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.
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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.

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

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[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

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[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 ex-

pertise (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
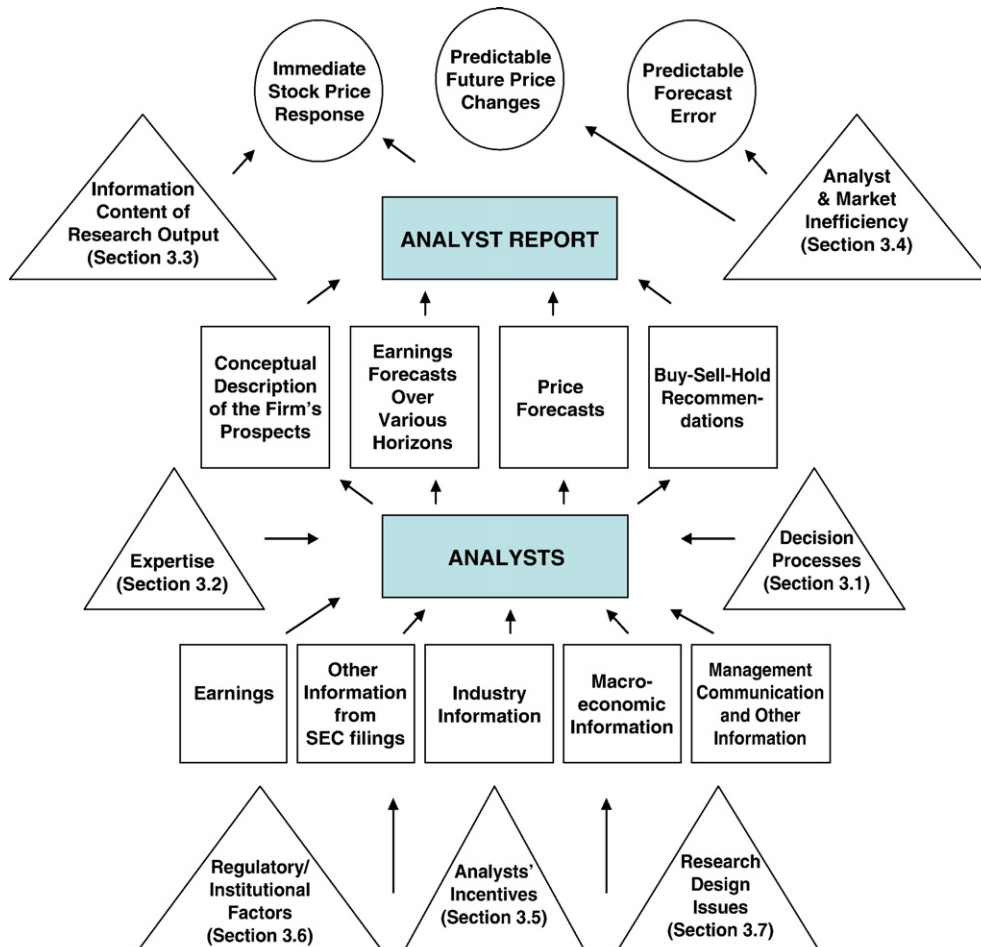

Fig. 1. Analysts' Reporting Environment.

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

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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.

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)

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[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.

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

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[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).

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[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 β, 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.

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

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[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-

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[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

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[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

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[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.

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.

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

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[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.

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 under-reaction 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 consistent with 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

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[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

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[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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