consider requiring fund shareholder reports to include a table showing the cost in dollars incurred by a shareholder who invested a standardized amount in the fund, paid the fund's actual expenses, and earned the fund's actual return for the period).

23 The comment letters and a summary of the comments prepared by the Commission staff are available for public inspection and copying in the Commission's Public Reference Room, 450 Fifth Street, N.W., Washington, D.C. (File No. S7-09-00).

24 Items 2(c)(2)(i) and (iii) of Form N-1A.

25 Rule 482(e)(4) and (5)(iii); rule 482(f); rule 34b-1(b)(1)(iii)(B) and (C).

26 General Instruction C.3(d)(iii) and Item 2(c)(2)(iv)(B) of Form N-1A.

27 *See* Item 21(b)(1) of Form N-1A.

28 Proposed Item 21(b)(3) of Form N-1A.

29 Proposed Item 21(b)(4) of Form N-1A.

30 Items 21(b)(2) and (3) of Form N-1A.

31 A recent report estimates that over the past decade the average holding period of mutual funds has decreased from over 10 years to about 3 years. Steve Galbraith, Mary Medley, Sean Yu, The Apotheosis of Stuart--Lighting the Candle in U.S. Equities, Bernstein Research Call, Sanford C. Bernstein & Co., Jan. 10, 2000.

32 Instruction 4 to Item 21(b)(1) of Form N-1A.

33 Items 2(c)(2)(i) and (iii) and 21(b)(1)-(3) of Form N-1A.

34 *See* Section D, *infra*, regarding modifications to the format of disclosure.

35 Item 2(c)(2)(iii) of Form N-1A.

36 Rule 498(c)(2)(iii) under the Securities Act [17 CFR 230.498(c)(2)(iii)]. In addition, after-tax returns would be required in registration statements filed on Form N-14 [17 CFR 239.23], the registration form used by mutual funds to register securities to be issued in mergers and other business combinations under the Securities Act. *See* Item 5(a) of Form N-14 (cross-referencing Item 2 of Form N-1A).

37 *See* Proposing Release, *supra* note 1, at nn. 36-41, and accompanying text.

38 Item 5(b)(2) of Form N-1A.

39 An estimated 88 percent of mutual fund shareholders considered the total return of the fund before their most recent fund purchase. Seventy-five percent of mutual fund shareholders considered the fund's performance relative to similar funds. ICI, *Understanding Shareholders' Use of Information and Advisers, supra* note 18, at 21.

40 *See* Section II.A., *supra,* regarding modifications to the types of returns required; Section II.D., *infra,* regarding modifications to the format of disclosure, including simplification of presentation for funds offering more than one class of shares in the prospectus; Section II.H., *infra,* regarding the narrative accompanying the performance table.

41 Item 7(e) of Form N-1A.

42 *See* discussion in note 40, *supra.*

43 Annually, funds are required to send Form 1099-DIV or a similar statement to any shareholder receiving $10 or more in taxable income. I.R.C. 6042. Form 1099-DIV reports the amount and character of fund distributions (*e.g.,* ordinary dividends, capital gain distributions, and non-taxable distributions) received by shareholders during the year. Funds also are required to send Form 1099-B or a similar statement to any shareholder who sells, exchanges, or redeems fund shares during the year. I.R.C. 6045. Form 1099-B reports the proceeds from the sale of fund shares.

44 The Securities Act requires mutual funds to send updated prospectuses only to those existing shareholders who make additional purchases. In practice, many mutual funds send an updated prospectus annually to all of their shareholders.

45 Item 5(b)(2) of Form N-1A.

46 Item 2(c)(2)(iii) of Form N-1A.

47 Item 2(c)(2)(iii) of Form N-1A; Instruction 2(e) to Item 2 of Form N-1A.

48 Instruction 3(c)(ii) to Item 2 of Form N-1A.

49 Item 2(c)(2)(iv)(C) of Form N-1A.

50 Instructions 2(e) and 3(c)(iii) to Item 2 of Form N-1A.

51 Instruction 2(e) to Item 2 of Form N-1A.

52 Item 2(c)(2)(iii) of Form N-1A.

53 General Instruction C.3(d)(iii) of Form N-1A.

54 These similar plans or arrangements may include those existing under current tax law or new types of plans or arrangements permitted by future changes in the tax law.

55 *See* IRS Publication 575, *Pension and Annuity Income* (2000), at 4 (explaining tax treatment of earnings under a variable annuity contract) and 7-19 (explaining tax treatment of distributions from retirement plans); IRS Publication 525, *Taxable and Non-Taxable Income* (2000), at 6 (explaining tax treatment of contributions to a retirement plan) and 15 (explaining tax treatment of proceeds of a life insurance contract); IRS Publication 575, *Pension and Annuity Income* (2000), at 5 (tax treatment of Section 457 Deferred Compensation Plan); IRS Publication 571, *Tax Sheltered Annuity Programs for Employees of Public Schools and Certain Tax-Exempt Organizations* (1999), at 2 (explaining tax treatment of Section 403(b) tax sheltered annuities).

56 I.R.C. 702 (regarding taxation of partners).

57 Interest on any state or local bond is excluded from gross income. However, there is no exclusion for capital gains resulting from the sale of such bonds. *See* I.R.C. 103(a); IRS Publication 564, *Mutual Fund Distributions* (2000), at 2 (describing tax treatment of tax-exempt mutual funds).

58 A tax-exempt fund, like any other fund, may assume, when calculating after-tax returns, that no taxes are due on the portions of any distribution that would not result in federal income tax on an individual. Instruction 3(a) to Item 21(b)(2) and Instruction 3(a) to Item 21(b)(3) of Form N-1A.

59 Rule 482(e)(4) permits the standardized after-tax returns for 1-, 5-, and 10-year periods to be contained in an advertisement, provided that the standardized after-tax returns (i) are current to the most recent calendar quarter ended prior to the submission of the advertisement for publication; (ii) are accompanied by quotations of standardized before-tax return; (iii) include both measures of standardized after-tax return; (iv) are set out with equal prominence to one another and in no greater prominence than the required quotations of standardized before-tax return; and (v) identify the length of and the last day of the 1-, 5-, and 10-year periods.

Any other measure of after-tax return could be included in advertisements if accompanied by the standardized measures of after-tax return. Rule 482(e)(5)(iii). Similarly, measures of after-tax return may be included in other sales materials if accompanied by the standardized measures of after-tax return. Rule 34b-1(b)(1)(iii)(B).

A quotation of standardized tax equivalent yield in an advertisement or other sales literature need not be accompanied by standardized after-tax returns. Rules 482(e)(2) and 34b-1(b)(iii)(B).

60 Specifically, any measure of after-tax return in a rule 482 advertisement will

be required to reflect all elements of return and be set out in no greater prominence than the required quotations of standardized before-tax and after-tax returns. The advertisement will be required to identify the length of and the last day of the period for which performance is measured. Rule 482 (e)(5)(i), (iv), and (v).

Likewise, any sales literature that contains a quotation of performance that has been adjusted to reflect the effect of taxes remains subject to the other requirements of rule 34b-1.

61 We believe that any fund that uses terms such as tax-managed, tax-efficient, tax-sensitive, or tax-aware in its name is representing or implying that the fund is managed to limit or control the effect of taxes on performance. Therefore, a fund using these terms in its name will be required to include standardized after-tax returns in any advertisement or sales literature that includes a quotation of performance.

62 Rules 482(e)(6) and 34b-1(b)(1)(iii)(C). The fund names rule, rule 35d-1(a)(4), requires a fund that uses a name suggesting that a fund's distributions are exempt from federal income tax or from both federal and state income tax to adopt a fundamental policy under section 8(b)(3) of the Investment Company Act: (i) to invest at least 80 percent of its assets in investments the income from which is exempt, as applicable, from federal income tax or from both federal and state income tax; or (ii) to invest its assets so at least 80 percent of the income that it distributes will be exempt, as applicable, from federal income tax or from both federal and state income tax. *See* Investment Company Names, Investment Company Act Release No. 24828 (Jan. 17, 2001).

63 *See, e.g.,* Advertising by Investment Companies, Investment Company Act Release No. 16245 (Feb. 2, 1988) [53 FR 3868 (Feb. 10, 1988)], at n.51. *See also* section 17(a) of the Securities Act [15 U.S.C. 77q]; section 10(b) of the Exchange Act [15 U.S.C. 78j(b); section 34(b) of the Investment Company Act [15 U.S.C. 80a-33]; section 206 of the Investment Advisers Act of 1940 [15 U.S.C. 80b-6].

64 Items 21(b)(2) and (3) of Form N-1A.

65 Items 21(b)(2) and (3) of Form N-1A; Instruction 1 to Item 21(b)(2) and Instruction 1 to Item 21(b)(3) of Form N-1A.

66 Items 21(b)(2) and (3) of Form N-1A.

67 Instruction 4 to Item 21(b)(2) of Form N-1A; Instruction 4 to Item 21(b)(3) of Form N-1A.

Currently, the highest individual marginal income tax rate imposed on ordinary income is 39.6%, and the highest rate imposed on long-term capital gains is 20%. I.R.C. 1(a)-(d), (h).

68 The concerns expressed by the commenters are, in any event, mitigated by the fact that after-tax returns will not reflect state and local taxes, which are often quite significant. State income tax rates can be as high as 12%; and a rate of 6%-7%, or higher, is common on taxable income of $55,000, the income level suggested by commenters as representative of a typical mutual fund investor. *See* The World Almanac and Book of Facts 161 (2000) (state income tax rates).

69 Instructions 6 and 7 to Item 21(b)(3) of Form N-1A. In order to simplify the computation of returns after taxes on distributions and sale of fund shares, funds may assume that a taxpayer has sufficient capital gains of the same character to offset any capital losses on a sale of fund shares and therefore that the taxpayer may deduct the entire capital loss. Instruction 7(d) to Item

21(b)(3) of Form N-1A.

70 Instruction 7(c) to Item 21(b)(3) of Form N-1A.

A fund would also be required to separately track the basis of shares acquired though the $1,000 initial investment and each subsequent purchase through reinvested distributions. We wish to clarify that a distribution representing a return of capital will reduce the basis of an existing lot of shares and be included in the basis of the shares acquired upon reinvestment, which may have the effect of shifting the amount of basis allocated to shares with various holding periods.

71 Instruction 7(d) to Item 21(b)(3) of Form N-1A.

72 I.R.C. 1222(1) provides that the term "short-term capital gain" means "gain from the sale or exchange of a capital asset held for not more than 1 year, if and to the extent such gain is taken into account in computing gross income."

73 Instruction 4 to Item 21(b)(2) of Form N-1A; Instruction 4 to Item 21(b)(3) of Form N-1A. The Proposing Release sets forth the maximum federal income tax rates for the years 1990-2000. Proposing Release, *supra* note 1, at n.66, and accompanying text.

74 Item 2(c)(iii) of Form N-1A.

75 Instruction 4 to Item 21(b)(2) of Form N-1A; Instruction 4 to Item 21(b)(3) of Form N-1A.

76 *Id.*

77 Instruction 3 to Item 21(b)(2) of Form N-1A; Instruction 3 to Item 21(b)(3) of Form N-1A.

78 *Id.*

79 Instruction 3 to Item 21(b)(2) of Form N-1A; Instruction 3 to Item 21(b)(3) of Form N-1A. A fund may elect to pass through to shareholders foreign tax credits if more than 50 percent of the value of the fund's total assets at the close of the taxable year consists of stock or securities in foreign corporations and the fund otherwise qualifies for favorable tax treatment as a regulated investment company for the taxable year. I.R.C. 853. In computing after-tax returns, a fund that elects to pass foreign tax credits through to shareholders may assume that the shareholders use those credits. We would not object if a fund adjusts after-tax returns to reflect the impact of distributions of up to $600 of foreign tax credits, the amount of credit that may be taken by a married couple filing jointly without regard to limits on the foreign tax credit. I.R.C. 904(a) and (j)(2). If a fund makes distributions of foreign tax credits in excess of $600, the fund must take into account the limits in the federal tax law on the ability of shareholders to use foreign tax credits.

80 Item 2(c)(2)(iv) of Form N-1A.

81 *See* rule 421(b) and (d) under the Securities Act [17 CFR 230.421(b) and (d)] (requiring that all information in the prospectus be presented in clear, concise, and understandable fashion and that registrants use plain English principles in the organization, language, and design of the summary and risk factors sections of their prospectuses); General Instruction C.1 to Form N-1A (fund prospectus should be easy to understand and promote effective communication); Item 2 of Form N-1A (requiring that the response to Item 2 be stated in plain English).

82 We eliminated the proposed requirement that funds explain the differences between the types of returns presented, which is unnecessary in light of our reduction of the returns from four to three and our revision of the table

captions. We also eliminated the proposed requirement that funds disclose that before-tax returns assume all distributions are reinvested. As commenters noted, funds are not currently required to include this technical information with before-tax returns. We also eliminated the similar proposed requirement that funds disclose that after-tax returns assume that taxes are paid out of fund distributions and that distributions, less taxes, are reinvested. Finally, we eliminated the proposed requirement that funds, whose after-tax returns exceed before-tax returns, explain the reason for this result. Funds, however, will have the option of including this explanatory material. Item 2(c)(2)(iv)(D) of Form N-1A.

83 As discussed above, we have simplified the proposal to require a fund offering more than one class of shares in its prospectus to show after-tax returns for one class only. *See* Section II.C., *supra* notes 48-50 and accompanying text. Consistent with this modification, such funds will be required to include disclosure that after-tax returns are shown for only one class and that after-tax returns for other classes will vary. Item 2(c)(2)(iv)(C) of Form N-1A.

84 Item 2(c)(2)(i) of Form N-1A.

85 Instruction 6 to Item 21(b)(1) of Form N-1A.

86 17 CFR 230.485(b).

87 As discussed above, we have modified the proposal by eliminating the proposed requirement to include after-tax returns in the MDFP, which is typically contained in the annual report. Accordingly, the hour burden for preparing and filing annual reports in compliance with rule 30d-1 will be reduced by 7.5 hours. *See* Proposing Release, *supra* note 1, at nn. 107-110, and accompanying text (discussing the estimated hour burden for proposal requiring after-tax return disclosure in annual reports). Funds will be required to include a statement in the MDFP that accompanies the performance table and graph to the effect that the returns shown do not reflect the deduction of taxes that a shareholder would pay on fund distributions or the redemption of fund shares. Item 5(b)(2) of Form N-1A. We believe that the hour burden for the required statement in the MDFP will be negligible and will not result in a change to the current hour burden for preparing and filing annual reports.

88 2000 Mutual Fund Fact Book, *supra* note 2, at 56.

89 Liberty Funds Release, *supra* note 3.

90 KPMG study, *supra* note 4, at 14.

91 Clements, *supra* note 5, at C1.

92 Dreyfus Corporation, *supra* note 6.

93 *See supra* note 10 and accompanying text.

94 In its prospectus, a mutual fund is required to disclose (i) the tax consequences of buying, holding, exchanging, and selling fund shares, including the tax consequences of fund distributions; and (ii) whether the fund may engage in active and frequent portfolio trading to achieve its principal investment strategies, and, if so, the tax consequences of increased portfolio turnover and how this may affect fund performance. *See* Item 7(e) of Form N-1A; Instruction 7 to Item 4 of Form N-1A. A fund also must disclose in its prospectus turnover rate and dividends and capital gains distributions per share for each of the last five fiscal years. *See* Items 9(a) and 22(b)(2) of Form N-1A. These items also require funds to show net realized and unrealized gain or loss on investments on a per share basis for each of the fund's last five fiscal years.

Given the $2.1 trillion of assets held in individual non-money market fund

95 taxable accounts, even a small change in relative after-tax returns affecting only a small portion of those assets can lead to significant benefits to investors.

96 A service provider that compiles and disseminates fund pricing and performance information recently announced that it will offer to calculate and publish after-tax returns for its fund clients. *See* Daly, *Program Lets Fund Companies Offer After-Tax Returns (Dec. 29, 1999)* (visited Feb. 9, 2000) http://www.ignites.com/.

97 As discussed above, we have modified the proposal by: eliminating the proposed requirement to disclose pre-liquidation before-tax returns; eliminating after-tax returns in annual reports; streamlining the required narrative disclosure; and simplifying the presentation for funds that offer multiple classes in a single prospectus.

98 This estimate is based on the staff's consultations with industry representatives.

99 The number of funds referenced in post-effective amendments that will be affected by the amendments is computed by subtracting those funds that are exempt from or permitted to omit the after-tax disclosure from the number of funds referenced in post-effective amendments (7,875 - 1,040 - 1,575, or 5,260). For purposes of our analysis, we have not excluded certain funds that also would be permitted to omit the after-tax return disclosure, such as funds that distribute prospectuses for use by investors in 401(k) plans or other similar tax-deferred arrangements. While these funds will be permitted to omit the after-tax return disclosure in prospectuses distributed to investors in these tax-deferred arrangements, they will still incur a burden from including the disclosure in prospectuses distributed to other investors.

100 This cost estimate is calculated by multiplying the estimated number of hours to comply with the requirements (94,680 hours) by the weighted average hourly wage ($64). The Commission's estimate concerning the burden hours is based on the staff's consultation with industry representatives. The Commission's estimate concerning the wage rate is based on salary information for the securities industry compiled by the Securities Industry Association. *See* Securities Industry Association, *Report on Management & Professional Earnings in the Securities Industry 1999* (Sept. 1999).

101 The estimate is based on the staff's consultation with industry representatives.

102 Software-related costs may decrease as vendors offering services for computing the new standardized after-tax returns enter the market. *See* Daly, *Program Lets Fund Companies Offer After-Tax Returns (Dec. 29, 1999)* (visited Feb. 9, 2000) http://www.ignites.com/.

103 This estimate is based on the assumption that tax-managed funds and index funds would be most likely to use advertisements that either include after-tax returns or include other performance information together with representations that the fund is managed to limit or control the effect of taxes on performance.

104 This estimate is based on the staff's consultations with industry representatives.

105 The total cost of the annual hour burden is calculated by multiplying the annual hour burden (79) by the weighted average hourly wage ($64). *See supra* note 100.

106 These estimates are based on filings received in calendar year 1999.

107 This number is computed by subtracting from the number of respondents filing rule 34b-1 sales material the number of money market funds, the

number of funds and UITs registered on Forms N-3 and N-4, and the number of funds used as underlying portfolios for variable insurance contracts (8,495 - 1,040 - 620 - 1,575, or 5,260).

108 This estimate is based on the assumption that tax-managed funds and index funds would be most likely to advertise after-tax performance.

109 The total annual burden for the amendments is computed by multiplying the estimated number of respondents (157.8) subject to rule 34b-1 by the additional burden imposed by the amendments (.5). The total cost of the annul burden attributable to the amendments is calculated by multiplying the total burden hours (78.9) by the weighted average hourly rate of $64.

110 15 U.S.C. 77(b), 78c(f), and 80a-2(c).

111 *See supra* notes 1-5 and accompanying text.

112 *See supra* note 10 and accompanying text.

113 *See supra* note 11 and accompanying text.

114 *See supra* note 12 and accompanying text.

115 17 C.F.R. 270.0-10.

116 This estimate is based on statistics compiled by the Commission's Division of Investment Management staff from January 1, 1999, through December 31, 1999.

117 This estimate is based on statistics compiled by the Commission's Division of Investment Management staff from January 1, 1999, through December 31, 1999.

118 This estimate is based on the staff's consultation with industry representatives. Since an investment company filing an initial registration statement on Form N-1A has no performance history to disclose, the proposed amendments would not affect such initial filings.

119 This estimate is based on the staff's consultation with industry representatives.

120 This estimate is based on the staff's consultation with industry representatives.

121 As discussed above, we have modified the proposal by: eliminating the proposed requirement to disclose pre-liquidation before-tax returns; eliminating after-tax returns in annual reports; streamlining the required narrative disclosure; and simplifying the presentation for funds that offer multiple classes in a single prospectus.

122 The amendments modify rule 482, which is part of Regulation C under the Securities Act of 1933. Regulation C describes the disclosure that must appear in registration statements under the Securities Act and Investment Company Act. The PRA burden associated with rule 482, however, is included in the investment company registration statement form, not in Regulation C. In this case, the amendments to rule 482 will affect the burden hours for Form N-1A, the registration form for open-end investment companies that currently advertise pursuant to rule 482. We estimate that the burden associated with Regulation C will not change with the amendments to rule 482.

123 As discussed above, we have modified the proposal by eliminating the proposed requirement to include after-tax returns in the MDFP, which is typically contained in the annual report. Accordingly, the hour burden for preparing and filing annual reports in compliance with rule 30d-1 will be

reduced by 7.5 hours. *See* Proposing Release, *supra* note 1, at nn. 107-110, and accompanying text (discussing the estimated hour burden for proposal requiring after-tax return disclosure in shareholder reports). Funds will be required to include a statement in the MDFP that accompanies the performance table and graph to the effect that the returns shown do not reflect the deduction of taxes that a shareholder would pay on fund distributions or the redemption of fund shares. Item 5(b)(2) of Form N-1A. We believe that the hour burden for the required statement in the MDFP will be negligible and will not result in a change to the current hour burden for preparing and filing annual reports.

124 As discussed above, we have modified the proposal by: eliminating the proposed requirement to disclose pre-liquidation before-tax returns; eliminating after-tax returns in annual reports; streamlining the required narrative disclosure; and simplifying the presentation for funds that offer multiple classes in a single prospectus. The elimination of after-tax returns in annual reports will reduce the hour burden for preparing and filing annual reports in compliance with rule 30d-1 by 7.5 hours. *See* Proposing Release, *supra* note 1, at nn. 107-110, and accompanying text (discussing the estimated hour burden for proposal requiring after-tax return disclosure in annual reports). We do not believe, however, that the other three modifications will affect the estimated burden hours overall.

125 These estimates are based on filings received in calendar year 1999. The current approved hour burden per portfolio for an initial Form N-1A is 824 hours.

126 These estimates are based on filings received in calendar year 1999. The current approved hour burden per portfolio for post-effective amendments to Form N-1A is 104 hours.

127 This estimate is based on the staff's consultations with industry representatives.

128 The number of funds referenced in post-effective amendments that will be affected by the amendments is computed by subtracting those funds that are exempt from or permitted to omit the after-tax return disclosure from the number of funds referenced in post-effective amendments (7,875 - 1,040 - 1,575, or 5,260). For purposes of our analysis, we have not excluded certain funds that also would be permitted to omit the after-tax return disclosure, such as funds that distribute prospectuses for use by investors in 401(k) plans or other similar tax-deferred arrangements. While these funds will be permitted to omit the after-tax return disclosure in prospectuses distributed to investors in these tax-deferred arrangements, they would still incur a burden from including the disclosure in prospectuses distributed to all other investors.

129 This total annual hour burden is calculated by adding the total annual hour burden for initial registration statements and the total annual hour burden for post-effective amendments, including the additional burden imposed by the amendments. As explained, the hour burden per portfolio for an initial filing would remain at 824 hours, for a total burden of 245,552 hours. The hour burden per portfolio for a post-effective amendment will be 122 hours (104 + 18), with a burden of 104 hours imposed on all 7,875 portfolios (104 × 7,875, or 819,000) and the additional 18 hours affecting 5,260 portfolios (18 × 5,260, or 94,680). Moreover, since the burden associated with rule 482 is included in Form N-1A (as discussed in note 122, *supra*), the Form N-1A burden will include the estimated rule 482 burden of .5 hours (the rule 482 burden is discussed below) that will be imposed on the three percent of funds that we estimate would use advertisements or sales literature that either include after-tax returns or include other performance information together with representations that the fund is managed to limit or control the effect of taxes on performance [.5 × (5,260 × 3%), or 79]. Thus, the total annual

hour burden for all funds for the preparation and filing of initial registration statements and post-effective amendments on Form N-1A will be 1,159,311 hours (245,552 + 819,000 + 94,680 + 79).

130 *See supra* note 122.

131 This estimate is based on the assumption that tax-managed funds and index funds would be most likely to advertise after-tax performance or use advertisements that include other performance information together with representations that the fund is managed to limit or control the effect of taxes on performance.

132 This estimate is based on the staff's consultations with industry representatives.

133 These estimates are based on filings received in calendar year 1999. The current approved hour burden per response for rule 34b-1 is 2.4 hours.

134 This number is computed by subtracting from the number of respondents filing rule 34b-1 sales material the number of money market funds, the number of funds and UITs registered on Forms N-3 and N-4, and the number of funds used as underlying portfolios for variable insurance contracts (8,495 - 1,040 - 620 - 1,575, or 5,260).

135 This estimate is based on the assumption that tax-managed funds and index funds would be most likely to advertise after-tax performance or use advertisements that include other performance information together with representations that the fund is managed to limit or control the effect of taxes on performance.

136 The current total annual hour burden is computed by multiplying the number of responses filed annually under rule 34b-1 by the current hour burden (37,000 × 2.4). The total annual hour burden for the industry has increased significantly from previous estimates because we have reevaluated the number of respondents subject to rule 34b-1.

137 The total annual burden is computed by adding the current burden (2.4 × 37,000, or 88,800) to the additional burden imposed by the proposed amendments [.5 × (8,495 - 1,040 - 620 - 1,575) × 4.35 × 3%, or 343].

*http://www.sec.gov/rules/final/33-7941.htm*

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# Has The Realized Equity Premium Been Shrinking?

Jun. 4, 2014 7:20 AM ET | 23 comments | by: Larry Swedroe

**Disclosure:** I have no positions in any stocks mentioned, and no plans to initiate any positions within the next 72 hours. **(More...)**

## Summary


- Claude Erb has done a series of papers in which he examines the various premiums — size, value, momentum, and beta.
- His most recent one focused specifically on the equity risk premium.
- While it's certainly possible that the equity risk premium could revert to its historical mean, mean reversion of valuations is far from a certainty.


Tying up our two-part series on premiums, today we'll explore the equity premium.

Claude Erb has done a series of papers in which he examines the various premiums - size, value, momentum, and beta - and found that there's a demonstrable trend in each case of the premiums shrinking in terms of realized returns. His April 2014 paper, "The Incredible Shrinking Realized Equity Risk Premium," focused specifically on the equity risk premium.

To create a trend line Erb used a three-step process:

**Step 1:** He linked the monthly excess returns into a "growth of $1" cumulative. The "market" excess return is the monthly total return minus the monthly Treasury-bill return from Ken French's website.

**Step 2:** On a monthly basis, he calculated the 10-year annualized rate of return. The first calculation covered the 10 years from June 1926 to June 1936, the second from July 1926 to July 1936, etc. Part of the reason for using the 10-year time horizon was that it is the same time horizon that Campbell and Shiller used in their early CAPE ratio research.

**Step 3:** He created a trend line using an Excel/PowerPoint function that regressed the rolling 10-year return on time (the x axis). He found that a 4.3 percent equity risk premium (the stock market total return in excess of the return of the t-bill) was the best fit of the relationship between 10-year excess return and time as of April 2014. Or given the way that 10-year equity excess returns have evolved over time, the relationship that best captures the downtrend in this measure suggests that the trend equity risk premium is currently 4.3 percent.

It's worth noting that Erb's 4.3 percent estimate is very similar to the current *real* expected return using Shiller's adjusted CAPE 10. The CAPE 10 is now at about 25.9. That produces an earnings yield of about 3.9 percent. However, we need to make an adjustment to arrive at the forecasted real return to stocks because the earnings figure from the CAPE 10 is on average a lag of 5 years. With real earnings growing about 1.5 percent a year, we need to multiply the 3.9 percent earnings yield by 1.075 percent (1.5 percent x 5 years). That produces a real expected return to stocks of about 4.2 percent.

Having estimated the equity risk premium at 4.3 percent, Erb noted that "the realized 'equity risk premium' has been in a downward trend since 1925. He explained that while a constant equity risk premium, and mean reversion, leads to the view that the probability rises over time that stocks will outperform high quality bonds, a declining equity risk premium, and mean reversion, leads to the view that the probability increases over time that safe assets will outperform stocks. He suggests that the declining equity risk premium has created a conundrum for many investors: Is it stocks for the long run, or bonds for the long run?

Erb also noted that a simple extrapolation of the declining trend in the equity risk premium results in a 0 premium by 2050. Logically (not that markets are always rational - see March 2000 when the earnings yield was below the yield on TIPS), that world shouldn't exist since no one would buy riskier stocks if there was no expectation of earning a risk premium. In other words, Stein's Law applies: If something cannot go on forever, it will stop (usually ending badly when it comes to stocks). However, it's certainly possible that instead of reverting to its historical mean (as many, such as Jeremy Grantham, are predicting) the equity risk premium could remain where it is, or even decline somewhat further. There are several possible/likely explanations for why the equity risk premium has been falling:

- When risk capital is scarce, it earns high "economic rents." As national wealth increases, the equity risk premium tends to fall as more capital is available to invest in risky assets. All else equal our rising national wealth should be expected to lead to a fall in the equity risk premium.
- Over time, the SEC's regulatory powers have increased, and accounting rules and regulations have been strengthened. The result is that investors have should have more confidence to invest in risky assets. Again, all else equal, this should lead to a smaller required equity risk premium.
- Implementation costs of equity strategies have fallen. Both commissions and bid/offer spreads have come way down over time. In addition, mutual fund expense ratios and loads are also much lower. And, the Internet has made trading much easier/more convenient. All else equal, lower implementation costs should lead to a lower equity risk premium. Lower trading costs can also help explain the falling small cap premium that Erb had found.
- Longer life expectancies can lead investors to have a stronger preference for equities as they provide the higher expected returns that may be needed to allow portfolios to last for longer horizons.

The bottom line is that while it's certainly possible that the equity risk premium could revert to its historical mean, mean reversion of valuations is far from a certainty. Thus, investors shouldn't draw the conclusion that the market is overvalued, nor that it's ripe for a fall.

# How Does the Market Interpret Analysts' Long-term Growth Forecasts?

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**How Does the Market Interpret Analysts' Long-term Growth Forecasts?**

**Abstract**

The long-term growth forecasts of equity analysts do not have well-defined horizons, an ambiguity of substantial import for many applications. I propose an empirical valuation model, derived from the Campbell-Shiller dividend-price ratio model, in which the forecast horizon used by the "market" can be deduced from linear regressions. Specifically, in this model, the horizon can be inferred from the elasticity of the price-earnings ratio with respect to the long-term growth forecast. The model is estimated on industry- and sector-level portfolios of S&P 500 firms over 1983-2001. The estimated coefficients on consensus long-term growth forecasts suggest that the market applies these forecasts to an average horizon somewhere in the range of five to ten years.

## 1. Introduction

Long-term earnings growth forecasts by equity analysts have garnered increasing attention over the last several years, both in academic and practitioner circles. For instance, one of the more popular valuation yardsticks employed by investment professionals of late is the ratio of a company's PE to its expected growth rate, where the latter is conventionally measured using analysts' long-term earnings growth forecasts. An expanding body of academic research uses equity analysts' earnings forecasts as well.

One of the more common and important applications is the measurement of the equity risk premium; and, as Chan, Karceski and Lakonishok (2003) argue, analysts' long-term forecasts are a "vital component" of such exercises. However, inferences from such studies can be quite sensitive to how those long-term growth forecasts are applied. Unfortunately, as evidenced by the range of assumptions employed in these applications, how these forecasts should be interpreted – that is, the horizon to which they ought to be applied – is quite ambiguous. For instance, Claus and Thomas (2001), in gauging the level of the equity risk premium, apply these growth forecasts to years 3 through 5; and beyond year 5 they apply a fixed growth rate assumption. At the other extreme, Harris and Marston (1992, 2001) and Khorana, Moyer and Patel (1999), apply these growth forecasts to an infinite horizon. In other studies, the assumed horizon usually falls somewhere in the middle.[1]

The implications are not purely academic, as these growth forecasts, or the perceptions they reflect, appear to have been a key factor driving equity market valuations skyward during the latter half of the 1990s. Indeed, as shown in figure 1, the PE ratio for S&P500, the ratio of the index price to 12-month-ahead operating earnings, rose more than 50 percent between January 1994 and January 2000. Over roughly that same time period, the "bottom-up" (weighted average) long-term earnings growth forecast for the S&P500 climbed almost 4 percentage points to nearly 15 percent, well above previous peaks. Findings in Sharpe (2001) suggest this was no

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[1]To estimate the intrinsic value of the companies in the Dow Jones Industrials Index, Lee, Myers and Swaminathan (1999) use the long-term earnings growth rate as a proxy for expected growth only through year 3. They implicitly pin down earnings growth beyond that point by assuming that the rate of return on equity reverts toward the industry median over time. Gebhardt, Lee and Swaminathan (2001) also use this formulation.

coincidence, that Wall Street's long-term growth forecasts have been a significant factor in valuations; however, because of their relatively short history and high autocorrelation, the size of that influence is difficult to gauge in aggregate analysis.

(Insert Figure 1)

In this study, I attempt to gauge the appropriate horizon over which to apply these growth forecasts by appealing to the market's judgement, that is, by inferring the horizon from market prices. In particular, I propose a straightforward empirical valuation model in which linear regression can be used to deduce the forecast horizon that the "market" uses to value stocks. This model is a descendent of the Campbell and Shiller (1988, 1989) dividend-price ratio model, which is an approximation to the standard dividend-discount formula. As in Sharpe (2001), their model is modified in order to emphasize the expected dynamics of earnings rather than dividends. In the resulting framework, the horizon over which the market applies analysts' long-term growth forecasts can be inferred from the elasticity of the PE ratio with respect to the growth forecast.

I estimate the model using industry- and sector-level portfolios of S&P 500 firms, constructed from quarterly data on stock prices and consensus firm-level earnings forecasts over 1983-2001. The estimated coefficients on consensus long-term growth forecasts suggest that the market applies these forecasts to an average horizon somewhere in the range of 5 to 10 years. Thus, these growth forecasts are more important for valuation than assumed in the many applications that treat them as 3-to-5 year forecasts, though far less influential than forecasts of growth into perpetuity. Among other implications, the results suggest that the increase in S&P500 constituent growth forecasts during the second half of the 1990s can explain up to half of the concomitant rise in their PE ratios.

## 2. The Relation Between PE Ratios, Expected EPS Growth, and Payout Rates

### *2.1 The Basic Idea*

The principal modeling goal is to develop a simple estimable model of the relationship between the price-earnings ratio and expected earnings growth. As discussed in the subsequent section, by expanding out terms in the model of Campbell and Shiller (1988), we can produce the following relation for any equity or portfolio of equities:

$$\log \frac{P_t}{EPS_{t+1}} \approx \sum_{j=2}^{\infty} \rho^{j-1} g_{t+j} \quad + \quad Z_t \tag{1}$$

where $P_t$ is the current stock price, $EPS_{t+1}$ is expected earnings per share in the year ahead, $g_{t+j}$ is expected growth in earnings per share in year t+j. ρ is a constant slightly less than 1, similar to a discount factor, and $Z_t$ is a function of the expected dividend payout rates and the required return.

For the analysis that follows, divide the discounted sum of expected EPS growth rates into two pieces:

$$\sum_{j=2}^{\infty} \rho^{j-1} g_{t+j} \quad = \quad \sum_{j=2}^{T} \rho^{j-1} g_t^L \quad + \quad \sum_{j=T+1}^{\infty} \rho^{j-1} g^{\infty} \tag{2}$$

where $g_t^L$ represents the expected average EPS growth rate over the next T years, measured by analysts' long-term growth forecasts, and $g^{\infty}$ is the average growth rate expected thereafter. This amounts to assuming there is a finite horizon, T, over which investors formulate their forecasts of earnings growth; beyond that horizon, expected average growth ($g^{\infty}$) is assumed constant or, at a minimum, uncorrelated with $g^L$ .

We thus rewrite (1) as follows:

$$\log \frac{P_t}{EPS_{t+1}} \quad = \quad \frac{\rho(1-\rho^{T-1})}{1-\rho} \, g_t^L \quad + \quad Z_{0t}(T) \tag{3}$$

where $\frac{\rho(1-\rho^{T-1})}{1-\rho} = [\rho + \rho^2 + \rho^3 + \ldots + \rho^{T-1}]$ and ***Z(T)*** now subsumes an additional (independent) term containing the growth rate expected after T. Clearly, the longer the horizon over which investors' formulate "long-term" growth forecasts, the larger will be the "effect" on stock prices of any change in that expected (average) growth rate. For instance, suppose ρ=0.96; if investors apply the forecast on a horizon running between year 1 through year 5 (growth in year 2, 3, 4, and 5) the multiplier on $g^L$ is 3.6. If, instead, this horizon ran from year 1 through year 10, the multiplier would be 7.4. The main contribution of this paper is to infer this horizon by estimating this multiplier--the elasticity of the PE ratio with respect to the expected growth rate--in the context of the valuation model described more thoroughly below.

*2.2 Derivation of the Empirical Model*

Campbell and Shiller (1988) show that the log of the dividend-price ratio of a stock can be expressed as a linear function of forecasted one-period rates of return and forecasted one-period dividend growth rates; that is,

$$\log \frac{D_t}{P_t} = E_t \left[ \sum_{j=1}^{\infty} \rho^{j-1} r_{t+j} - \sum_{j=1}^{\infty} \rho^{j-1} \Delta d_{t+j} \right] + k \qquad \textbf{(4)}$$

where $D_t$ is dividends per share in the period ending at time t and $P_t$ is the price of the stock at t. On the right hand side, $E_t$ denotes investor expectations taken at time t, $r_{t+j}$ is the return during period $t+j$, and $\Delta d_{t+j}$ is dividend growth in $t+j$, calculated as the change in the log of dividends. The $\rho$ is a constant less than unity, and can be thought of as a pseudo-discount factor.

Campbell-Shiller show that $\rho$ is best approximated by the average value over the sample period of the ratio of the share price to the sum of the share price and the per share dividend, or $P_t /(P_t + D_t)$. $k$ is a constant that ensures the approximation holds exactly in the steady-state growth case. In that special case, where the expected rate of return and the dividend growth rate are constant, equation (4) collapses to the Gordon growth model: $D_t /P_t = R - G$.

The Campbell-Shiller dynamic growth model is convenient because it faciliates the use of linear regression for testing hypotheses. As pointed out by Nelson (1999), the Campbell Shiller dividend-price ratio model can be reformulated by breaking the log dividends per share term into the sum of two terms--the log of the earnings per share and the log of the dividend payout rate. When this is done and terms are rearranged, then the Campbell-Shiller formulation can be rewritten as:

$$\log \frac{EPS_t}{P_t} = E_t \left[ \sum_{j=1}^{\infty} \rho^{j-1} r_{t+j} - \sum_{j=1}^{\infty} \rho^{j-1} g_{t+j} - (1-\rho) \sum_{j=1}^{\infty} \rho^{j-1} \phi_{t+j} \right] + k \qquad \textbf{(5)}$$

where $EPS_t$ represents earnings per share in the period ending at $t$, $g_{t+j} = \Delta \log EPS_{t+j}$, or earnings per share growth in $t+j$, and $\phi_{t+j} = \log(D_{t+j}/EPS_{t+j})$, the log of the dividend payout rate in $t+j$.

This reformulation is particularly convenient as it facilitates a focus on earnings growth.

To simplify and further focus data requirements on earnings forecasts (as opposed to dividend forecasts), I assume that the expected path of the payout ratio can be characterized by a simple dynamic process. In particular, reflecting the historical tendency of payout ratios to revert back toward their target levels subsequent to significant departures, I assume that investors forecast the (log) dividend payout ratio as a stationary first-order autoregressive process:

$$E_t\phi_{t+j} = \lambda\phi^* + (1-\lambda)\phi_{t+j-1} \tag{6}$$

In words, the payout rate is expected to adjust toward some norm, $\phi^*$, at some speed $\lambda < 1$.

It is straightforward to show that, given (6), the discounted sum of expected log payout ratios in (5) can be written as a linear function of the current payout rate:

$$E_t \sum_{j=1}^{\infty} \rho^{j-1}\phi_{t+j} = \frac{1-\lambda}{1-\rho(1-\lambda)}\phi_t + \frac{\lambda/(1-\rho)}{1-\rho(1-\lambda)}\phi^* \tag{7}$$

The final equation is arrived at by substituting into (5) the assumed structure of expected payout rates (7), and the assumed structure of earnings growth forecasts (2). Rearranging terms, and defining $R_t$ as the discounted sum of expected returns:

$$\log \frac{P_t}{EPS_{t+1}} = \frac{\rho(1-\rho^{T-1})}{1-\rho} g_t^L + \alpha\phi_t + \left[\frac{\rho^{T+1}}{1-\rho} g^\infty + (1-\alpha)\phi^*\right] - R_t + k \tag{8}$$

where $\alpha \equiv \frac{(1-\rho)(1-\lambda)}{1-\rho(1-\lambda)}$ is between 0 and 1.

*2.3 Empirical Implementation*

To translate equation (8) into a regression equation with the log PE ratio as dependent variable, note that the first pair of right-hand side variables--the long-term growth forecast $(g^L)$ and the current log dividend payout rate ($\phi$)--are observable, at least by proxy. The pair of terms in brackets are the expected “long-run” log payout ratio and expected earnings growth in the “out years,” both of which are unobservable and assumed constant; thus, they are absorbed into the regression constant. Even if constant over time, they are likely to vary cross-sectionally, which suggests the need for additional controls or industry dummies. Finally, expected future returns, $R_t$, are also unobservable. To control for time variation in expected returns, macroeconomic factors are added to the list of regressors. As discussed below, cross-sectional variation in expected returns is dealt with by including fixed effects.

Letting *i* represent a firm or portfolio of firms, and letting Z represent proxies for, or factors in, expected returns, (8) is translated into the following regression equation:

$$\log \frac{P_{it}}{EPS_{i,t+1}} = \beta g_{it}^{L} + \alpha \phi_{it} + \beta_{0i} - \gamma Z_{it} + u_{it} \qquad \textbf{(9)}$$

with $u_{it}$ a mean-zero error term, assumed to be uncorrelated with the explanatory variables.

Given an assumed value for ρ, the horizon over which investors apply analysts' long-term growth forecasts can be inferred from the magnitude of β, which should be positive. For these calculations I assume ρ=0.96; in that case, if long-term growth horizon applied to the five years of growth beginning at the end of the current year ( T=6), we would expect the coefficient on long-term growth to be 4.4 . The resultant mapping from horizon T to implied coefficient is provided in the following table:

| T | 2 | 3 | 4 | 5 | 6 | 8 | 10 | 20 | ∞ |
|---|---|---|---|---|---|---|---|---|---|
| β | 0.96 | 1.9 | 2.8 | 3.6 | 4.4 | 6.0 | 7.4 | 12.9 | 24 |

To understand why the best approximation for ρ is $\frac{P}{P+D}$ , consider the case where *g* is the expected growth into perpetuity (T=∞). In this case, the coefficient on *g*, according to (8), would boil down to simply ρ/(1−ρ) = *P/D*. But this is precisely the implied effect of growth on price in the Gordon (constant) growth model; in that model, $\frac{\partial \log P}{\partial g} = \frac{1}{r-g} = \frac{P}{D}$ . Moreover, as long as the horizon is not extremely distant -- the coefficient on $g^L$ is not too large -- then the inferred horizon is not very sensitive to the precise choice of ρ.[2]

According to the model (8), the coefficient on the dividend payout rate should lie between 0 and 1. It would equal 1 if the current payout rate was expected to be maintained

[2]For instance, if T=6, then the coefficient (β ) is predicted to be 4.3 for ρ=0.95 versus 4.6 for ρ=0.97.

forever ($\lambda$=0); in most cases it should be much closer to zero than 1, even if the dividend payout rate is expected to revert quite slowly back to the long-run payout rate. For instance, if $\lambda$=0.1 (the payout rate is adjusted annually by 10 percent of the gap between the desired and current level), then the theoretical coefficient on the payout rate (given $\rho$=.96) would be 0.27.

Clearly, the assumed dynamics of the payout rate are a simplification. It is quite plausible, for instance, that the long-run target for any given industry evolves over time. If that were the case, then we would expect the current payout rate to carry more information about the average future payout; thus, its coefficient would be larger than that what is implied by short-run autocorrelations, and we would interpret it somewhat differently. However, this would not alter our interpretation of the coefficient on the growth forecast. Indeed, excluding the payout rate from the regression or adding another lag does not substantially alter inferences drawn with regard to the growth horizon.

As in much of the research on expected returns, estimation is conducted on portfolios of firms. One potential benefit of this aggregation is a reduction in potential measurement error that comes from using analysts' forecasts as proxies for long-term growth forecasts. But using portfolios is also necessary because model (8) cannot be applied literally to firms that do not have positive dividends and earnings because the log payout ratio would be undefined. The model is too stylized for application to very immature firms. To some extent, this observation guides the choice of portfolio groupings. In particular, firms are grouped into portfolios by industry, rather than by characteristics that would be correlated with firm size or maturity.

## 3. Data and Sample Description

### *3.1 The data*

The sample is constructed using monthly survey data on equity analyst earnings forecasts and historical annual operating earnings, both obtained from I/B/E/S International. A dataset of quarterly stock prices and earnings forecasts is constructed using the observations from the middle month of each quarter (February, May, August, and November), beginning in 1983, when long-term growth forecasts first become widely available in the I/B/E/S database. The sample in each quarter is built using firms belonging to the S&P500 at the time. Sample firms must also have consensus forecasts for earnings per share in the current fiscal year (EPS1) and the following fiscal year (EPS2), as well as a consensus long-term growth forecast. Data on dividends per share are mostly drawn from the historical I/B/E/S tape, though missing values in the early part of the sample are filled in using Compustat.

The data of greatest interest in this study are the equity analysts' long-term growth forecasts, which I measure using the median analyst forecast from I/B/E/S, where the typical forecast represents the "expected annual increase in operating earnings over the company's next full business cycle." In general, these forecasts refer to a period of between three to five years (I/B/E/S International, 1999). Clearly, this description is fairly ambiguous about the horizon of these forecasts, though three to five years is probably the most widely cited horizon.

The measure of expected earnings used for the denominator of the PE ratio is constructed using forecasts for both current-year and next-year earnings. For any given observation, a firm's "12-month-ahead" earnings per share $EPS_t = w_m*EPS1 + (1-w_m)*EPS2$, where the weight ($w_m$) on current year EPS is proportional to the fraction of the current year that remains. For instance, $w_m$ is 1 if the firm just reported its previous fiscal-year earnings within the past month, and it equals 11/12 if the firm reported its previous year's earnings one month ago. The PE ratio is then calculated as the ratio of current price to 12-month-ahead earnings.

To construct the lagged dividend payout ratio, I create an analogous measure of 12-month *lagging* earnings. Specifically; 12-month lagging earnings, or $EPS_{t-1} = w_m*EPS0 + (1-w_m)*EPS1$, where *EPS0* is earnings per share reported for the previous fiscal year. The dividend payout rate is then calculated as the ratio of the firm's most recent (annualized) dividend per share to its 12-month lagging operating earnings per share. Prior to 1985, the dividend variable is not provided in the I/B/E/S data. For these observations, the dividend per share value is taken from Compustat.

### *3.2 Construction of Sector and Industry Portfolios*

For each quarterly observation, firms are grouped into portfolios using two alternative levels of aggregation. In the more aggregated case, firms are grouped into 11 sectors, which are broad economic groupings as defined by I/B/E/S (Consumer Services, Technology, ...etc.). The second portfolio grouping is comprised of industry-level portfolios, constructed using I/B/E/S industry codes that are similar in detail to the old 2-digit Standard Industrial Classification (SIC) industry groupings. For instance, the technology sector is broken down into (i) computer manufacturers, (ii) semiconductors and components, (iii) software and EDP services, and (iv) office and communication equipment.

Each quarterly observation for each variable is constructed by aggregating over all portfolio members in that quarter--S&P500 firms in the given sector (or industry). Constructing a portfolio aggregate long-term growth forecast is somewhat tricky because these variables are growth rates and because there is no clearly optimal set of weights for aggregating these growth rates. The most intuitive choice would be the level of a firm's previous-year earnings; but this would be nonsensical in the case where some firms had negative earnings. To get around this, I use a measure of expected earnings; in particular, each firm's weight is calculated as current shares times the maximum of [EPS1, EPS2, 0]. Because *EPS2* is almost always positive for S&P500 firms, this approach avoids the problem of potentially negative weights and minimizes the number of companies that get zero weight.

The dependent variable, the price-earnings ratio, is constructed by summing up the market values of all (S&P500) sector or industry members, and then dividing by the sum of their expected 12-month ahead earnings. Similarly, dividend payout rates at the portfolio level are constructed by summing the dividends (dividends per share times shares outstanding) of portfolio members and dividing by the sum of their 12-month lagging earnings.

The payout rate and the PE ratio are undefined when their denominators are negative; thus, these variables are occasionally undefined when we use the finer industry-level portfolio partition. Moreover, there is a higher frequency of negative observations on 12-month lagging earnings than on 12-month ahead earnings (presumably owing to analysts' optimistic bias); that is, actual earnings are negative more often than expected earnings. To reduce the loss of industry-level observations as a result of negative earnings, in constructing industry payout ratios, I substituted an industry's 12-month ahead earnings for its 12-month lagging earnings in cases where the latter is negative and the former is not, with little effect on the results.

### *3.3 Controls for expected returns*

Because empirical inferences are partly drawn from the time series dimension of the data, I include a couple proxies for the expected long-run return on the market portfolio, specifically the long-term (10-year) government bond yield and the risk spread on corporate bonds, equal to the difference between the yields on the Moody's Aaa and Baa corporate bond indexes. In light of the findings by Fama and French (1989) and others, that *excess* expected equity returns are positively related to the risk spreads on bonds, we expect the PE ratio to be negatively related to both the corporate risk spread and the bond yield.

A third macro factor I consider is the expected inflation rate, as proxied by the four-quarter expected inflation rate from the Philadelphia Federal Reserve survey of professional forecasters. As suggested in Sharpe (2001), expected inflation also appears to be a positive factor in required equity returns (before taxes), perhaps because inflation raises the effective tax rate on real equity returns.

I do not construct a measure of the industry or sector portfolio betas, or any other cross-sectional determinants of expected returns. First, the bulk of empirical research weighs in on the side of finding very little role for beta. Perhaps most salient study in this regard is Gebhardt, Lee, and Swaminathan (2001), which also analyzes expected returns with an earnings-based ex ante measure. They find beta to be of little value in explaining cross-sectional differences in expected return. On the other hand, their findings suggest that industry membership is a factor in expected returns; I control for potential industry factors in expected returns by including fixed industry effects.[3]

### *3.4 Sample Statistics*

After dropping the first observation per sector or industry in order to create one lag on the PE ratio, the sample runs from 1983:Q2 to 2001:Q2. This leaves a potential of 73 quarterly

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[3]Indeed, Gebhardt, et. al find the long-term growth forecast to be a positive factor in firm-level expected returns. But that finding might be the result of assumptions they use to construct their ex ante measure of expected return. If their measure builds in too long a horizon on the growth forecast, then the growth forecast will appear to have a positive effect on expected return (or a negative effect on valuations). In their "terminal value" calculation, the slow decay rate of ROE, and the use of median industry ROE as the expected ROE for perpetuity, may implicitly build in too long a horizon on current expected earnings growth or, more precisely, on the value of ROE in year t+4. Indeed, it is somewhat curious that long-term growth is a significant factor in expected return only when the regression also includes the book-to-market ratio–another key component in the construction of the dependent variable.

observations for each of 11 sectors, or 803 sector-time observations. In addition to excluding observations for which earnings are negative or dividends are zero, those with extreme values are also filtered out. In particular, observations are excluded if either the portfolio PE ratio exceeds 300 or its dividend payout rate exceeds 5.0.

In the case of sector portfolios, these filters remove only 2 observations; and no observations are lost as a result of negative earnings or zero dividends. Distributions of the key variables for the sector portfolios are depicted by the top number among each pair of numbers in table 1. The average sector price-earnings ratio over the sample period is about 14, and it ranges from 3.5 to 54.1. The average dividend payout rate is 0.45 (or 45 percent of earnings), with a range of 0.08 to 2.16. The average expected long-term growth rate is 11 percent, with a range of 5 to 20 percent.

Correlations among variables are shown in the bottom half of the table. The PE ratio is strongly correlated with the earnings growth forecast, as theory would suggest, but it is uncorrelated with the dividend payout rate. The earnings growth forecast is negatively correlated with the dividend payout rate, consistent with the prediction that firms with lower growth prospects pay out a higher proportion of their dividends.

In the case of industry portfolios, roughly 120 observations are excluded where industry dividends are zero or, in a handful of cases, where expected year-ahead earnings are negative, leaving 4071 observations on 66 industries.[4] Another 14 observations are excluded because the PE ratio exceeds 300 or the dividend payout rate exceeds 5, leaving 4057 industry-quarter observations, an average of about 62 quarters per industry. Distributions and correlations for the industry portfolio variables are depicted by the bottom figures among the pairs in table 1.

## 4. Empirical Results

### *4.1 Sector Regressions*

Table 2 shows the results of sector portfolio regressions with the log of the PE ratio as dependent variable. Heteroskedasticity and autocorrelation-consistent (Newey-West) standard

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[4]I have also excluded 5 very small industries for which the average total industry market value (over the sample period) is less than $1 billion. Also note that not all industries exist over the entire sample.

errors are reported below the coefficient estimates. Column (1) shows the simplest specification; it includes the earnings growth forecast, the sector payout rate, the yield on the 10-year Treasury bond, and the risk spread on corporate bonds. The coefficient estimate on the growth forecast is 8.05, with a standard error of 0.5, indicating relatively high precision. The magnitude of the coefficient suggests that growth forecasts reflect expectations over a fairly long horizon. In particular, given that $\frac{\rho(1-\rho^{T-1})}{1-\rho}$ equals 7.75 for T=10 and 8.5 for T=11, the inference would be that the long-term growth forecast represents the expected growth rate for a 9 or 10 year period, starting from the coming year's expected level of earnings.

The coefficient on the payout rate, 0.34, falls within the [0,1] range dictated by theory; but, interpreted literally, the magnitude of the coefficient implies that payout rates adjust very slowly toward their long-run desired levels. Interpreted more loosely, one could infer that the current payout rate conveys some information about a sector's long-run desired payout rate, which is not likely to be constant over the very long run as assumed by the model.

The coefficients on the bond yield and the risk spread are both negative, as theory and previous empirical results would predict. The coefficient on the Treasury bond yield implies that a one percentage point increase in long-term yields drives down the PE ratio by about 12 percent -- or, holding E constant, drives down the stock price 12 percent. The regression R-squared is quite high, suggesting these four variables explain about 70 percent of the overall cross-sectional and time series variation in price-earnings ratios. The root mean squared error is 0.2.

One problem with this specification, however, is the presence of strong autocorrelation in the errors, reflected in a Durbin-Watson statistic of 0.32. In specification (2), this is rectified by modeling the dynamics with the addition of a lagged dependent variable, the lagged PE ratio, which receives a coefficient of 0.75. Not surprisingly, adding this regressor boosts the R-squared substantially, to 0.910, and cuts the root mean squared error in half. The Durbin-h test now strongly rejects the presence of autocorrelation.

Interpreting the coefficient on the growth forecast is a bit more complicated here because that coefficient, equal to 2.00, now represents only the "impact effect". The total long-run effect of a change in the growth forecast is equal to the impact coefficient divided by one minus the coefficient on the lagged PE, or $2/(1-0.75) = 8$. Thus, the conclusion from the original regression holds up: the growth forecast still appears to represent a horizon of about 9 years.

The long-run effect of the payout rate is 0.28, only a bit smaller than the static estimate. One notable difference from the static model is that the sign on the risk spread flips to positive, although that variable is no longer statistically significant. Thus, once we account for growth expectations and the underlying dynamics, the risk spread no longer has marginal explanatory power for stock valuations.

The third and fourth specifications address the potential omitted variable problem. Gebhardt, et. al (2001) find sector-level factors in expected returns. If sector-level (but non-growth-related) factors are correlated with sector long-term growth expectations, then the coefficient on growth forecasts will be biased. Sector-level expected-return factors can be removed using a fixed effects estimator. In column (3), results are shown for the static version of the model estimated on sector-mean-adjusted variables; and, in (4), results are shown when fixed effects are similarly incorporated into the dynamic model. In both cases, the results continue to yield conclusions similar to the first specification.[5]

Finally, I consider the possibility that omitted macroeconomic factors in expected returns are correlated with changes in the average sector growth forecast over time. Column (5) shows the results from adding expected inflation, specifically, expected inflation over the next four quarters as measured by the Philadelphia Fed survey of professional forecasters. As shown by Sharpe (2001), expected inflation seems to be related to both expected earnings growth and expected returns. In addition, controlling for expected inflation allows us to interpret the estimated effect of changes in expected long-term growth as reflecting changes in real growth expectations. In any case, adding expected inflation to the dynamic specification reduces somewhat the estimated effect of expected growth. Here, the long-run effect of 6.63 is consistent with a horizon between 7 and 8 years.

The final specification takes a more agnostic approach to macro factors and adds year dummies (in addition to the fixed sector effects). This eliminates any effect of the growth forecast that might be purely time-driven, and thus provides the most conservative estimate of the effect of these earnings expectations. Indeed, the long-run coefficient on the growth forecast falls to 5.45 in this regression, which suggests a horizon of about 6 years. Considering the

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[5]Given the sample size, the small sample bias that arises when a lagged dependent variable is used in conjunction with fixed effects should not be an issue.

totality of the findings in table 2, one would conclude that the horizon of the earnings growth forecast falls somewhere in the range of 6 to 10 years.

*4.2 Industry Regressions*

An analogous set of results based on narrower industry-level portfolios is shown in table 3. The industry-level results generally follow the pattern of the sector-portfolio results, with one important difference. In these regressions, the long-run coefficient on the growth forecast tends to be about two-thirds the magnitude found in the analogous sector-level regressions. In particular, the coefficient estimate on the growth forecast runs from 5.4 in the specifications without fixed effects down to 3.9 in the specification with both fixed industry and time effects. These results would suggest that investors apply the growth forecast to a somewhat shorter horizon – between 5 and 7 years, compared to the 6 to 10-year range suggested by the sector-level analysis.

One potential explanation of the difference between the sector- and industry-level coefficient estimates revolves around the idea that the analyst growth forecasts measure investor expectations with error. Assuming minimal measurement error on other regressors, then measurement error in the growth forecast would produce a downward bias in the coefficient on expected growth. Furthermore, if measurement errors were not highly correlated across firms or industries within a given sector, then using a higher level of aggregation would tend to reduce this measurement error. A similar but more structural explanation for the difference in results could be that investor expectations of a firm's or industry's growth beyond the very near term is partly reflected in growth expectations for other firms or industries within the same sector. Under either interpretation, we would expect sector growth forecasts to help explain variation in industry PE ratios, even after controlling for the industry growth forecast.

This hypothesis can be examined by reestimating the industry regressions but with the *sector growth* forecast as an additional explanatory variable. With both the industry and sector growth forecasts in the regression, the sum of their two coefficients can be interpreted as measuring the total effect of an increase in forecasted industry growth that is matched by an equal-sized increase in the forecast for sector-level growth.

The key results from re-estimating specification (1) are provided in the first column of

Table 4. As shown, the coefficients on the industry and sector growth forecasts are 4.35 and 1.87, respectively. These two coefficients sum up to 6.22, which is larger than the original industry growth effect from the analogous industry-level regression (table 3) though still smaller than the coefficient in the sector-level regression (table 2). Results from rerunning specification (4) are shown in the second column. The estimated (long-run) coefficients on industry and sector growth forecasts are 3.62 and 3.41, respectively. Thus, it again appears that sector growth expectations help explain industry valuations. Here, the coefficients sum to a total effect of 7.03, which is closer to the long-run coefficient on growth in the sector regression (7.92) than to that in the industry regression (4.53).[6]

*4.3 Robustness over time*

As a final robustness test of the model and its application to the analyst forecast data, I split the data into early (1983-1991) and late (1992-2001) subsamples and reestimate some of the key industry- and sector-level regressions. This experiment provides evidence on the extent to which our inferences depend upon the time period under consideration. Table 5 compares the coefficients estimates on the long-term growth forecast for the two time periods, under four alternative specifications (regressions (1) and (4) for both the sector and industry portfolios). Although not shown in the table, the coefficient on the dividend payout rate is always positive and less than 0.5, while the coefficient on the Treasury bond yield is always negative.

In short, the results do indicate that there is a substantial difference between the early and late sample valuation effects of long-term growth forecasts. Although statistically positive in all cases, the coefficient on the growth forecast is about double in the later subsample compared to the analogous early-sample estimate. For instance, in the simple sector regression (1), the early-sample coefficient on growth is 6.1, whereas the late sample coefficient in 10.0. This suggests that the horizon in the early sample is about 7 years, whereas it is closer to 12 years in the more recent period. At the other end of the spectrum, the dynamic fixed-effect regression (4) on

[6]An alternative tack, which amounts to the same test, would be to put the industry growth forecast and, second, the differential between the sector and industry growth forecasts in the regression. In this case, the coefficient on the industry growth forecast would be 7.02, and the coefficient on the differential would be 3.4.

industry portfolios produces a long-run coefficient of 2.3 in the early period, suggesting a 2 to 3 year horizon, versus 4.5 in the late period, consistent with a 5-year horizon.[7] We are thus led to the inference that long-term growth forecasts carried more weight, or were applied to a longer horizon, during the past decade. This could owe either to the fact that analyst forecasts have become more widely applied in valuation analysis or to an increased emphasis placed on these long-term growth forecasts by analysts and their customers.

*4.4 Caveats*

Before concluding, some cautionary remarks are in order. It should be emphasized that the interpretation0 of the results is conditioned upon the maintained hypothesis that the assumptions behind the model are a reasonably approximation of reality. While this is true of any econometric application, it is important here because the conclusions revolve around the magnitude of the key coefficients, rather than just their sign and statistical significance. Clearly, there are a number of rationales one could invoke for why that model might be prone to either overestimate or underestimate the forecast horizons imputed to investors.

On one hand, the analysis ignores the potential influence of momentum, or positive-feedback, trading, which would cause stock prices to overreact to fundamentals. In other words, if stock prices in an industry rise due to an increase in the growth outlook over the next few years, momentum trading could amplify the ultimate stock price effect. In that case, the model would overstate the duration that investors actually attribute to growth forecasts.

On the other and, it is possible that the *required* return on a firm or industry's stock is positively related to its expected growth rate, since high growth firms or industries may be riskier. This would imply the presence of a second (negative) channel through which growth expectations might influence PE ratios, making identification problematic. If we fail to control for a any such negative effect on stock prices coming through a required-return channel, the model would underestimate the imputed horizon of these forecasts, by underestimating their positive influence owing to their role as proxies of expected growth.

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[7]While the "discount" or weighting factor [$\rho = P/(P+D)$] used in the model approximation should be somewhat smaller in the early period, due to the higher average dividend yield in the 1980s, the difference would not be nearly enough to justify the difference in coefficient estimates.

**5. Summary and Implications**

The empirical analysis strongly confirms the value-relevance of analysts' long-term earnings growth forecasts. In particular, most regression coefficient estimates suggest that a 1 percentage point increase in expected earnings growth can explain a 4 to 8 percent boost in an industry's PE ratio. According to the model, these regression coefficients imply that the market treats these forecasts as having an applicable horizon of at least 5 years, and perhaps as many as 10 years. Results from splitting the sample indicates that long-term growth forecasts had larger valuation effects during the past decade than they did in the previous decade, which suggests that the upper-end estimates (the 10-year horizon) may be more relevant for the more recent period. In light of the 4 percentage point increase in the "bottom-up" growth forecast for the S&P500 during the latter half of the 1990s (documented in figure 1), these findings suggest that the increrase in long-term growth expectations might account for as much as a 32 % (8 x 4%) rise in the market PE ratio over those years, about half of the total increase.

The empirical relation between equity valuations and long-term growth forecasts suggests that investors view such forecasts as strong indicators of growth prospects for several years. It would thus appear that the market places a great deal of faith in the ability of analysts to divine differences in firm or industry long- term prospects; but, this begs the question: How good are such longer-term growth predictions? A detailed analysis of this issue is beyond the scope of my study; however, some recent research suggests that investors could well be misguided in putting so much weight on these forecasts.

One finding is that long-term forecasts are not only upward biased, like forecasts on more specific, shorter-term horizons, but they also appear to be "extreme"; that is to say, the higher a growth forecast is, the more upward biased it tends to be [Dechow and Sloan (1997), Rajan and Servaes (1997)]. In addition, there is mixed support for the view that analysts over-extrapolate from recent observations [De Bondt (1992), La Porta (1996)].

If the weight placed on these forecasts overreaches the ability of analysts (and perhaps anyone else) to predict long-run performance, the forecasts should be contrary indicators of future stock performance. Indeed, these studies find that stock returns for firms with high long-term growth forecasts tend to be substandard. In an analysis of long-term growth forecasts issued from 1982-1984, De Bondt (1992) finds a significant inverse relation between expected growth and excess returns over the subsequent 12-18 months. La Porta's (1996) analysis of forecasts issued from 1982-1991 finds subsequent stock returns to be negatively related to beginning-of-period long-term growth forecasts; and both Rajan and Servaes (1997) and Dechow, Hutton and Sloan (1999) find that post-offering performance of IPO stocks is worse for firms with higher long-term growth forecasts.

Finally, Chan, Karceski and Lakonishok (2003) offer some very interesting evidence on the efficacy of long-term growth forecasts. In particular, they compare realized growth to forecasted growth for firms sorted annually into quintile portfolios based on their I/B/E/S long-term growth forecasts. On average over their sixteen year sample, the median growth rate forecast in the top quintile is 22.4 percent, compared to a median of 6 percent in the bottom quintile, a spread of 16-1/2 percentage points. They compare this spread with the spread between the median growth rates actually experienced in subsequent years. Their calculations imply that, from year 2 through 5, the median realized growth rates in the top and bottom quintiles differed by 5-1/2 percentage points, only a third of the average forecasted differential.[8]

On average, my coefficient estimates suggest that industry portfolios are valued as if the market believes that the differential in long-term growth forecasts should be applied to a six- to seven-year horizon. Of course, there are alternative interpretations of my regression estimates. One possibility is that investors (correctly) expect only a third of the differential between growth forecasts to be realized, but that they apply that smaller differential over a much longer horizon. To rationalize this interpretation, though, investors would need to expect the reduced differential to persist for over 20 years. Such beliefs would appear to fly in the face of another finding by Chan, et al. (2001), that there is remarkably little long-term persistence in firm-level income growth. All this would seem to indicate that, even if using the long horizons suggested by my estimates produces more accurate measures of investors' expected returns, using such horizons would seem to be an ill-advised strategy for making portfolio investment decisions.

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[8]They find that, in the first year after the forecast, median realized growth in operating income for those quintiles was 16 percent and 3-1/2 percent, a spread of 12-1/2 percentage points, about three-fourths of the expected spread. But the spread in median realized growth narrows to 7 points when the performance period is extended to 5 years. Backing out the strong contribution from the first year yields an implied average growth differential in the subsequent four years (years 2-5) of about 5-1/2 percent.

Like the evidence on stock returns and growth forecasts discussed earlier, the analysis by Chan, et al. (2001) is largely focused on the cross-sectional informativeness of growth forecasts. To complete the picture, an important direction for future research would involve focusing on the efficacy of the time-series information in long-term growth forecasts, measured by *changes* in such forecasts for a given firm or industry.

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**Table 1**

**Sample Statistics for Sector Portfolios (top) and Industry Portfolios (bottom)**

| | Mean | Std. Dev | Min | Max |
|---|---|---|---|---|
| P/E | 14.2 | 5.8 | 3.5 | 54.1 |
| | 14.9 | 7.5 | 3.0 | 127.3 |
| Payout | 0.45 | 0.20 | 0.08 | 2.2 |
| | 0.41 | 0.28 | 0.01 | 4.1 |
| Growth | 11.2 | 0.03 | 0.05 | 0.20 |
| | 14.9 | 0.03 | 0.03 | 0.27 |

**Pearson Correlation Coefficients**

| | P/E | Payout |
|---|---|---|
| Payout | 0.02 | 1.00 |
| | 0.15 | 1.00 |
| Growth | 0.45 | -0.44 |
| | 0.30 | -0.33 |

The samples runs quarterly from 1983:Q2 to 2001:Q2. In the more aggregated portfolios, there are 801 observations on 11 sectors; the second sample has 4071 observations on 66 industries.

**Table 2**
**Sector Portfolio Regressions: Dependent variable is the sector-level log PE ratio***

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Growth (β) | 8.05 | 2.00 | 9.69 | 2.66 | 2.30 | 1.69 |
| | (0.50) | (0.55) | (1.05) | (0.77) | (0.70) | (0.70) |
| β/(1-λ) | | *8.00* | | *7.92* | *6.63* | *5.45* |
| Payout Rate | 0.34 | 0.07 | 0.31 | 0.07 | 0.09 | 0.09 |
| | (0.05) | (0.03) | (0.08) | (0.04) | (0.04) | (0.04) |
| 10-Year Treasury Yield | -11.99 | -3.99 | -11.84 | -4.73 | -2.86 | |
| | (0.63) | (0.78) | (0.52) | (0.67) | (0.57) | |
| Risk Spread | -9.90 | 3.41 | -8.82 | 2.84 | | |
| | (4.02) | (1.92) | (3.27) | (1.78) | | |
| Expected. Inflation | | | | | -5.18 | |
| | | | | | (1.04) | |
| Lagged PE (λ) | | 0.75 | | 0.67 | 0.65 | 0.69 |
| | | (0.06) | | (0.05) | (0.05) | (0.06) |
| Adj. R-Squared | .706 | .910 | .714 | .889 | .893 | .764 |
| Root MSE | .204 | .113 | .172 | .107 | .106 | .085 |

*801 sector-time observations on 11 sectors over 1983:Q2 to 2001:Q2. Specifications (1) and (2) are estimated with OLS; fixed industry effects are added in (3)-(6) by using OLS on industry mean-adjusted values; year dummies are added in (6). Newey-West robust standard errors are shown in parentheses. Below the standard error for the coefficient on *Growth* (long-term growth) in (2), (4)-(6) is the implied "long-run" effect of *Growth* – equal to the coefficient on growth divided by (1-λ), where λ is the coefficient on the lagged PE.

**Table 3**
**Industry Portfolio Regressions: Dependent variable is the industry-level log PE ratio***

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Growth (β) | 5.39 | 0.91 | 5.06 | 1.36 | 1.20 | 1.00 |
| | (0.37) | (0.16) | (0.36) | (0.21) | (0.20) | (0.22) |
| *β/(1-λ)* | | *5.45* | | *4.53* | *3.96* | *3.88* |
| Payout Rate | 0.15 | 0.04 | 0.20 | 0.07 | 0.08 | 0.07 |
| | (0.02) | (0.01) | (0.02) | (0.01) | (0.01) | (0.01) |
| 10-Year Treasury Yield | -10.59 | -2.87 | -10.33 | -3.98 | -2.38 | |
| | (0.54) | (0.27) | (0.38) | (0.28) | (0.30) | |
| Risk Spread | -5.93 | 4.36 | -6.83 | 2.26 | | |
| | (3.33) | (1.30) | (2.13) | (1.31) | | |
| Expected Inflation | | | | | -3.96 | |
| | | | | | (0.67) | |
| Lagged PE (λ) | | 0.83 | | 0.71 | 0.70 | 0.74 |
| | | (0.02) | | (0.02) | (0.02) | (0.03) |
| Adj. R-Squared | .421 | .857 | .510 | .792 | .794 | .699 |
| Root MSE | .311 | .155 | .226 | .147 | .146 | .12 |

*4057 industry-time observations on 66 industries over 1983:Q2-2001:Q2 Specifications (1) and (2) are estimated with OLS; fixed industry effects are added to (3)-(6), by using OLS on industry mean-adjusted values; year dummies are added in (6). Newey-West robust standard errors are shown in parentheses. Below the standard error for the coefficient on *Growth* (long-term growth) in (2), (4)-(6) is the implied “long-run” effect of *Growth* – equal to the coefficient on growth divided by (1-λ), where λ is the coefficient on the lagged PE.

**Table 4**
**Sector Growth Effects in Industry Portfolio Regressions**

| Coefficient on: | (1) | (4) |
|---|---|---|
| Industry Growth | 4.35 | 3.62 |
| Sector Growth | 1.87 | 3.40 |
| Total | 6.22 | 7.02 |

Coefficients on growth forecast's are all significant at the 1 percent level. Figures under specifications (4) refer to implied long-run effects of growth, analogous to those in column (4) of tables 2 and 3.

**Table 5**
**Coefficients on Growth in Early & Late Samples**

| | Sectors | | Industries | |
|---|---|---|---|---|
| | (1) | (4) | (1) | (4) |
| 1983-1991 | 6.1 | 2.9 | 4.0 | 2.3 |
| 1992-2001 | 10.0 | 10.6 | 6.5 | 4.5 |

Coefficients on growth forecast's are all significant at the 1 percent level. Figures under specifications (4) refer to implied long-run effects of growth, analogous to those in column (4) of tables 2 and 3.

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## CAPITAL ASSET PRICES: A THEORY OF MARKET EQUILIBRIUM UNDER CONDITIONS OF RISK*


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### I. INTRODUCTION

ONE OF THE PROBLEMS which has plagued those attempting to predict the behavior of capital markets is the absence of a body of positive microeconomic theory dealing with conditions of risk. Although many useful insights can be obtained from the traditional models of investment under conditions of certainty, the pervasive influence of risk in financial transactions has forced those working in this area to adopt models of price behavior which are little more than assertions. A typical classroom explanation of the determination of capital asset prices, for example, usually begins with a careful and relatively rigorous description of the process through which individual preferences and physical relationships interact to determine an equilibrium pure interest rate. This is generally followed by the assertion that somehow a market risk-premium is also determined, with the prices of assets adjusting accordingly to account for differences in their risk.

A useful representation of the view of the capital market implied in such discussions is illustrated in Figure 1. In equilibrium, capital asset prices have adjusted so that the investor, if he follows rational procedures (primarily diversification), is able to attain any desired point along a *capital market line*.[1] He may obtain a higher expected rate of return on his holdings only by incurring additional risk. In effect, the market presents him with two prices: the *price of time*, or the pure interest rate (shown by the intersection of the line with the horizontal axis) and the *price of risk*, the additional expected return per unit of risk borne (the reciprocal of the slope of the line).


* A great many people provided comments on early versions of this paper which led to major improvements in the exposition. In addition to the referees, who were most helpful, the author wishes to express his appreciation to Dr. Harry Markowitz of the RAND Corporation, Professor Jack Hirshleifer of the University of California at Los Angeles, and to Professors Yoram Barzel, George Brabb, Bruce Johnson, Walter Oi and R. Haney Scott of the University of Washington.



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1. Although some discussions are also consistent with a non-linear (but monotonic) curve.

At present there is no theory describing the manner in which the price of risk results from the basic influences of investor preferences, the physical attributes of capital assets, etc. Moreover, lacking such a theory, it is difficult to give any real meaning to the relationship between the price of a single asset and its risk. Through diversification, some of the risk inherent in an asset can be avoided so that its total risk is obviously not the relevant influence on its price; unfortunately little has been said concerning the particular risk component which is relevant.

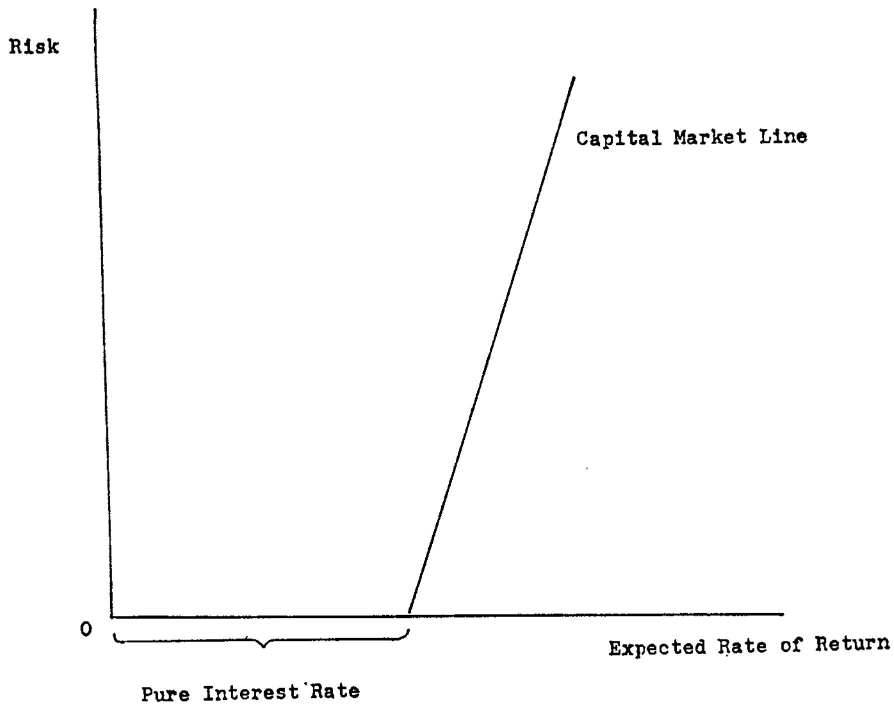


FIGURE 1

In the last ten years a number of economists have developed *normative* models dealing with asset choice under conditions of risk. Markowitz,[2] following Von Neumann and Morgenstern, developed an analysis based on the expected utility maxim and proposed a general solution for the portfolio selection problem. Tobin[3] showed that under certain conditions Markowitz's model implies that the process of investment choice can be broken down into two phases: first, the choice of a unique optimum combination of risky assets; and second, a separate choice concerning the allocation of funds between such a combination and a single riskless

2. Harry M. Markowitz, *Portfolio Selection, Efficient Diversification of Investments* (New York: John Wiley and Sons, Inc., 1959). The major elements of the theory first appeared in his article "Portfolio Selection," *The Journal of Finance*, XII (March 1952), 77-91.

3. James Tobin, "Liquidity Preference as Behavior Towards Risk," *The Review of Economic Studies*, XXV (February, 1958), 65-86.

asset. Recently, Hicks[4] has used a model similar to that proposed by Tobin to derive corresponding conclusions about individual investor behavior, dealing somewhat more explicitly with the nature of the conditions under which the process of investment choice can be dichotomized. An even more detailed discussion of this process, including a rigorous proof in the context of a choice among lotteries has been presented by Gordon and Gangolli.[5]

Although all the authors cited use virtually the same model of investor behavior,[6] none has yet attempted to extend it to construct a *market* equilibrium theory of asset prices under conditions of risk.[7] We will show that such an extension provides a theory with implications consistent with the assertions of traditional financial theory described above. Moreover, it sheds considerable light on the relationship between the price of an asset and the various components of its overall risk. For these reasons it warrants consideration as a model of the determination of capital asset prices.

Part II provides the model of individual investor behavior under conditions of risk. In Part III the equilibrium conditions for the capital market are considered and the capital market line derived. The implications for the relationship between the prices of individual capital assets and the various components of risk are described in Part IV.

## II. Optimal Investment Policy for the Individual

### *The Investor's Preference Function*

Assume that an individual views the outcome of any investment in probabilistic terms; that is, he thinks of the possible results in terms of some probability distribution. In assessing the desirability of a particular investment, however, he is willing to act on the basis of only two para-

4. John R. Hicks, "Liquidity," *The Economic Journal*, LXXII (December, 1962), 787-802.

5. M. J. Gordon and Ramesh Gangolli, "Choice Among and Scale of Play on Lottery Type Alternatives," College of Business Administration, University of Rochester, 1962. For another discussion of this relationship see W. F. Sharpe, "A Simplified Model for Portfolio Analysis," *Management Science*, Vol. 9, No. 2 (January 1963), 277-293. A related discussion can be found in F. Modigliani and M. H. Miller, "The Cost of Capital, Corporation Finance, and the Theory of Investment," *The American Economic Review*, XLVIII (June 1958), 261-297.

6. Recently Hirshleifer has suggested that the mean-variance approach used in the articles cited is best regarded as a special case of a more general formulation due to Arrow. See Hirshleifer's "Investment Decision Under Uncertainty," *Papers and Proceedings of the Seventy-Sixth Annual Meeting of the American Economic Association*, Dec. 1963, or Arrow's "Le Role des Valeurs Boursieres pour la Repartition la Meilleure des Risques," *International Colloquium on Econometrics*, 1952.

7. After preparing this paper the author learned that Mr. Jack L. Treynor, of Arthur D. Little, Inc., had independently developed a model similar in many respects to the one described here. Unfortunately Mr. Treynor's excellent work on this subject is, at present, unpublished.

meters of this distribution—its expected value and standard deviation.[8] This can be represented by a total utility function of the form:

$$U = f(E_w, \sigma_w)$$

where $E_w$ indicates expected future wealth and $\sigma_w$ the predicted standard deviation of the possible divergence of actual future wealth from $E_w$.

Investors are assumed to prefer a higher expected future wealth to a lower value, ceteris paribus ($dU/dE_w > 0$). Moreover, they exhibit risk-aversion, choosing an investment offering a lower value of $\sigma_w$ to one with a greater level, given the level of $E_w$ ($dU/d\sigma_w < 0$). These assumptions imply that indifference curves relating $E_w$ and $\sigma_w$ will be upward-sloping.[9]

To simplify the analysis, we assume that an investor has decided to commit a given amount ($W_i$) of his present wealth to investment. Letting $W_t$ be his terminal wealth and R the rate of return on his investment:

$$R \equiv \frac{W_t - W_i}{W_i},$$

we have

$$W_t = R\,W_i + W_i.$$

This relationship makes it possible to express the investor's utility in terms of R, since terminal wealth is directly related to the rate of return:

$$U = g(E_R, \sigma_R).$$

Figure 2 summarizes the model of investor preferences in a family of indifference curves; successive curves indicate higher levels of utility as one moves down and/or to the right.[10]

8. Under certain conditions the mean-variance approach can be shown to lead to unsatisfactory predictions of behavior. Markowitz suggests that a model based on the semi-variance (the average of the squared deviations below the mean) would be preferable; in light of the formidable computational problems, however, he bases his analysis on the variance and standard deviation.

9. While only these characteristics are required for the analysis, it is generally assumed that the curves have the property of diminishing marginal rates of substitution between $E_w$ and $\sigma_w$, as do those in our diagrams.

10. Such indifference curves can also be derived by assuming that the investor wishes to maximize expected utility and that his total utility can be represented by a quadratic function of R with decreasing marginal utility. Both Markowitz and Tobin present such a derivation. A similar approach is used by Donald E. Farrar in *The Investment Decision Under Uncertainty* (Prentice-Hall, 1962). Unfortunately Farrar makes an error in his derivation; he appeals to the Von-Neumann-Morgenstern cardinal utility axioms to transform a function of the form:

$$E(U) = a + bE_R - cE_R^2 - c\sigma_R^2$$

into one of the form:

$$E(U) = k_1E_R - k_2\sigma_R^2.$$

That such a transformation is not consistent with the axioms can readily be seen in this form, since the first equation implies non-linear indifference curves in the $E_R$, $\sigma_R^2$ plane while the second implies a linear relationship. Obviously no three (different) points can lie on both a line and a non-linear curve (with a monotonic derivative). Thus the two functions must imply different orderings among alternative choices in at least some instance.

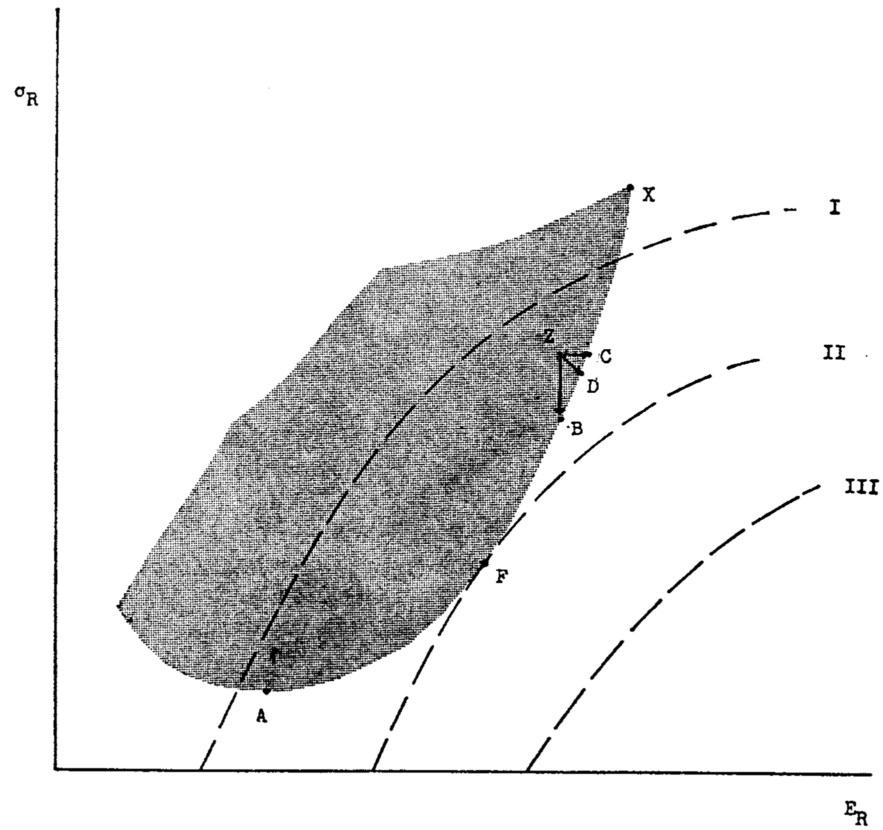


FIGURE 2

*The Investment Opportunity Curve*

The model of investor behavior considers the investor as choosing from a set of investment opportunities that one which maximizes his utility. Every investment plan available to him may be represented by a point in the $E_R$, $\sigma_R$ plane. If all such plans involve some risk, the area composed of such points will have an appearance similar to that shown in Figure 2. The investor will choose from among all possible plans the one placing him on the indifference curve representing the highest level of utility (point F). The decision can be made in two stages: first, find the set of efficient investment plans and, second choose one from among this set. A plan is said to be efficient if (and only if) there is no alternative with either (1) the same $E_R$ and a lower $\sigma_R$, (2) the same $\sigma_R$ and a higher $E_R$ or (3) a higher $E_R$ and a lower $\sigma_R$. Thus investment Z is inefficient since investments B, C, and D (among others) dominate it. The only plans which would be chosen must lie along the lower right-hand boundary (AFBDCX)—the ***investment opportunity curve.***

To understand the nature of this curve, consider two investment plans —A and B, each including one or more assets. Their predicted expected values and standard deviations of rate of return are shown in Figure 3.

If the proportion $\alpha$ of the individual's wealth is placed in plan A and the remainder (1-$\alpha$) in B, the expected rate of return of the combination will lie between the expected returns of the two plans:

$$E_{Rc} = \alpha E_{Ra} + (1 - \alpha)\ E_{Rb}$$

The predicted standard deviation of return of the combination is:

$$\sigma_{Rc} = \sqrt{\alpha^2 \sigma_{Ra}{}^2 + (1 - \alpha)^2\ \sigma_{Rb}{}^2 + 2r_{ab}\ \alpha(1 - \alpha)\ \sigma_{Ra}\sigma_{Rb}}$$

Note that this relationship includes $r_{ab}$, the correlation coefficient between the predicted rates of return of the two investment plans. A value of +1 would indicate an investor's belief that there is a precise positive relationship between the outcomes of the two investments. A zero value would indicate a belief that the outcomes of the two investments are completely independent and —1 that the investor feels that there is a precise inverse relationship between them. In the usual case $r_{ab}$ will have a value between 0 and +1.

Figure 3 shows the possible values of $E_{Rc}$ and $\sigma_{Rc}$ obtainable with different combinations of A and B under two different assumptions about

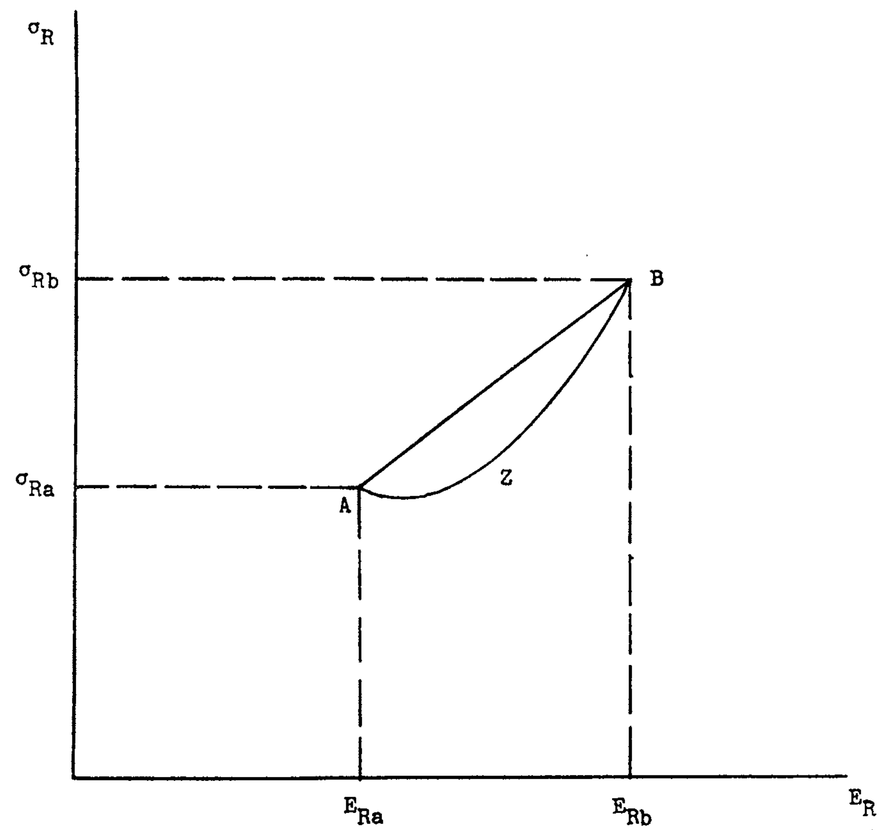


FIGURE 3

the value of $r_{ab}$. If the two investments are perfectly correlated, the combinations will lie along a straight line between the two points, since in this case both $E_{Rc}$ and $\sigma_{Rc}$ will be linearly related to the proportions invested in the two plans.[11] If they are less than perfectly positively correlated, the standard deviation of any combination must be less than that obtained with perfect correlation (since $r_{ab}$ will be less); thus the combinations must lie along a curve below the line AB.[12] AZB shows such a curve for the case of complete independence ($r_{ab} = 0$); with negative correlation the locus is even more U-shaped.[13]

The manner in which the investment opportunity curve is formed is relatively simple conceptually, although exact solutions are usually quite difficult.[14] One first traces curves indicating $E_R$, $\sigma_R$ values available with simple combinations of individual assets, then considers combinations of combinations of assets. The lower right-hand boundary must be either linear or increasing at an increasing rate ($d^2 \sigma_R/dE^2_R > 0$). As suggested earlier, the complexity of the relationship between the characteristics of individual assets and the location of the investment opportunity curve makes it difficult to provide a simple rule for assessing the desirability of individual assets, since the effect of an asset on an investor's over-all investment opportunity curve depends not only on its expected rate of return ($E_{Ri}$) and risk ($\sigma_{Ri}$), but also on its correlations with the other available opportunities ($r_{i1}, r_{i2}, \ldots, r_{in}$). However, such a rule is implied by the equilibrium conditions for the model, as we will show in part IV.

### *The Pure Rate of Interest*

We have not yet dealt with riskless assets. Let P be such an asset; its risk is zero ($\sigma_{Rp} = 0$) and its expected rate of return, $E_{Rp}$, is equal (by definition) to the pure interest rate. If an investor places $\alpha$ of his wealth

11. $$E_{Rc} = \alpha E_{Ra} + (1 - \alpha)\, E_{R_b} = E_{Rb} + (E_{R_a} - E_{R_b})\, \alpha$$

$$\sigma_{R_c} = \sqrt{\alpha^2 \sigma_{R_a}{}^2 + (1 - \alpha)^2\, \sigma_{Rb}{}^2 + 2 r_{ab}\, \alpha(1 - \alpha)\, \sigma_{Ra}\, \sigma_{Rb}}$$

but $r_{ab} = 1$, therefore the expression under the square root sign can be factored:

$$\begin{aligned}\sigma_{Rc} &= \sqrt{[\alpha\sigma_{Ra} + (1 - \alpha)\ \sigma_{R_b}]^2} \\ &= \alpha\ \sigma_{Ra} + (1 - \alpha)\ \sigma_{Rb} \\ &= \sigma_{Rb} + (\sigma_{Ra} - \sigma_{Rb})\ \alpha\end{aligned}$$

12. This curvature is, in essence, the rationale for diversification.

13. When $r_{ab} = 0$, the slope of the curve at point A is $-\dfrac{\sigma_{Ra}}{E_{Rb} - E_{Ra}}$, at point B it is $\dfrac{\sigma_{Rb}}{E_{Rb} - E_{Ra}}$. When $r_{ab} = -1$, the curve degenerates to two straight lines to a point on the horizontal axis.

14. Markowitz has shown that this is a problem in parametric quadratic programming. An efficient solution technique is described in his article, "The Optimization of a Quadratic Function Subject to Linear Constraints," *Naval Research Logistics Quarterly*, Vol. 3 (March and June, 1956), 111-133. A solution method for a special case is given in the author's "A Simplified Model for Portfolio Analysis," *op. cit.*

in P and the remainder in some risky asset A, he would obtain an expected rate of return:

$$E_{Rc} = \alpha E_{Rp} + (1 - \alpha) E_{Ra}$$

The standard deviation of such a combination would be:

$$\sigma_{Rc} = \sqrt{\alpha^2 \sigma^2_{Rp} + (1 - \alpha)^2 \sigma_{Ra}^2 + 2 r_{pa}\, \alpha (1 - \alpha)\, \sigma_{Rp} \sigma_{Ra}}$$

but since $\sigma_{Rp} = 0$, this reduces to:

$$\sigma_{Rc} = (1 - \alpha)\, \sigma_{Ra}.$$

This implies that all combinations involving any risky asset or combination of assets plus the riskless asset must have values of $E_{Rc}$ and $\sigma_{Rc}$ which lie along a straight line between the points representing the two components. Thus in Figure 4 all combinations of $E_R$ and $\sigma_R$ lying along

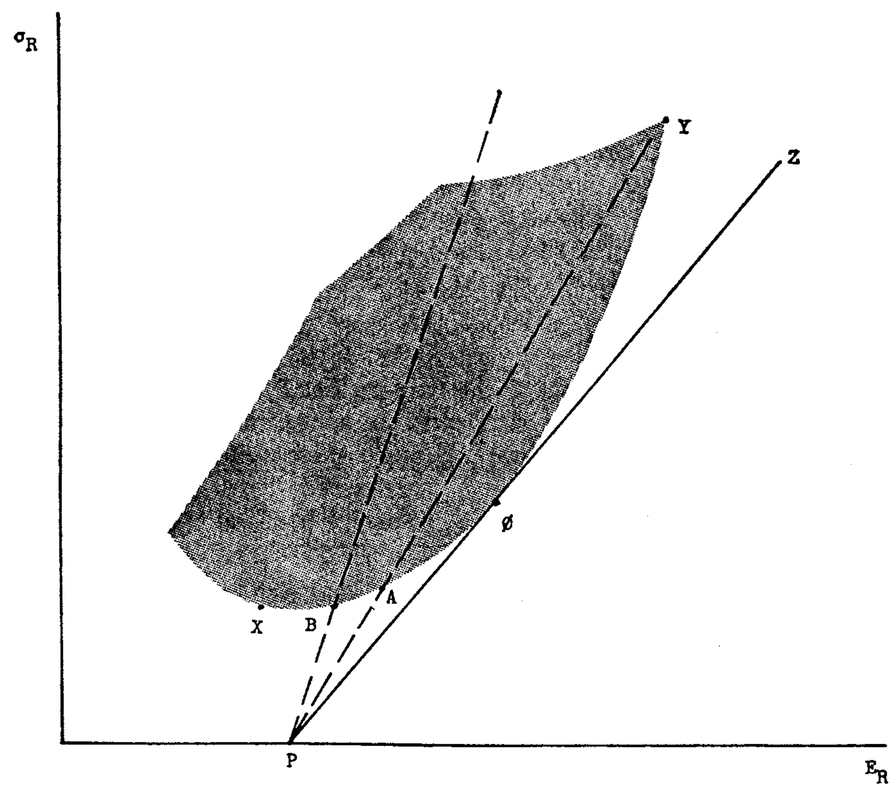


FIGURE 4

the line PA are attainable if some money is loaned at the pure rate and some placed in A. Similarly, by lending at the pure rate and investing in B, combinations along PB can be attained. Of all such possibilities, however, one will dominate: that investment plan lying at the point of the original investment opportunity curve where a ray from point P is tangent to the curve. In Figure 4 all investments lying along the original curve from X to $\phi$ are dominated by some combination of investment in $\phi$ and lending at the pure interest rate.

Consider next the possibility of borrowing. If the investor can borrow at the pure rate of interest, this is equivalent to disinvesting in P. The effect of borrowing to purchase more of any given investment than is possible with the given amount of wealth can be found simply by letting $\alpha$ take on negative values in the equations derived for the case of lending. This will obviously give points lying along the extension of line PA if borrowing is used to purchase more of A; points lying along the extension of PB if the funds are used to purchase B, etc.

As in the case of lending, however, one investment plan will dominate all others when borrowing is possible. When the rate at which funds can be borrowed equals the lending rate, this plan will be the same one which is dominant if lending is to take place. Under these conditions, the investment opportunity curve becomes a line (P$\phi$Z in Figure 4). Moreover, if the original investment opportunity curve is not linear at point $\phi$, the process of investment choice can be dichotomized as follows: first select the (unique) optimum combination of risky assets (point $\phi$), and second borrow or lend to obtain the particular point on PZ at which an indifference curve is tangent to the line.[15]

Before proceeding with the analysis, it may be useful to consider alternative assumptions under which only a combination of assets lying at the point of tangency between the original investment opportunity curve and a ray from P can be efficient. Even if borrowing is impossible, the investor will choose $\phi$ (and lending) if his risk-aversion leads him to a point below $\phi$ on the line P$\phi$. Since a large number of investors choose to place some of their funds in relatively risk-free investments, this is not an unlikely possibility. Alternatively, if borrowing is possible but only up to some limit, the choice of $\phi$ would be made by all but those investors willing to undertake considerable risk. These alternative paths lead to the main conclusion, thus making the assumption of borrowing or lending at the pure interest rate less onerous than it might initially appear to be.

## III. Equilibrium in the Capital Market

In order to derive conditions for equilibrium in the capital market we invoke two assumptions. First, we assume a common pure rate of interest, with all investors able to borrow or lend funds on equal terms. Second, we assume homogeneity of investor expectations:[16] investors are assumed

15. This proof was first presented by Tobin for the case in which the pure rate of interest is zero (cash). Hicks considers the lending situation under comparable conditions but does not allow borrowing. Both authors present their analysis using maximization subject to constraints expressed as equalities. Hicks' analysis assumes independence and thus insures that the solution will include no negative holdings of risky assets; Tobin's covers the general case, thus his solution would generally include negative holdings of some assets. The discussion in this paper is based on Markowitz' formulation, which includes non-negativity constraints on the holdings of all assets.

16. A term suggested by one of the referees.

to agree on the prospects of various investments—the expected values, standard deviations and correlation coefficients described in Part II. Needless to say, these are highly restrictive and undoubtedly unrealistic assumptions. However, since the proper test of a theory is not the realism of its assumptions but the acceptability of its implications, and since these assumptions imply equilibrium conditions which form a major part of classical financial doctrine, it is far from clear that this formulation should be rejected—especially in view of the dearth of alternative models leading to similar results.

Under these assumptions, given some set of capital asset prices, each investor will view his alternatives in the same manner. For one set of prices the alternatives might appear as shown in Figure 5. In this situa-

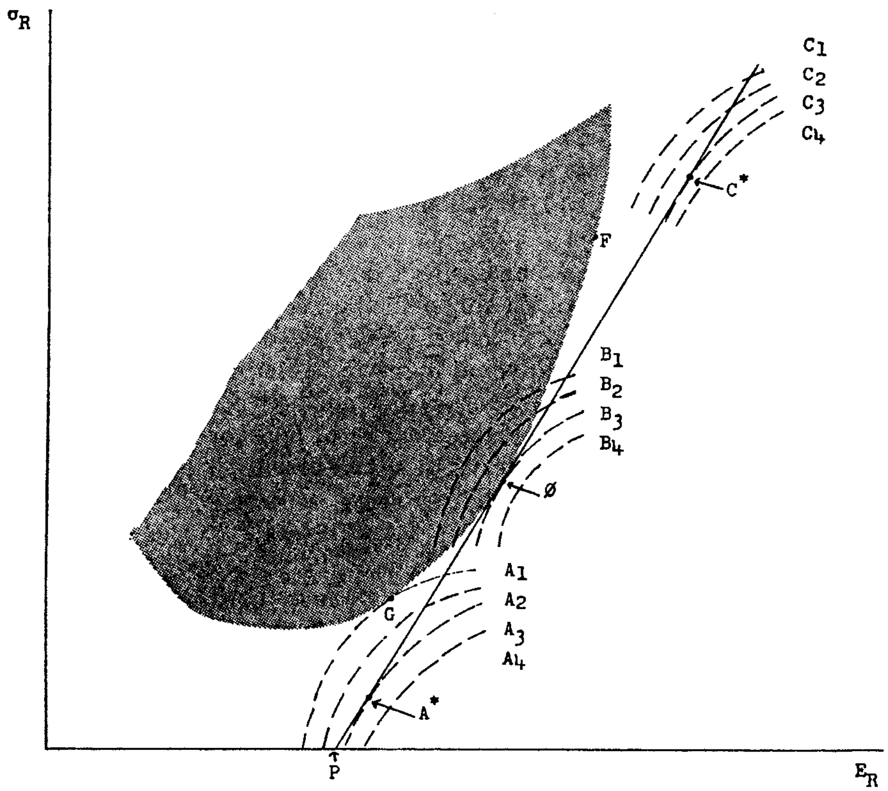


FIGURE 5

tion, an investor with the preferences indicated by indifference curves $A_1$ through $A_4$ would seek to lend some of his funds at the pure interest rate and to invest the remainder in the combination of assets shown by point $\phi$, since this would give him the preferred over-all position A*. An investor with the preferences indicated by curves $B_1$ through $B_4$ would seek to invest all his funds in combination $\phi$, while an investor with indifference curves $C_1$ through $C_4$ would invest all his funds plus additional (borrowed) funds in combination $\phi$ in order to reach his preferred position (C*). In any event, all would attempt to purchase only those risky assets which enter combination $\phi$.

The attempts by investors to purchase the assets in combination $\phi$ and their lack of interest in holding assets not in combination $\phi$ would, of course, lead to a revision of prices. The prices of assets in $\phi$ will rise and, since an asset's expected return relates future income to present price, their expected returns will fall. This will reduce the attractiveness of combinations which include such assets; thus point $\phi$ (among others) will move to the left of its initial position.[17] On the other hand, the prices of assets not in $\phi$ will fall, causing an increase in their expected returns and a rightward movement of points representing combinations which include them. Such price changes will lead to a revision of investors' actions; some new combination or combinations will become attractive, leading to different demands and thus to further revisions in prices. As the process continues, the investment opportunity curve will tend to become more linear, with points such as $\phi$ moving to the left and formerly inefficient points (such as F and G) moving to the right.

Capital asset prices must, of course, continue to change until a set of prices is attained for which every asset enters at least one combination lying on the capital market line. Figure 6 illustrates such an equilibrium condition.[18] All possibilities in the shaded area can be attained with combinations of risky assets, while points lying along the line PZ can be attained by borrowing or lending at the pure rate plus an investment in some combination of risky assets. Certain possibilities (those lying along PZ from point A to point B) can be obtained in either manner. For example, the $E_R$, $\sigma_R$ values shown by point A can be obtained solely by some combination of risky assets; alternatively, the point can be reached by a combination of lending and investing in combination C of risky assets.

It is important to recognize that in the situation shown in Figure 6 many alternative combinations of risky assets are efficient (i.e., lie along line PZ), and thus the theory does not imply that all investors will hold the same combination.[19] On the other hand, all such combinations must be perfectly (positively) correlated, since they lie along a linear border of

17. If investors consider the variability of future dollar returns unrelated to present price, both $E_R$ and $\sigma_R$ will fall; under these conditions the point representing an asset would move along a ray through the origin as its price changes.

18. The area in Figure 6 representing $E_R$, $\sigma_R$ values attained with only risky assets has been drawn at some distance from the horizontal axis for emphasis. It is likely that a more accurate representation would place it very close to the axis.

19. This statement contradicts Tobin's conclusion that there will be a unique optimal combination of risky assets. Tobin's proof of a unique optimum can be shown to be incorrect for the case of perfect correlation of efficient risky investment plans if the line connecting their $E_R$, $\sigma_R$ points would pass through point P. In the graph on page 83 of this article (*op. cit.*) the constant-risk locus would, in this case, degenerate from a family of ellipses into one of straight lines parallel to the constant-return loci, thus giving multiple optima.

the $E_R$, $\sigma_R$ region.[20] This provides a key to the relationship between the prices of capital assets and different types of risk.

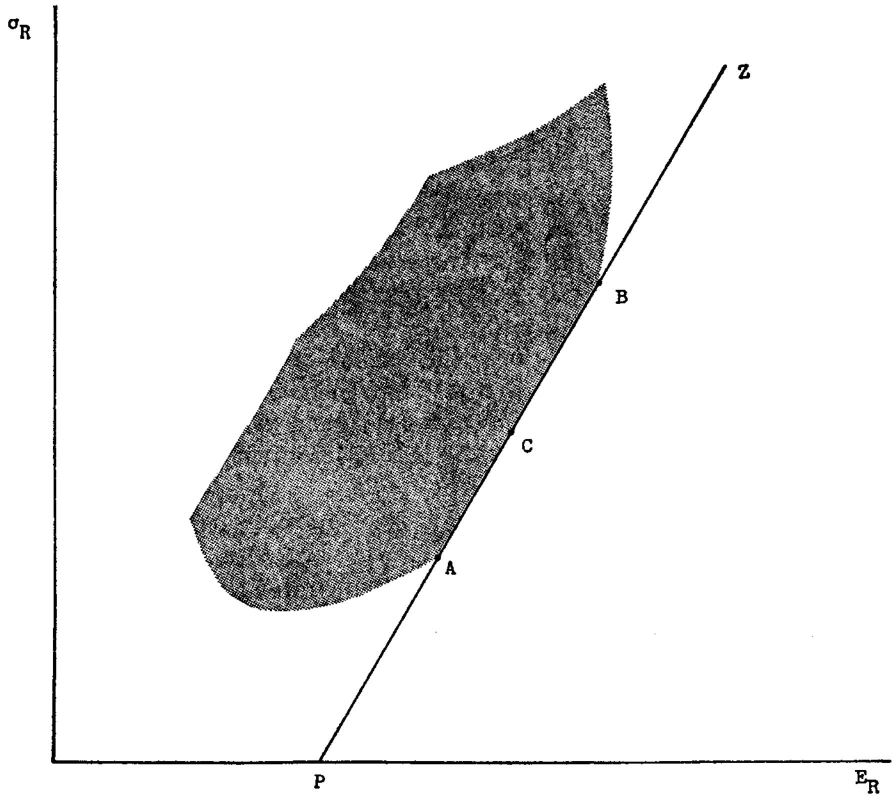


FIGURE 6

## IV. THE PRICES OF CAPITAL ASSETS

We have argued that in equilibrium there will be a simple linear relationship between the expected return and standard deviation of return for efficient combinations of risky assets. Thus far nothing has been said about such a relationship for individual assets. Typically the $E_R$, $\sigma_R$ values associated with single assets will lie above the capital market line, reflecting the inefficiency of undiversified holdings. Moreover, such points may be scattered throughout the feasible region, with no consistent relationship between their expected return and total risk ($\sigma_R$). However, there will be a consistent relationship between their expected returns and what might best be called *systematic risk*, as we will now show.

Figure 7 illustrates the typical relationship between a single capital

20. $E_R$, $\sigma_R$ values given by combinations of any two combinations must lie within the region and cannot plot above a straight line joining the points. In this case they cannot plot below such a straight line. But since only in the case of perfect correlation will they plot along a straight line, the two combinations must be perfectly correlated. As shown in Part IV, this does not necessarily imply that the individual securities they contain are perfectly correlated.

asset (point i) and an efficient combination of assets (point g) of which it is a part. The curve igg′ indicates all $E_R$, $\sigma_R$ values which can be obtained with feasible combinations of asset i and combination g. As before, we denote such a combination in terms of a proportion $\alpha$ of asset i and $(1 - \alpha)$ of combination g. A value of $\alpha = 1$ would indicate pure invest-

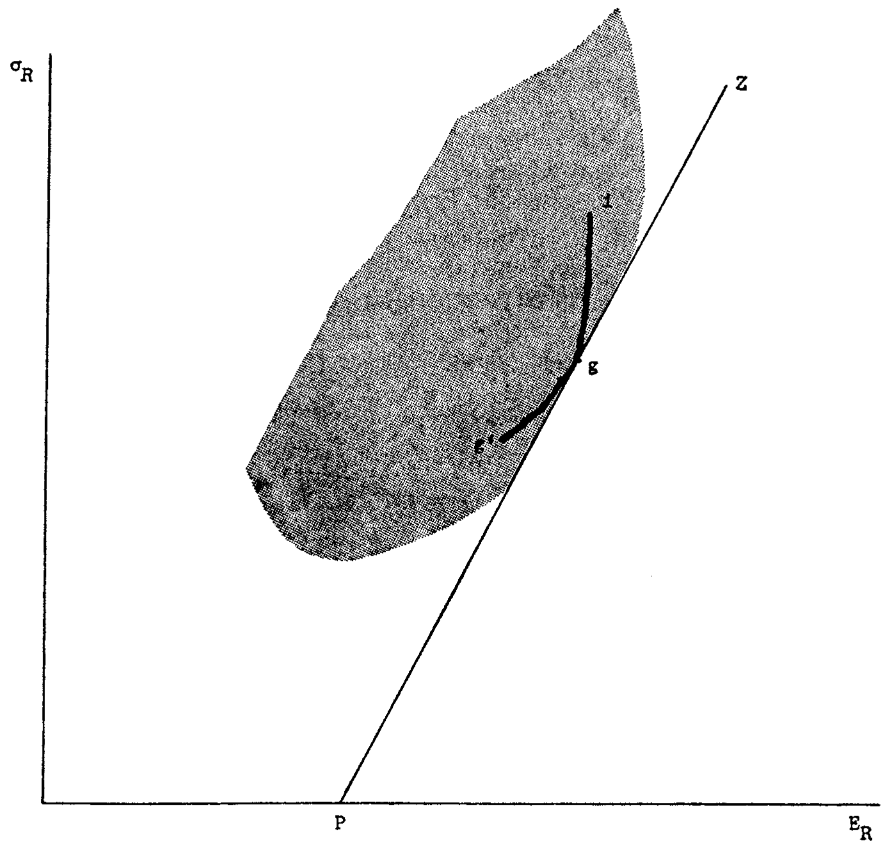


FIGURE 7

ment in asset i while $\alpha = 0$ would imply investment in combination g. Note, however, that $\alpha = .5$ implies a total investment of more than half the funds in asset i, since half would be invested in i itself and the other half used to purchase combination g, which also includes some of asset i. This means that a combination in which asset i does not appear at all must be represented by some negative value of $\alpha$. Point g′ indicates such a combination.

In Figure 7 the curve igg′ has been drawn tangent to the capital market line (PZ) at point g. This is no accident. All such curves must be tangent to the capital market line in equilibrium, since (1) they must touch it at the point representing the efficient combination and (2) they are continuous at that point.[21] Under these conditions a lack of tangency would

21. Only if $r_{ig} = -1$ will the curve be discontinuous over the range in question.

imply that the curve intersects PZ. But then some feasible combination of assets would lie to the right of the capital market line, an obvious impossibility since the capital market line represents the efficient boundary of feasible values of $E_R$ and $\sigma_R$.

The requirement that curves such as igg′ be tangent to the capital market line can be shown to lead to a relatively simple formula which relates the expected rate of return to various elements of risk for all assets which are included in combination g.[22] Its economic meaning can best be seen if the relationship between the return of asset i and that of combination g is viewed in a manner similar to that used in regression analysis.[23] Imagine that we were given a number of (ex post) observations of the return of the two investments. The points might plot as shown in Fig. 8. The scatter of the $R_i$ observations around their mean (which will approximate $E_{Ri}$) is, of course, evidence of the total risk of the asset — $\sigma_{Ri}$. But part of the scatter is due to an underlying relationship with the return on combination g, shown by $B_{ig}$, the slope of the regression line. The response of $R_i$ to changes in $R_g$ (and variations in $R_g$ itself) account for

22. The standard deviation of a combination of g and i will be:

$$\sigma = \sqrt{\alpha^2\sigma_{Ri}{}^2 + (1-\alpha)^2\,\sigma_{Rg}{}^2 + 2r_{ig}\,\alpha(1-\alpha)\ \sigma_{Ri}\sigma_{Rg}}$$

at $\alpha = 0$:

$$\frac{d\sigma}{d\alpha} = -\frac{1}{\sigma}\,[\sigma_{Rg}{}^2 - r_{ig}\sigma_{Ri}\sigma_{Rg}]$$

but $\sigma = \sigma_{Rg}$ at $\alpha = 0$. Thus:

$$\frac{d\sigma}{d\alpha} = -\ [\sigma_{Rg} - r_{ig}\sigma_{Ri}]$$

The expected return of a combination will be:

$$E = \alpha E_{Ri} + (1-\alpha)\ E_{Rg}$$

Thus, at all values of $\alpha$:

$$\frac{dE}{d\alpha} = -\ [E_{Rg} - E_{Ri}]$$

and, at $\alpha = 0$:

$$\frac{d\sigma}{dE} = \frac{\sigma_{Rg} - r_{ig}\sigma_{Ri}}{E_{Rg} - E_{Ri}}.$$

Let the equation of the capital market line be:

$$\sigma_R = s(E_R - P)$$

where P is the pure interest rate. Since igg' is tangent to the line when $\alpha = 0$, and since $(E_{Rg}, \sigma_{Rg})$ lies on the line:

$$\frac{\sigma_{Rg} - r_{ig}\sigma_{Ri}}{E_{Rg} - E_{Ri}} = \frac{\sigma_{Rg}}{E_{Rg} - P}$$

or:

$$\frac{r_{ig}\sigma_{Ri}}{\sigma_{Rg}} = -\left[\frac{P}{E_{Rg} - P}\right] + \left[\frac{1}{E_{Rg} - P}\right] E_{Ri}.$$

23. This model has been called the diagonal model since its portfolio analysis solution can be facilitated by re-arranging the data so that the variance-covariance matrix becomes diagonal. The method is described in the author's article, cited earlier.

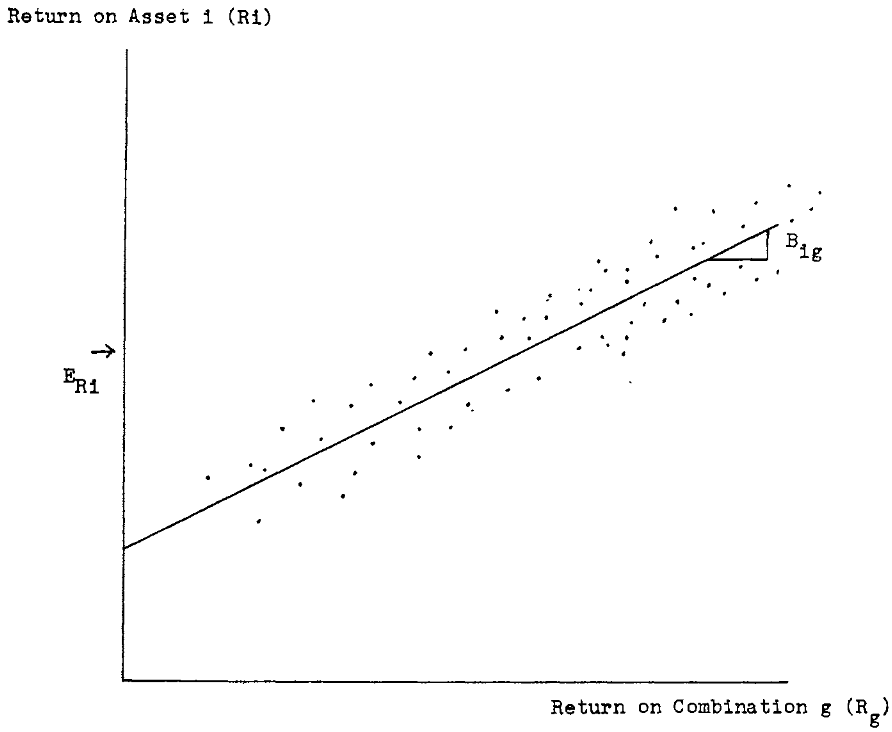


FIGURE 8

much of the variation in $R_i$. It is this component of the asset's total risk which we term the *systematic* risk. The remainder,[24] being uncorrelated with $R_g$, is the unsystematic component. This formulation of the relationship between $R_i$ and $R_g$ can be employed *ex ante* as a predictive model. $B_{ig}$ becomes the *predicted* response of $R_i$ to changes in $R_g$. Then, given $\sigma_{Rg}$ (the predicted risk of $R_g$), the systematic portion of the predicted risk of each asset can be determined.

This interpretation allows us to state the relationship derived from the tangency of curves such as igg′ with the capital market line in the form shown in Figure 9. All assets entering efficient combination g must have (predicted) $B_{ig}$ and $E_{Ri}$ values lying on the line PQ.[25] Prices will

24. ex post, the standard error.

25.

$$r_{ig} = \sqrt{\frac{B_{ig}^2 \sigma_{Rg}^2}{\sigma_{Ri}^2}} = \frac{B_{ig}\sigma_{Rg}}{\sigma_{Ri}}$$

and:

$$B_{ig} = \frac{r_{ig}\sigma_{Ri}}{\sigma_{Rg}}.$$

The expression on the right is the expression on the left-hand side of the last equation in footnote 22. Thus:

$$B_{ig} = -\left[\frac{P}{E_{Rg} - P}\right] + \left[\frac{1}{E_{Rg} - P}\right] E_{Ri}.$$

adjust so that assets which are more responsive to changes in $R_g$ will have higher expected returns than those which are less responsive. This accords with common sense. Obviously the part of an asset's risk which is due to its correlation with the return on a combination cannot be diversified away when the asset is added to the combination. Since $B_{ig}$ indicates the magnitude of this type of risk it should be directly related to expected return.

The relationship illustrated in Figure 9 provides a partial answer to the question posed earlier concerning the relationship between an asset's risk

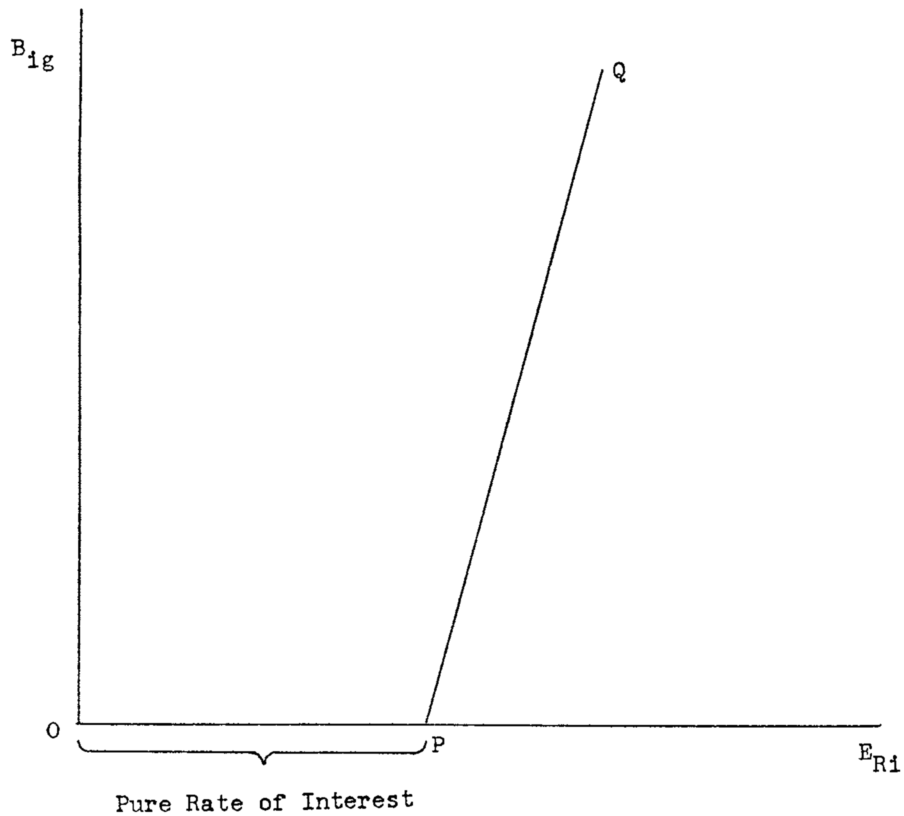


FIGURE 9

and its expected return. But thus far we have argued only that the relationship holds for the assets which enter some particular efficient combination (g). Had another combination been selected, a different linear relationship would have been derived. Fortunately this limitation is easily overcome. As shown in the footnote,[26] we may arbitrarily select *any* one

26. Consider the two assets i and i*, the former included in efficient combination g and the latter in combination g*. As shown above:

$$B_{ig} = -\left[\frac{P}{E_{Rg} - P}\right] + \left[\frac{1}{E_{Rg} - P}\right] E_{Ri}$$

and:

of the efficient combinations, then measure the predicted responsiveness of *every* asset's rate of return to that of the combination selected; and these coefficients will be related to the expected rates of return of the assets in exactly the manner pictured in Figure 9.

The fact that rates of return from all efficient combinations will be perfectly correlated provides the justification for arbitrarily selecting any one of them. Alternatively we may choose instead any variable perfectly correlated with the rate of return of such combinations. The vertical axis in Figure 9 would then indicate alternative levels of a coefficient measuring the sensitivity of the rate of return of a capital asset to changes in the variable chosen.

This possibility suggests both a plausible explanation for the implication that all efficient combinations will be perfectly correlated and a useful interpretation of the relationship between an individual asset's expected return and its risk. Although the theory itself implies only that rates of return from efficient combinations will be perfectly correlated, we might expect that this would be due to their common dependence on the over-all level of economic activity. If so, diversification enables the investor to escape all but the risk resulting from swings in economic activity—this type of risk remains even in efficient combinations. And, since all other types can be avoided by diversification, only the responsiveness of an asset's rate of return to the level of economic activity is relevant in

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$$B_{i*g*} = -\left[\frac{P}{E_{Rg*} - P}\right] + \left[\frac{1}{E_{Rg*} - P}\right] E_{Ri*}.$$

Since $R_g$ and $R_{g*}$ are perfectly correlated:

$$r_{i*g*} = r_{i*g}$$

Thus:

$$\frac{B_{i*g*}\sigma_{Rg*}}{\sigma_{Ri*}} = \frac{B_{i*g}\sigma_{Rg}}{\sigma_{Ri*}}$$

and:

$$B_{i*g*} = B_{i*g}\left[\frac{\sigma_{Rg}}{\sigma_{Rg*}}\right].$$

Since both g and g* lie on a line which intercepts the E-axis at P:

$$\frac{\sigma_{Rg}}{\sigma_{Rg*}} = \frac{E_{Rg} - P}{E_{Rg*} - P}$$

and:

$$B_{i*g*} = B_{i*g}\left[\frac{E_{Rg} - P}{E_{Rg*} - P}\right]$$

Thus:

$$-\left[\frac{P}{E_{Rg*} - P}\right] + \left[\frac{1}{E_{Rg*} - P}\right] E_{Ri*} = B_{i*g}\left[\frac{E_{Rg} - P}{E_{Rg*} - P}\right]$$

from which we have the desired relationship between $R_{i*}$ and g:

$$B_{i*g} = -\left[\frac{P}{E_{Rg} - P}\right] + \left[\frac{1}{E_{Rg} - P}\right] E_{Ri*}$$

$B_{i*g}$ must therefore plot on the same line as does $B_{ig}$.

assessing its risk. Prices will adjust until there is a linear relationship between the magnitude of such responsiveness and expected return. Assets which are unaffected by changes in economic activity will return the pure interest rate; those which move with economic activity will promise appropriately higher expected rates of return.

This discussion provides an answer to the second of the two questions posed in this paper. In Part III it was shown that with respect to equilibrium conditions in the capital market as a whole, the theory leads to results consistent with classical doctrine (i.e., the capital market line). We have now shown that with regard to capital assets considered individually, it also yields implications consistent with traditional concepts: it is common practice for investment counselors to accept a lower expected return from defensive securities (those which respond little to changes in the economy) than they require from aggressive securities (which exhibit significant response). As suggested earlier, the familiarity of the implications need not be considered a drawback. The provision of a logical framework for producing some of the major elements of traditional financial theory should be a useful contribution in its own right.

FINANCIAL ANALYSTS JOURNAL®
*Reflections*

# Perspectives on the Equity Risk Premium

Jeremy J. Siegel

The equity risk premium, or the difference between the expected returns on stocks and on risk-free assets, has commanded the attention of both professional economists and investment practitioners for many decades. In the past 20 years, more than 320 articles, enough to fill some 40 economics and finance journals, have been published with the words "equity premium" in the title.

The intense interest in the magnitude of the premium is not surprising. The difference between the return on stocks and the return on bonds is critical not only for asset allocation but also for wealth projections for individual investors, foundations, and endowments. One of the most asked questions by investors is: How much more can I expect to earn from shifting from bonds to stocks?

Academic interest in the equity premium surged after Mehra and Prescott published a seminal article in 1985 titled "The Equity Premium: A Puzzle." By examining the behavior of the stock market and aggregate consumption, they showed that the equity risk premium, under the usual assumptions about investor behavior toward risk, should be much lower than had been calculated from the historical data. Indeed, Mehra and Prescott stated that the equity premium in the U.S. markets should be, at most, 0.35 percent instead of the approximately 6 percent premium computed from data going back to 1872.

The Mehra–Prescott research raised the following question: Have investors been demanding—and receiving—"too high" a return for holding stocks based on the fundamental uncertainty in the economy, or are the models that economists use to describe investor behavior fundamentally flawed? If the returns have been too high, then analysts can justify increased asset allocation to equities and reduced allocation to bonds; if the models are flawed, economists need to develop new models to describe investor behavior.

My discussion of the equity risk premium will be divided into three parts: (1) a summary of the data used to calculate the equity premium and discussion of potential biases in the historical data, (2) analysis of the economic models, and (3) discussion of the implications of the findings for investors and for forecasts of the future equity premium.[1]

The equity risk premium determines asset allocations, projections of wealth, and the cost of capital, but we do not have a simple model that explains the premium.

## Historical Returns on Stocks and Bonds

In this section, I present historical asset returns since 1802, define the equity premium, and discuss biases in the historical data that affect future estimates of the equity premium.

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**Equity Returns.** The historical returns on stocks, bonds, and bills and the equity risk premium for the U.S. markets from 1802 through 31 December 2004 are in **Table 1**.[2] Both the arithmetic mean of the annual data, which is the "expected return" used in the capital asset pricing model (CAPM), and the compound (or geometric) return, which is the return most often used by individual and professional investors, are given in Table 1.[3] The last columns display the equity risk premium in relation to both long-term U.S. government bonds and T-bills. Returns and premiums are broken down into two subperiods in Panel A, into three major subperiods in Panel B, and into the major bull and bear markets since World War II in Panel C.

The stability of the real (inflation-adjusted) return on stocks over all long periods is impressive.[4] The compound annual real return on equity has averaged 6.82 percent over the past 203 years and, as Panels B and C show, settled between 6.5 percent and 7.0 percent for each of the three major subperiods and for the post–World War II data. This return is about twice the growth of the economy and includes the risk premium above risk-free assets that investors have demanded to hold stocks.

When the period for which stock returns are analyzed shrinks to one or two decades, the real return on stocks can deviate substantially from the long-run average. Since World War II, returns in major market cycles have fluctuated from a 10.02 percent annual real equity return in the bull market of 1946–1965 to a –0.36 percent annual real equity return in the bear market of 1966–1981; in the great bull market of 1982–1999, the return doubled the 203-year average.

**Fixed-Income Returns.** The middle columns in Table 1 show that real bond returns, in contrast to stocks, have experienced a declining trend in the past two centuries. From 1802 through 2004, the average annual compound real return on long-term bonds was about half the equity return, but in the 19th century, real bond returns were nearly 5 percent. Since the end of World War II, the bond return has averaged less than 1.50 percent. The 3.31 percent average real return over the last two centuries is approximately equal to the real growth of the economy, but in the post–World War II period, real returns on bonds have fallen far below economic growth.[5]

The real return on short-dated T-bills has fallen even more sharply than the return on bonds over the past two centuries. For the entire period, real T-bill returns averaged 2.84 percent, 67 bps below the return on long-term bonds. Average short-term

**Table 1. Historical Real Stock and Bond Returns and the Equity Premium**

| | Real Return | | | | | | Stock Return minus Return on: | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Stocks | | Bonds | | Bills | | Bonds | | Bills | |
| Period | Comp. | Arith. | Comp. | Arith. | Comp. | Arith. | Comp. | Arith. | Comp. | Arith. |
| *A. Long periods to present* | | | | | | | | | | |
| 1802–2004 | 6.82% | 8.38% | 3.51% | 3.88% | 2.84% | 3.02% | 3.31% | 4.50% | 3.98% | 5.36% |
| 1871–2004 | 6.71 | 8.43 | 2.85 | 3.24 | 1.68 | 1.79 | 3.86 | 5.18 | 5.03 | 6.64 |
| *B. Major subperiods* | | | | | | | | | | |
| 1802–1870 | 7.02% | 8.28% | 4.78% | 5.11% | 5.12% | 5.40% | 2.24% | 3.17% | 1.90% | 2.87% |
| 1871–1925 | 6.62 | 7.92 | 3.73 | 3.93 | 3.16 | 3.27 | 2.89 | 3.99 | 3.46 | 4.65 |
| 1926–2004 | 6.78 | 8.78 | 2.25 | 2.77 | 0.69 | 0.75 | 4.53 | 6.01 | 6.09 | 8.02 |
| *C. Post–World War II full sample, bull markets, and bear markets* | | | | | | | | | | |
| 1946–2004 | 6.83% | 8.38% | 1.44% | 2.04% | 0.56% | 0.62% | 5.39% | 6.35% | 6.27% | 7.77% |
| 1946–1965 | 10.02 | 11.39 | –1.19 | –0.95 | –0.84 | –0.75 | 11.21 | 12.34 | 10.86 | 12.14 |
| 1966–1981 | –0.36 | 1.38 | –4.17 | –3.86 | –0.15 | –0.13 | 3.81 | 5.24 | –0.21 | 1.51 |
| 1982–1999 | 13.62 | 14.30 | 8.40 | 9.28 | 2.91 | 2.92 | 5.22 | 5.03 | 10.71 | 11.38 |
| 1982–2004 | 9.47 | 10.64 | 8.01 | 8.74 | 2.31 | 2.33 | 1.46 | 1.90 | 7.16 | 8.32 |

*Note*: "Comp." stands for "compound"; "Arith." stands for "arithmetic."

rates were 34 bps above long-term rates for 1802–1870, but they were 57 bps below long rates from 1871 through 1925 and have been 156 bps below long rates since 1926.

The increase in the spread between long rates and short rates was caused partly by the increased liquidity of the T-bill market, which lowered short rates, and partly by the increase in the inflation premium investors have required on long-term bonds over much of the post–World War II period.

**The Equity Premium.** The decline in the real return on bonds, combined with the relative stability of the real return on equity, has increased the equity premium over time, as the last columns in Table 1 show. Over the 1802–2004 period, the equity risk premium as measured from compound annual returns and in relation to bonds rose (see Panel B) from 2.24 percent to 2.89 percent to 4.53 percent. Measured in relation to T-bills, the equity risk premium has increased even more.

**The Risk-Free Rate: Long or Short?** Should the equity risk premium be measured against the rate of short-term or long-term government bonds? In the simple representations of the CAPM, the risk-free rate is calculated against the rate on short-term risk-free assets, such as T-bills. When an intertemporal CAPM is used, however, a short rate may not be appropriate.[6] Investors should hedge against changes in investment opportunities, as represented by changes in the real risk-free rate. And in an intertemporal context, a risk-free asset can be considered an annuity that provides a constant real return over a long period of time.[7] The return on this annuity is best approximated by the returns on long-term inflation-indexed government bonds. In the United States, inflation-indexed government bonds were not introduced until 1997, so real returns on bonds before that date must be calculated *ex post* by subtracting inflation from nominal bond yields.

**Calculation of the Equity Premium.** The equity risk premium can be defined by the reference asset class, time period chosen, or method of calculating mean returns so as to take on a wide range of values. Its maximum value is calculated by using the *arithmetic* mean return of historical stock returns and subtracting the mean return on the highest-quality short-dated securities, such as T-bills. Measured in this way, the equity premium in the United States since 1802 has been 5.36 percent and since 1926, has been 8.02 percent. When *geometric* mean returns are used, the equity premium shrinks to 3.98 percent since 1802 and 6.09 percent since 1926. If we calculate the equity premium against long-dated (instead of short-term) bonds, the compound premium falls farther—to 3.31 percent over the past 202 years and 4.53 percent since 1926.

So, over the period from 1926 to the present, the premium can differ by 3.5 percentage points depending on whether long- or short-dated securities are used or arithmetic or geometric returns are calculated. Notwithstanding, the premium calculated by any of these methods far exceeds the magnitude derived in the Mehra–Prescott model.

**Biases in Historical Equity Returns.** In calculations of the equity risk premium, certain biases must be recognized: the international survivorship bias; failure to take transaction costs and diversification benefits into account; investor ignorance of risks, returns, and mean reversion; taxes and individuals' pension assets; and biases in the historical record of bond returns.

- *International survivorship bias.* Some economists claim that the historical real return on U.S. equities quite probably overstates the true expected return on stocks (Brown, Goetzmann, and Ross 1995). They maintain that the United States simply turned out to be the most successful capitalist country in history, a development that was by no means certain when investors were buying stock in the 19th and early 20th centuries.

Because the economic outcome in the United States was better than expected, U.S. returns may overstate the *expected* return on stocks. The cause is a phenomenon called "survivorship bias." This bias will exist whenever stock returns are recorded in successful equity markets, such as those in the United States, but omitted where stocks have faltered or disappeared outright, such as they did in Russia.

To address survivorship bias and to compile definitive series of long-term international stock returns, three U.K. economists—Dimson and Marsh from the London School of Business and Staunton from the U.K. statistical center—examined stock and bond returns over the past century in 16 countries. Their research, published in *Triumph of the Optimists: 101 Years of Global Investment Returns,* found that the superior returns on stocks over bonds is not characteristic of the U.S. market alone but exists in virtually all countries (see Dimson, Marsh, and Staunton 2002, 2004). **Figure 1** shows the average annual real stock, bond, and bill returns of the 16 countries they analyzed from 1900 through 2003.

Real equity returns ranged from a low of 1.9 percent in Belgium to a high of 7.5 percent in Sweden and Australia. Stock returns in the United States, although quite good, were not exceptional. U.S. stock returns were exceeded by the returns in Sweden, Australia, and South Africa.

If an equal investment had been placed in each of these markets in 1900, the average annual real return on stocks from 1900 through 2003 would have been 6.0 percent a year, not far below the U.S. return of 6.5 percent.[8] Furthermore, in the countries where real equity returns were low, such as Belgium, Italy, and Germany, real bond returns were also low, so the equity premium in Italy and Germany as measured against bonds was actually higher than the premium in the United States. In fact, the compound annual return of an equal amount invested in stocks in each country surpassed an identical amount in bonds in each country by 4 percent a year, only slightly less than the 4.6 percent equity risk premium found for the United States over the same time period.

When all the information was analyzed, the authors concluded:

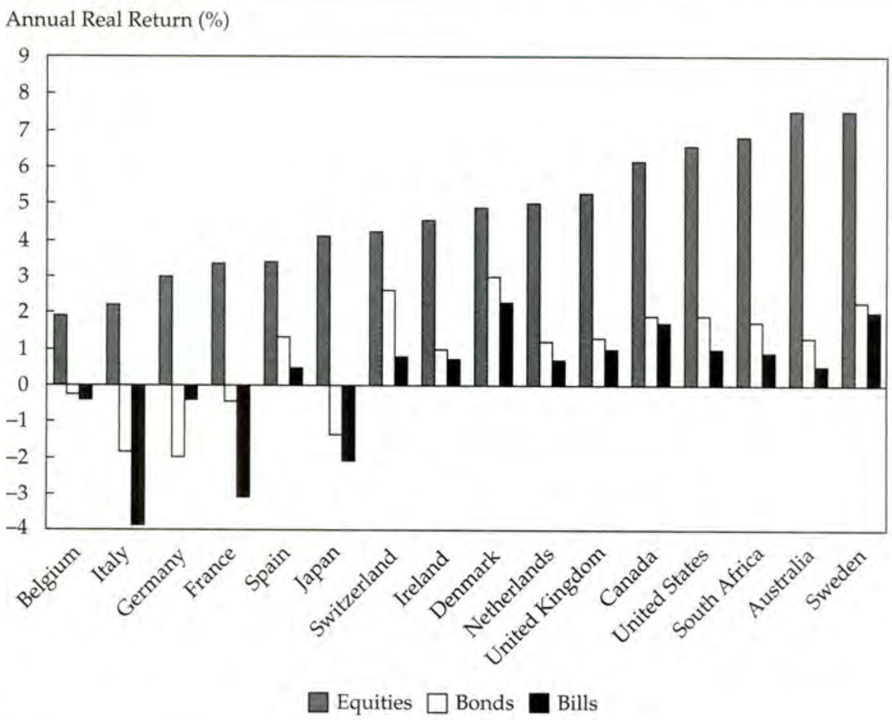
> While the U.S. and the U.K. have indeed performed well . . . there is no indication that they are hugely out of line with other countries. . . . Concerns about success and survivorship bias, while legitimate, may therefore have been somewhat overstated [and] investors may have not been materially misled by a focus on the U.S. (Dimson, Marsh, and Staunton 2002, p. 175)

The high historical equity premium is a worldwide, not just a U.S., phenomenon.[9]

*Transaction costs and diversification.* The returns used to calculate the equity premium are derived from published stock indices, but investors may not have realized these returns in their portfolios. Transaction costs in the equity markets were far higher over most of the period than they are today.

Low-cost indexed mutual and exchange-traded funds were not available to investors of the 19th century or most of the 20th century. Before 1975, brokerage commissions on buying and selling individual stocks were fixed by the NYSE at high levels. Moreover, it is not unreasonable to

**Figure 1. Real Returns on International Assets, 1900–2003**



assume that until recently, transaction costs involved with replicating a market portfolio with reinvested dividends subtracted 1–2 percentage points a year from stockholder returns.[10] So, the *realized* equity returns were probably much lower than those calculated from published data.

*Investor ignorance of risks, returns, and mean reversion*. Because data on long-term stock returns were not available until the second half of the 20th century, investors in the past were probably ignorant of the true risks and returns from holding stocks and may have underestimated the return and/or overestimated the risk of equities. When Fisher and Lorie (1964) first documented long-term returns in the 1960s, many economists were surprised that even when the Great Depression was included, stocks yielded such a high rate of return.

Another advantage of stocks that until recently was not recognized is the evidence of *mean reversion* of long-term equity returns.[11] In the early development of capital asset pricing theory, financial returns were modeled as random walks whose risk increased as the square root of the time period. But examination of long-term data strongly suggests a predictable component of stock returns that makes the returns less variable over long periods than they would be if mean reversion did not exist. Mean reversion increases the desirability of stocks as assets for long-term investors.

Ignorance of the historical risks and returns of various asset classes may have led to a general underpricing of equities as an asset class. This result, in turn, may have raised realized returns higher than would be justified if stocks were priced by investors with full knowledge of the distribution of stock returns.[12]

*Pension assets and taxes*. The evolution of U.S. federal tax policy also may have influenced stock returns. The tremendous increase in tax-sheltered plans over the past several decades has greatly increased the demand for equities. For example, in 1974, ERISA established minimum standards for pension plans in private industry and allowed equities to play a greatly expanded role in asset accumulation.

McGrattan and Prescott (2003) argued that the increase in tax-sheltered savings has led to a significant drop in the average tax rate on equities. This drop may have boosted stock returns and, to the extent that stocks substituted for bonds, lowered the real return on fixed-income assets.

*Biases in historical bond returns*. Real government bond returns may have been biased downward in the period since 1926, especially since World War II. Bondholders clearly did not anticipate the double-digit inflation of the 1970s and 1980s.

Table 1 shows the extraordinarily poor bond returns in the 35 years following World War II. Of course, when inflation was brought down in the 1980s and 1990s, interest rates returned to the levels of the immediate postwar period. But the resulting bull market in bonds did not offset the losses of the inflationary 1960s and 1970s because, although the inflation rate returned to its earlier level, the *price level* did not. So, over the entire inflation cycle, bondholders suffered a permanent loss of return. This phenomenon is one reason real bond returns since World War II have averaged only 1.4 percent, less than half their historical level.[13]

## Models of the Equity Premium

The biases just discussed have probably raised the historical return on equities and, therefore, the historical value of the equity risk premium. Nevertheless, accounting for these biases is unlikely to reduce the premium to the level that Mehra and Prescott maintain is consistent with reasonable levels of risk aversion. So, we are compelled to analyze whether the assumptions of the models used to describe investor behavior are, in fact, reasonable representations of investor and financial market behavior.

The equity premium puzzle is centered on the "reasonable" level of risk aversion for investors. Recall that risk premiums exist because individuals are assumed to have declining marginal utility of consumption. How fast this utility declines measures the investor's degree of risk aversion. In early risk models, the investor's utility function, $U$, was assumed to be a function of wealth, $W$, such that

$$U(W) = \left[\frac{1}{(1-A)}\right] W^{(1-A)}. \quad (1)$$

The parameter $A$ is the coefficient of relative risk aversion, or the percentage change (elasticity) of the marginal utility of wealth caused by a 1 percent change in the level of wealth. In other words, $A$ is directly related to the pain felt by investors when their wealth falls.

With this utility function, and under the assumption that returns are lognormally distributed, the arithmetic equity premium, $EP$, can be approximated by

$$EP \approx A(\sigma^2), \quad (2)$$

where σ is the standard deviation of returns on an investor's portfolio. If we use 0.18 as the standard deviation of annual stock market returns and an (arithmetic) equity risk premium of 8 percent as measured from annual data since 1926, we obtain a level of risk aversion, $A$, of 2 or 3.[14]

These levels of risk aversion produced by the early models seemed reasonable. With a risk aversion of 2, an individual would be willing to pay 4 percent of his wealth to insure against an equal probability of a 20 percent rise or 20 percent fall in wealth. If $A$ equals 3, this insurance payment would be 5.6 percent of wealth.

But Equation 1 is not correctly specified. Economists knew that wealth is a proxy for consumption, which is the correct variable to put into the utility function. Putting consumption into the utility function led to the development of the "consumption CAPM" (CCAPM) popularized by Breeden (1979).

There is an important empirical difference between the consumption-based CAPM and the wealth-based CAPM. Per capita consumption, as measured by national income account statistics, fluctuates far less than the value of wealth. The standard deviation of the growth of consumption is only about 4 percent, so the variance of changes in the stock market is almost 20 times greater than the variance of the changes in consumption.

If we plug the variance of consumption of 0.16 percent and an equity premium of 8 percent into Equation 2, we find a risk aversion of 50. If investors were really this risk averse, they would pay an insurance premium of 17 percent to avoid an equal probability of a 20 percent rise or fall in their wealth. For investors to act this risk averse is implausible. In other words, if individuals actually have a risk aversion coefficient of 2 or 3, the equity risk premium implied in the CCAPM is much smaller, on the order of 0.3–0.4 percent. The intuition here is that historical changes in consumption are not large enough to significantly alter utility, so investors are willing to take nearly a "fair bet" with stocks.[15]

Another way of looking at this issue is that the standard CAPM assumes that changes in wealth cause equal changes in consumption, but in reality, movements in the stock market are not associated with dramatic changes in consumption. Any risk that is not strongly correlated with consumption should not require a large risk premium, and empirically, the returns on equities fall into that category.[16]

The equity premium puzzle was not the only anomaly implied by the consumption CAPM. Weil (1989) showed that not only did the CCAPM imply that the historical equity premium was too large, but it also implied that the historical real rate of return on bonds, given economic growth and reasonable risk-aversion parameters, was far too small. This anomaly was called the "risk-free rate puzzle." These two puzzles were related to the "excess volatility puzzle," which had been explored earlier by Shiller (1981), who showed that stock prices have been too volatile to be explained by changes in subsequent dividends.

These puzzles are caused by the fact that the stock market has fluctuated far more than the underlying economic variables, such as aggregate consumption or GDP.

## Finding the Model That Fits the Data

Before attempting to change the basic model summarized by Equation 1 with consumption substituting for wealth, I should note that some economists believe that the high levels of risk aversion implied by the model are not necessarily unreasonable. Kandel and Stambaugh (1991) pointed out that, although high levels of risk aversion may lead to unreasonable behavior with respect to large changes in consumption, the behavior may not be implausible for small changes in wealth. For example, to avoid a 50/50 chance of your consumption rising or falling by 1 percent if your coefficient of risk aversion is 10, you would pay 5 percent of the gamble. Even if risk-aversion coefficient $A$ is as high as 29, which best fits the data in the Kandel–Stambaugh model, an investor would pay only 14.3 percent of the gamble to avoid the risk of a 1 percent rise or fall in wealth. Neither of these actions appears unreasonable.

Fama, agreeing that a large risk-aversion coefficient is not necessarily a puzzle, stated that

> a large equity premium says that consumers are extremely averse to small negative consumption shocks. This is in line with the perception that consumers live in morbid fear of recessions (and economists devote enormous energy to studying them) even though, at least in the post war period, recessions are associated with small changes in per capita consumption. (1991, p. 1596)

In evaluating these arguments, however, remember that in the domain of retirement savings, the stakes are large relative to wealth or yearly consumption. A typical faculty member at age 55 saving, say, 10 percent of her salary a year might well have half or more of her wealth (including future earnings) in her retirement account. Similarly, university endowments are a substantial portion of the wealth of private universities. And even with mean reversion of equity returns, the 10-year to 20-year standard deviation of equity returns is substantial. So, we seem to be back in the high-stakes category, where high values of risk aversion lead to absurd behavior.

**Changes in the Utility Function.** In an attempt to solve the puzzle, most economists have been driven to modify the consumption-based utility function represented by Equation 1 to justify a higher equity premium without requiring an implausibly high level of risk aversion. A popular generalization of Equation 1, pioneered by Epstein and Zin (1989), breaks the rigid link between risk aversion (investor reaction to changes in consumption over a *given period of time*) and the reaction to changes in consumption over time, called the *intertemporal rate of substitution*, which affects the real rate of interest. This class of utility functions has been fruitful in explaining low real rates but does not go far in explaining the equity premium.

Another line of research makes utility a function not only of current consumption but also of some "benchmark" level of consumption. If the benchmark is taken to be prior levels of consumption, then individuals are taken to be sensitive not only to their level of consumption today but also to how it has changed from yesterday. Thus, individuals are assumed to take time to adjust to new levels of consumption, a behavior that can be described as "habit formation."

Constantinides (1990) showed that habit formation makes an investor more risk averse to a short-run change in consumption, leading to higher "short-run" risk aversion than "long-run" risk aversion. Evidently, once one has tasted the good life, it is difficult to adjust one's consumption downward. A similar approach was taken by Campbell and Cochrane (1999), who claimed that utility is a function of consumption over and above some habit that is slow to change. Therefore, in a recession, risk aversion increases markedly even though in absolute terms, recessions exhibit relatively small declines in consumption. The equity premium, as well as all other risk premiums, does indeed increase in recessionary periods.

Abel (1990) examined asset pricing when an individual's utility is derived not only from the individual's own consumption but also *relative* to the consumption of others around them—what he termed "catching up with the Joneses." This utility function is less risk averse if everyone's income moves up and down together, but when individuals compare their living standards with others', the comparison makes individuals act very risk averse. This utility function helps solve the real rate puzzle but is not much help in explaining the equity premium.[17]

An alternative approach, elaborated by Benartzi and Thaler (1995), is built on the "cumulative prospect theory" proposed by Tversky and Kahneman (1992). Prospect theory shares the claim that utility is based on benchmarks, so today's level of consumption is important, but prospect theory, which is a pioneering model in behavioral finance, asserts that asset *returns*, rather than consumption or wealth, are arguments of the utility function. In these models, investors dislike losses much more intensely than they like gains. When the utility function is based on *changes* in wealth rather than *levels* of wealth, investors are referred to as "loss averse" rather than "risk averse."[18]

When investors have these loss-averse preferences, their attitudes toward risky assets depend crucially on the time horizon over which returns are evaluated. For example, loss-averse investors who compute the values of their portfolios every day would find investing in stocks unattractive because stock prices fall almost as often as they rise. Investors who check returns less frequently have a higher probability of seeing positive returns. The concept of loss-averse preferences explains why individuals are so risk averse in the short run, what Benartzi and Thaler called "myopic loss aversion."

**Uncertain Labor Income.** The previous models assumed that the only important source of uncertainty is the return on equity. A more realistic way to model uncertainty would be to recognize that labor income is also uncertain. This fact can markedly change investors' behavior toward the risks in financial markets.

Uncertain labor income may explain why risk aversion increases in a recession; it is well known that unemployment and the number of layoffs affect workers' decisions. During recessions, stocks frequently sell at large discounts relative to their long-term values, a factor that increases long-run equity returns.

The inability to borrow large sums against labor income also means that many workers, especially young workers, are not able to hold as much equity as they would like, even though their "human capital," measured as the value of their future labor income, is high. Constantinides, Donaldson, and Mehra (2002) reported that this phenomenon can have important consequences for asset pricing. Older workers do hold equity, but this age cohort displays greater risk aversion than younger workers because older workers have much more limited ability to offset portfolio losses by changing their work effort. As a result, the economy in general displays the greater risk aversion of the older generation, for whom future consumption is more geared to the level of financial assets than to income. Indeed, Mankiw and Zeldes (1991) found that large stockholders' consumption reflects a larger sensitivity to market fluctuations than does the consumption of smaller stockholders.

**Modeling the Risks to Consumption and Equities.** Another path to justifying the equity risk premium, rather than changing the form of the utility function, is to reexamine the statistical properties of consumption and stock returns. The standard approach is to assume that both the growth of consumption and the return on stocks are stochastic processes marked by lognormal distributions with constant expected returns. Although this specification is analytically tractable and reasonably replicates the behavior of the historical data, it may not be correct.

Weitzman (2004) argues in a working paper that we do not know the exact distributions of output in the economy, so treating the historically estimated means and standard deviations as known parameters is incorrect. Uncertainty about the true means and variances of the distribution signifies that the probability distributions of consumption and stock returns have fatter tails than assumed in the lognormal distribution.

We know that stock returns do, in fact, have far fatter tails than implied by lognormality. If lognormality prevailed, the probability of the 19 percent decline in the S&P 500 Index that occurred on 19 October 1987 would be less than 1 in $10^{71}$, so even if we had had billions of exchanges operating daily for the last 12 billion years (the estimated age of the universe), there would be virtually no chance of observing this event. Yet, the decline did occur, and it may have dramatically increased investors' perceptions of equity risk.

Weitzman shows that, in the absence of risk-free assets, these fatter-tailed distributions alter the analytics of the equity premium dramatically. Instead of yielding an extremely low equity premium, these distributions yield an arbitrarily high equity premium for any level of risk aversion. Furthermore, this model has the ability to explain a low risk-free rate *and* the "excess volatility" of the stock market.

This research is not unrelated to the earlier studies of Rietz (1988), who speculated shortly after Mehra and Prescott's research that investors fear a lurking "disaster state" of extreme negative consumption that has not yet been realized. Such fear would lead to a higher equity premium.[19] Recently, Barro (2005) found strong support for this theory in the data for international markets.

In a similar vein, Bansal and Yaron (2004) rewrote the stochastic properties of the consumption and dividend growth models. Instead of modeling consumption growth as uncorrelated through time, they assumed it has a small long-run predictable component that is affected by past growth. So, a shock to consumption influences its expected growth as well as the expected growth of dividends many years into the future, which can have a dramatic impact on the valuation of equities.[20] When this consumption process is combined with time-varying variance, the Bansal–Yaron model, like Weitzman's approach, has the capability of explaining all the asset pricing puzzles.[21]

## Practical Applications

The practitioner might ask: How does the equity premium puzzle matter to investors? This question should be analyzed in the following way.

If the equity premium should be only a fraction of 1 percent, as the basic economic model suggests, then either stocks should be priced much higher or bonds should be priced much lower than they have been on a historical basis.[22] If stock prices rose and bond prices fell, the result would lower the forward-looking returns on equities and raise returns on fixed-income assets, thereby lowering the equity premium. Clearly, if investors believe this narrower premium will prevail at some time in the future, they should be fully invested in stocks now.

But this scenario is highly unlikely to occur. Although the future equity premium is likely to be somewhat lower than in the past, few believe investors will hold stocks if their expected return is only a fraction of a percent above the return of risk-free assets.

Yet, we should not dismiss the equity premium puzzle. The search for the right model has yielded insights that can give practitioners guidance in structuring their clients' portfolios. One promising area is the work on habit formation, which implies that there may be a significant difference in an investor's short-term and long-term attitudes toward risk. This research suggests that an advisor may find it worthwhile to explore the investor's reaction to lowering consumption in a short time frame versus lowering it in a longer time frame, when other adjustments can be made to ease the impact of a reduced standard of living.

A related issue is the importance of examining labor income as a component of portfolio choice. Individuals whose labor income is uncertain and whose borrowing capabilities are low should hold a lower allocation of equities. Those with highly marketable skills should hold a higher fraction in equities. Those who are near retirement and have no flexibility to change their labor income will be more risk averse than investors with marketable labor skills.

A high equity premium can arise from assuming that investors demand a minimum level of consumption that must be attained in any investment plan, no matter what the time period to adjust. The effect is equivalent to assuming that risk aversion becomes extremely high at low levels of consumption. This approach has given rise to the growth of "liability investing," in which investors, especially those approaching retirement, fund what they deem absolute minimum expenditures with risk-free assets, such as Treasury Inflation-Indexed Securities (informally called TIPS), with the remainder being subject to the usual risk and return trade-offs (see Waring 2004).

Investors who suffer from myopic loss aversion, the condition in which the downs in the market deliver much more pain than the ups deliver pleasure, should be advised to set their best allocations and then assess the value of their portfolios infrequently. Blind trusts controlled by outside advisors might be the best strategy for the investors who are particularly sensitive to losses.

Financial planners must also evaluate their clients' fears of remote but catastrophic events and evaluate the likelihood of such events. In some economic states, such as a terrorist strike or a nuclear attack, equities could suffer extreme losses. Practitioners should note that these events will also affect the value of government bonds, so what are considered risk-free assets may even no longer exist.[23] War and other conflicts that destroy wealth also cannot be ruled out. Furthermore, over a very long horizon, there is the possibility that capitalism as a form of economic organization may cease to exist and that the wealth of the propertied classes will be expropriated. For investors with fears of these remote, yet not inconceivable, events, a financial advisor must determine whether the equity premium is sufficient to overcome the outcomes.

## Future of the Equity Risk Premium

Despite the fact that the models that economists taught in their classes predicted a small equity premium, most academic economists, even at the peak of the bull market in 2000, maintained a personal estimate of the equity premium (which, presumably, they taught to students) close to the historical mean realized premium since 1926—that is, about 6 percent (compound) or 8 percent (arithmetic) over T-bills.

For his 2000 paper, Welch surveyed a large number of academic economists, who estimated the arithmetic premium of stocks over short-term bonds at 7 percent, about 100 bps below the 1926–2004 average.[24] If we subtract 2 percentage points to convert to the geometric average and then subtract a further 150 bps to convert from short-run to long-run bonds, we obtain a geometric equity premium of stocks over bonds of about 3.5 percent.

Professional money managers apparently have a lower estimate of the equity risk premium than do academics. At a CFA Institute conference I spoke to in early 2004, Peter Bernstein—noted author, money manager, and an organizer of the conference—asked the large crowd of professional investors whether they would be inclined to hold in their portfolios a preponderance of equity over fixed income if they knew that the equity premium was 3 percent. A majority raised their hands. When he asked the same question with a 2 percent premium, most of the audience did not.[25]

I noted in the opening of this article that persuasive reasons support a lower forward-looking real return on equity than the return found in the historical data. The sharp drop in the cost of acquiring and maintaining a diversified portfolio of common stocks, not only in the United States but now worldwide, should increase the price of equities and lower their future return. If we assume these annual costs have been brought down by 100 bps, then the future real return on equities should be 5.5–6.0 percent, about 1 percentage point lower than the historical range of 6.5–7.0 percent. Although these returns are below the historical average calculated from indices, investors today will receive the same realized return from stocks as they obtained earlier when trading costs were higher.

For bonds, the question is whether real future returns should be higher than the 2.25 percent average recorded since 1926. Until recently, I believed that the answer was unambiguously yes. The historical real return on bonds was biased downward by the inflation of the 1970s. Indeed, when TIPS were issued in 1997, their real yield was 3.5 percent, and it climbed to more than 4 percent in 2000. If we assume future real bond returns will be 3.5 percent and real stock returns will be between 5.5 percent and 6 percent, the equity premium will be between 2 percent and 3 percent, a level that would leave most money managers satisfied with their equity allocations.

But in the last few years, the real return on protected government bonds has dropped sharply. TIPS yields, which had been as high as 3 percent in the summer of 2002, fell to 1.5 percent in 2005. The causes of the drop are not well understood but may be related to such factors as fear of a decline in growth because of the decline in the number of workers, the increased risk aversion of an aging population, the excess of saving over investment, manifesting itself through the demand for U.S. government bonds from developing Asian countries, or the increased demand for fixed-income assets by pension funds seeking to offset their pension liabilities. Another possibility is that bondholders believe central banks will keep inflation low, so they view government bonds as true hedges against disaster scenarios ranging from armed conflict to terrorist attacks—and even natural disasters.

If the equity premium is 2–3 percent and real bond yields remain at 1.5 percent, the projected real return on stocks is only about 4 percent. Some noted analysts believe that real stock returns will indeed be this low because this return comports with a 2 percent dividend yield plus the 2 percent long-term real growth of per share dividends found in long-run stock data (Bernstein and Arnott 2003).

I believe, however, that this forecast of real stock returns is too low. First, future dividend growth should be higher than the historical average because the dividend payout ratio has fallen dramatically, which enables companies to use retained earnings to finance growth.[26] Second, future real stock returns can be predicted by taking the earnings yield, which is the inverse of the well-known P/E. This approach works extremely well with long-run data because the average historical P/E of 15 has corresponded to a 6.7 percent real return on stocks. The P/E taken from data in August 2005 points to a 5.5–6.0 percent real stock return. As mentioned earlier, the higher level of stock prices relative to earnings is justified by the steep decline in the costs of holding a fully diversified equity portfolio.

Finally, I believe that the pessimism about future economic growth is unwarranted. In my opinion, the negative impact of the aging of the developed world's population will be more than offset by accelerating growth in the developing world, which will lead to rapid worldwide growth over the next several decades.[27] Forward-looking equity returns of an internationally diversified portfolio should therefore be in the range of 5.5–6.0 percent. If the real return on bonds remains in the 1.5–2.0 percent range, because of increased risk aversion or other factors unrelated to economic growth, then the equity risk premium has probably risen to a level that comports with the post-1926 data.

## Conclusion

The equity premium is a critical number in financial economics. It determines asset allocations, projections of retirement and endowment wealth, and the cost of capital to companies. Economists are still searching for a simple model that can justify the premium in the face of the much lower volatility of aggregate economic data. Although there are good reasons why the future equity risk premium should be lower than it has been historically, projected compound equity returns of 2–3 percent over bonds will still give ample reward for investors willing to tolerate the short-term risks of stocks.

## Notes

1. Many excellent academic reviews of the equity premium puzzle are available. Cochrane (2005) of the University of Chicago has provided a complete updated review.
2. The stock series is from a combination of sources. Data for 1802–1871 are from Schwert (1990); data for 1871–1925 are from Cowles (1938); data for 1926–2004 are from the CRSP capitalization-weighted indexes of all NYSE, Amex, and NASDAQ stocks. More extensive descriptions of the data can be found in Siegel (2002).
3. As an approximation, the geometric return is equal to the arithmetic return minus one-half the variance of the return. For a fuller description, see the subsection "Calculation of the Equity Premium."
4. Smithers and Wright (2000) called this stable long-term return "Siegel's Constant."
5. Theoretically, real interest rates do not necessarily equal growth. The real rate is also a function of the time rate of discount and the level of risk aversion.
6. See Merton (1973) for a description of the intertemporal CAPM.
7. Campbell and Viceira (2002) indicated that the yield on the 10-year U.S. inflation-linked bond would be the closest in duration to the indexed annuity, especially for someone approaching retirement.
8. Mathematically, the average return of an equally weighted world portfolio is higher than the average equity return in each country.
9. In fact, *Triumph of the Optimists* may have actually *understated* long-term international stock returns. The U.S. stock markets and other world markets for which we have data did very well in the 30 years prior to 1900, which is when their study began. U.S. returns measured from 1871 outperformed returns taken from 1900 by 32 bps. Data from the United Kingdom show a similar pattern.
10. Before commissions were deregulated in May 1975, a typical trade—say, 100 shares at $30—paid a commission of $58.21, almost 2 percent of market value. Small odd-lot trades resulting from reinvesting dividends could cost, considering odd-lot premiums, as much as 4 percent.
11. See Poterba and Summers (1988) for early research on mean reversion and Cochrane (1999) for evidence of stock return predictability.
12. Abel (2002) explored the implications for the equity risk premium when investors had incorrect information on the distributions of returns.
13. Recently, real bond returns have fallen sharply, which is discussed later.
14. See Friend and Blume (1975) for an earlier derivation of the risk-aversion parameter.
15. Arrow (1965) showed that for small risks, investors should be risk neutral, requiring little or no premium.
16. When consumption and stock returns are not perfectly correlated, $EP = \sigma_c \sigma_W \rho_{c,W}$, where $\sigma_c$ is the standard deviation of consumption, $\sigma_W$ is the standard deviation of stocks, and $\rho_{c,W}$ is the correlation coefficient between the two. Because empirically $\rho$ is about 0.2, this equation leads to approximately the same estimate of risk aversion as does the CCAPM (see Cochrane 2005).
17. Once Abel (1999) added leverage, the equity premium was better estimated.
18. In the standard model, loss aversion is equivalent to a "kink" in the utility function at the current level of consumption. The loss in utility when consumption drops below the kink is greater than the gain when consumption is above, even for tiny changes in consumption.
19. Mehra and Prescott (1988), criticizing Rietz's research, noted that a disaster state was very likely to be realized in the more than 100 years of data that Mehra and Prescott analyzed.
20. The intuition here comes from the Gordon model of stock price determination, in which small changes in the growth rate of dividends have a large impact on stock prices.
21. Note that in reconciling the volatility of stocks with underlying macroeconomic variables, the compilation of national income accounts requires a large amount of estimation and smoothing of past data, and averaged data on any index lower its volatility. As for estimation, it is well known that the "appraised" value of real estate is far more stable than the value of securities that *represent* similar assets, such as REITs.
22. Indeed, a best-selling book by James Glassman and Kevin Hassett (1999) on the stock market, *Dow 36,000*, marketed at the peak of the last bull market, maintained this thesis and predicted that stocks would have to increase fourfold to bring their real yields down to those of bonds.
23. Perhaps this fear explains why gold continues to be popular despite the fact that in portfolio models, precious metals are often dominated by stocks and inflation-protected bonds.
24. These academics predicted that other academics' estimates were higher—in the 7.5–8.0 percent range.
25. The conference was "Points of Inflection: Investment Management Tomorrow"; a webcast of the Bernstein presentation is available at www.cfawebcasts.org. Rob Arnott has been doing such surveys for a number of years and has communicated to me that most of the institutional money managers would be satisfied with an equity premium measured against bond returns of 2–3 percent (see Arnott and Bernstein 2002).
26. If retained earnings can be invested at the same rate of return as required by equity investors, a drop in the dividend yield will produce an equal rise in the future growth of dividends (see Siegel 2002). Arnott and Asness (2003), believing that company managers squander retained earnings on low-return projects, rejected my contention that real dividends will grow faster in the future.
27. See Siegel (2005) for support for these statements.

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