Darden Graduate School of Business
University of Virginia

Working Paper No. 99-08

THE MARKET RISK PREMIUM: EXPECTATIONAL ESTIMATES USING ANALYSTS' FORECASTS

Robert S. Harris
Felicia C. Marston

The Market Risk Premium: Expectational Estimates Using Analysts' Forecasts

Robert S. Harris
Felicia C. Marston

Draft October 12, 1999

Felicia C. Marston is on the faculty at the McIntire School of Commerce, University of VA 22903, (804) 924-1417, fm2v@virginia.edu. Robert S. Harris is on the faculty at the Darden School, University of Virginia, Charlottesville, VA 22906, (804) 924-4823, harrisr@darden.gbus.virginia.edu. We thank Erik Benrud and seminar participants at the University of Virginia and at the SEC for comments. Thanks to Darden Sponsors, TVA, the Walker Family Fund and McIntire Associates for support of this research and to IBES, Inc. for supplying data.

The Market Risk Premium: Expectational Estimates Using Analysts' Forecasts

Abstract

We use expectational data from financial analysts to estimate a market risk premium for U.S. stocks. Using the SP500 as a proxy for the market portfolio, we find an average market risk premium of 7.14% above yields on long-term U.S. government bonds over the period 1982-1998. We also find that this risk premium varies over time and that much of this variation can be explained by either the level of interest rates or readily available forward-looking proxies for risk. The market risk premium appears to move inversely with government interest rates suggesting that required returns on stocks are more stable than interest rates themselves.

The Market Risk Premium: Expectational Estimates Using Analysts' Forecasts

The notion of a market risk premium (the spread between investor required returns on safe and average risk assets) has long played a central role in finance. It is a key factor in asset allocation decisions to determine the portfolio mix of debt and equity instruments. Moreover, the market risk premium plays a critical role in the Capital Asset Pricing Model (CAPM), practitioners most widely used means of estimating equity hurdle rates. In recent years, the practical significance of estimating such a market premium has increased as firms, financial analysts and investors employ financial frameworks to analyze corporate and investment performance. For instance, the increased use of Economic Value Added to assess corporate performance has provided a new impetus for estimating capital costs.

The most prevalent approach to estimating the market risk premium relies on some average of the historical spread between returns on stocks and bonds.[1] This choice has some appealing characteristics but is subject to many arbitrary assumptions such as the relevant period for taking an average. Compounding the difficulty of using historical returns is the well noted fact that standard models of consumer choice would predict much lower spreads between equity and debt returns than have occurred in U.S. markets—the so called equity premium puzzle (see Welch (1998), Siegel and Thaler (1997)). In addition, theory calls for a forward looking risk premium that could well change over time.

---

[1] Bruner, Eades, Harris and Higgins (1998) provide survey evidence on both textbook advice and practitioner methods for estimating capital costs. Despite substantial empirical assault, the CAPM continues to play a major role in applied finance. As testament to the market for cost of capital estimates Ibbotson Associates (1998) publishes a "Cost of Capital Quarterly."

This paper takes an alternate approach by using expectational data to estimate the market risk premium. The approach has two major advantages for practitioners. First, it provides an independent estimate which can be compared to historical averages. At a minimum, this can help in understanding likely ranges for risk premia. Second, expectational data allow investigation of changes in risk premia over time. Such time variations in risk premia serve as important signals from investors that should affect a host of financial decisions.

The paper updates and extends earlier work (Harris (1986), Harris and Marston (1992)) which incorporates financial analysts' forecasts of corporate earnings growth. Updating through 1998 provides an opportunity to see whether changes in the risk premium are in part responsible for the run up in share prices in the bull market. In addition, we provide new tests of whether changes in risk premia over time are linked to forward-looking measures of risk. Specifically, we look at the relationship between the risk premium and four ex-ante measures of risk: the spread between yields on corporate and government bonds, consumer sentiment about future economic conditions, the average level of dispersion across analysts as they forecast corporate earnings and the implied volatility on the SP500 Index derived from options data.

Section I provides background on the estimation of equity required returns and a brief discussion of current practice in estimating the market risk premium. In Section II, models and data are discussed. Following a comparison of the results to historical returns in Section III, we examine the time-series characteristics of the estimated market premium in Section IV. Finally, conclusions are offered in Section V.

I. Background

The notion of a "market" required rate of return is a convenient and widely used construct. Such a rate (k) is the minimum level of expected return necessary to compensate investors for bearing the average risk of equity investments and receiving dollars in the future rather than in the present. In general, k will depend on returns available on alternative investments (e.g., bonds). To isolate the effects of risk, it is useful to work in terms of a market risk premium (*rp*), defined as

$$rp = k - i, \tag{1}$$

where i = required return for a zero risk investment.

Lacking a superior alternative, investigators often use averages of historical realizations to estimate a market risk premium. Bruner *et al.* (1998) provide recent survey results on best practices by corporations and financial advisors. While almost all respondents used some average of past data in estimating a market risk premium, a wide range of approaches emerged. "While most of our 27 sample companies appear to use a 60+- year historical period to estimate returns, one cited a window of less than ten years, two cited windows of about ten years, one began averaging with 1960, and another with 1952 data" (p. 22). Some used arithmetic averages and some geometric. This historical approach requires the assumptions that past realizations are a good surrogate for future expectations and, as typically applied, that the risk premium is constant over time. Carleton and Lakonishok (1985) demonstrate empirically some of the problems with such historical premia when they are dissaggregated for different time periods or groups of firms. As Bruner *et al* (1998) point out, few respondents cited use of expectational data to supplement or replace historical returns in estimating the market premium.

Survey evidence also shows substantial variation in empirical estimates. When respondents gave a precise estimate of the market premium, they cited figures from 4 to over 7 percent (Bruner *et al* 1998). A quote from a survey respondent highlights the range in practice. "In 1993, we polled various investment banks and academic studies on the issue as to the appropriate rate and got anywhere between 2 and 8%, but most were between 6 and 7.4%." (Bruner *et al* 1998, p. 23). An informal sampling of current practice also reveals large differences in assumptions about an appropriate market premium. For instance, in a 1999 application of EVA analysis, Goldman Sachs Investment Research specifies a market risk premium of "3%

from 1994-1997 and 3.5% from 1998-1999E for the S&P Industrials" (Goldman Sachs (1999, p. 59)). At the same time an April 1999 phone call to Stern Stewart revealed that their own application of EVA typically employed a market risk premium of 6%. In its application of the CAPM, Ibbotson Associates (1998) uses a market risk premium of 7.8%. Not surprisingly, academics don't agree on risk premium either. Welch (1998) surveyed leading financial economists at major universities. For a 30-year horizon, he found a mean risk premium of 6.12% but a range from 2% to 9% with an interquartile range of 2% (based on 104 responses).

To provide additional insight on estimates of the market premium, we use publicly available expectational data. This expectational approach employs the dividend growth model (hereafter referred to as the discounted cash flow or DCF model) in which a consensus measure of financial analysts' forecasts (FAF) of earnings is used as a proxy for investor expectations. Earlier works by Malkiel (1982), Brigham, Vinson, and Shome (1985), Harris (1986) and Harris and Marston (1992) have used FAF in DCF models[2].

II. Models and Data

We employ the simplest and most commonly used version of the DCF model to estimate shareholders' required rate of return, k, as shown in Equation (2):

$$k = \left(\frac{D_1}{P_0}\right) + g, \qquad (2)$$

where D_1 = dividend per share expected to be received at time one, P_0 = current price per share (time 0), and g = expected growth rate in dividends per share[3]. A primary difficulty in using the

---

[2] Ibbotson Associates (1998) use a variant of the DCF model with forward-looking growth rates as one means to estimate cost of equity; however, they do this as a separate technique and not as part of the CAPM. For their CAPM estimates they use historical averages for the market risk premium. The DCF approach with analysts' forecasts has been used frequently in regulatory settings.

[3] Our methods follow Harris (1986) and Harris and Marston (1992) who provide an overview of earlier research and a detailed discussion of the approach employed here. For instance, theoretically, i is a risk-free rate, though empirically its proxy (e.g., yield to maturity on a government bond) is only a "least risk" alternative that is itself subject to risk. They also discuss single versus multistage growth discounted cash flow models and procedures used in calculating the expected dividend yield. While the model calls for expected growth in dividends, in the long run, dividend growth is sustainable only via growth in earnings. As long as payout ratios are not expected to change, the two growth rates will be the same.

DCF model is obtaining an estimate of *g*, since it should reflect market expectations of future performance. This paper uses published FAF of long-run growth in earnings as a proxy for g. Equation (2) can be applied for an individual stock or any portfolio of companies. We focus primarily on its application to estimate a market premium as proxied by the SP500.

FAF come from IBES Inc. The mean value of individual analysts' forecasts of five-year growth rate in EPS is used as our estimate of *g* in the DCF model. The five-year horizon is the longest horizon over which such forecasts are available from IBES and often is the longest horizon used by analysts. IBES requests "normalized" five-year growth rates from analysts in order to remove short-term distortions that might stem from using an unusually high or low earnings year as a base. Growth rates are available on a monthly basis.

Dividend and other firm-specific information come from COMPUSTAT. D_1 is estimated as the current indicated annual dividend times (1+g). Interest rates (both government and corporate) are gathered from Federal Reserve Bulletins and *Moody's Bond Record.* Table 1 describes key variables used in the study. Data are collected for all stocks in the Standard & Poor's 500 stock (SP500) index followed by IBES. Since five-year growth rates are first available from IBES beginning in 1982, the analysis covers the period from January 1982-December 1998.

We generally adopt the same approach as used in Harris and Marston (1992). For each month, a market required rate of return is calculated using each dividend paying stock in the SP500 index for which data are available. As additional screens for reliability of data, in a given month we eliminate a firm if there are fewer than three analysts' forecasts or if the standard deviation around the mean forecast exceeds 20%. Combined these two screens eliminate fewer than 20 stocks a month. Later we report on the sensitivity of our results to various screens. The DCF model in Equation (2) is applied to each stock and the results weighted by market value of equity to produce the market-required return.[4] The risk premium is constructed by subtracting the interest rate on government bonds.

For short-term horizons (quarterly and annual), past research (Brown, 1993) finds that on average analysts' forecasts are overly optimistic compared to realizations. However, recent research on quarterly horizons (Brown, 1997) suggests that analysts' forecasts for SP500 firms do not have an optimistic bias for the period 1993-1996. There is very little research on the properties of five-year growth forecasts, as opposed to shorter horizon predictions.[5] Any analysts' optimism is not necessarily a problem for our analysis. If investors share analysts' views, our procedures will still yield unbiased estimates of required returns and risk premia. In light of the possible bias, however, we interpret our estimates as "upper bounds" for the market premium.

To broaden our exploration, we tap four very different sources to create ex ante measures of equity risk at the market level. The first proxy comes from the bond market and is calculated as the spread between corporate and government bond yields (BSPREAD). The rationale is that increases in this spread signal investors' perceptions of increased riskiness of corporate activity that would be translated to both debt and equity owners. The second measure, CON, is the consumer confidence index reported by the Conference Board at the end of the month. While the reported index tends to be around 100, we rescale CON as the actual index divided by 100. We also examined use of CON as of the end of the prior month; however, in regression analysis

---

[4] We weighted 1998 results by year-end 1997 market values since our monthly data on market value did not extend through this period. Since we did not have data on firm-specific dividend yields for the last four months of 1998, we estimated the market dividend yield for these months using the dividend yield reported in the *Wall Street Journal* scaled by the average ratio of this figure to the dividend yield for our sample as calculated in the first eight months of 1998. We then made adjustments using growth rates from IBES to calculate the market required return. We also estimated results using an average dividend yield for the month which employed the average of the price at the end of the current and prior months. These average dividend yield measures led to essentially the same regression coefficients as those reported later in the paper but introduced significant serial correlation in some regressions (Durbin-Watson statistics significantly different from 2.0 at the .01 level).

[5] To our knowledge, the only studies of possible bias in analysts' five-year growth rates are Boebel (1991) and Boebel, Harris and Gultekin (1993). They both find evidence of optimism in IBES growth forecasts. In the most thorough study to date, Boebel (1991) reports that this bias seems to be getting smaller over time. His forecast data do not extend into the 1990's.

this lagged measure was generally not statistically significant in explaining the level of the market risk premium[6]. The third measure, DISP, measures the dispersion of analysts' forecasts. Such analyst disagreement should be positively related to perceived risk since higher levels of uncertainty would likely generate a wider distribution of earnings forecasts for a given firm. DISP is calculated as the equally weighted average of firm-specific standard deviations for each stock in the SP500 covered by IBES. The firm-specific standard deviation is calculated based on the dispersion of individual analysts' growth forecasts around the mean of individual forecasts for that company in that month. Our final measure, VOL, is the implied volatility on the SP500 index. As of the beginning of the month, we use a dividend adjusted Black Scholes Formula to estimate the implied volatility in the SP500 index option contract which expires on the third Friday of the month. The call premium, exercise price and the level of the SP500 index are taken from the *Wall Street Journal* and treasury yields come from the Federal Reserve. Dividend yield comes from DRI. We use the option contract that is closest to being at the money.

III. Estimates of the Market Premium

Table 2 reports both required returns and risk premia by year (averages of monthly data). The results are quite consistent with the patterns reported earlier (e.g., Harris and Marston, 1992). The estimated risk premia are positive, consistent with equity owners demanding additional rewards over and above returns on debt securities. The average expectational risk premium (1982 to 1998) over government bonds is 7.14%, slightly higher than the 6.47% average for 1982 to 1991 reported earlier (Harris and Marston, 1992). For comparison purposes, Table 3 contains historical returns and risk premia. The average expectational risk premium

[6] We examined two other proxies for Consumer Confidence. The Conference Board's Consumer Expectations Index yielded essentially the same results as those reported. The University of Michigan's Consumer Sentiment Indices tended to be less significantly linked to the market risk premium though coefficients were still negative.

reported in Table 2 is approximately equal to the arithmetic (7.5%) long-term differential between returns on stocks and long-term government bonds.[7]

Table 2 shows the estimated risk premium changes over time, suggesting changes in the market's perception of the incremental risk of investing in equity rather than debt securities. Scanning the next to last column of Table 2, the risk premium is higher in the 1990's than earlier and especially so in late 1997 and 1998. Our DCF results provide no evidence to support the notion of a declining risk premium in the 1990's as a driver of the strong run up in equity prices.

A striking feature in Table 2 is the relative stability of our estimates of *k*. After dropping (along with interest rates) in the early and mid-1980's, the average annual value of *k* has remained within a 75 basis point range around 15 percent for over a decade. Moreover, this stability arises despite some variability in the underlying dividend yield and growth components of *k* as Table 2 illustrates. The results suggest that *k* is more stable than government interest rates. Such relative stability of *k* translates into parallel changes in the market risk premium. In a subsequent section, we examine whether changes in our market risk premium estimates appear linked to interest rate conditions and a number of proxies for risk[8].

We explored the sensitivity of our results to our screening procedures in selecting companies. Our reported results screen out all non-dividend paying stocks on the premise that use of the DCF model is inappropriate in such cases. The dividend screen eliminates an average of 55 companies per month. In a given month, we also screen out firms with fewer than three analysts' forecasts, or if the standard deviation around the mean forecast exceeds 20%. When we repeated our analysis without any of the screens, the average risk premium over the sample

---

[7] Interestingly, for the 1982-1996 period the arithmetic spread between large company stocks and long-term government bonds was only 3.3% per year. The downward trend in interest rates resulted in average annual returns of 14.1% on long-term government bonds over this horizon. Some (e.g., Ibbotson, 1997) argue that only the income (not total) return on bonds should be subtracted in calculating risk premia.

[8] Although our focus is on the market risk premium, in earlier work (Harris and Marston (1992), Marston, Harris and Crawford (1993)), we examined the cross-sectional link between expectational equity risk premia at the firm level and beta and found a significant positive correlation. For comparative purposes, we replicated and updated that

period increased by only 40 basis points, from 7.14% to 7.54%. We also estimated the beta of our sample firms and found the sample average to be one, suggesting that our screens do not systematically remove low or high-risk firms. Specifically, using firms in our screened sample as of December 1997 (the last date for which we had CRSP return data), we used ordinary least squares regressions to estimate beta for each stock using the prior sixty months of data and the CRSP return (SPRTRN) as the market index. The value-weighted average of the individual betas was 1.00.

In the results reported here we use firms in the SP500 as reported by COMPUSTAT in September 1998 which could create a survivorship bias, especially in the earlier months of our sample. We compared our current results to those obtained in our earlier work (Harris and Marston (1992)) for which we had data to update the SP500 composition each month. For the overlapping period, January 1982-May 1991 the two procedures yield the same average market risk premium, 6.47%. This suggests that the firms departing from or entering the SP500 index do so for a number of reasons with no discernable effect on the overall estimated SP500 market risk premium.

IV. Changes in the Market Risk Premium Over Time

With changes in the economy and financial markets, equity investments may be perceived to change in risk. For instance, investor sentiment about future business conditions likely affects attitudes about the riskiness of equity investments compared to investments in the bond markets. Moreover, since bonds are risky investments themselves, equity risk premia (relative to bonds) could change due to changes in perceived riskiness of bonds, even if equities displayed no shifts in risk.

In earlier work covering the 1982-1991 period, Harris and Marston (1992) reported regression results indicating that the market premium decreased with the level of government

---

analysis through 1998 and reached very similar conclusions. At the firm level our expectational estimates of risk interest rates and increased with the spread between corporate and government bond yields (BSPREAD). This bond yield spread was interpreted as a time series proxy for equity risk. We introduce three additional ex ante measures of risk shown in Table 1: CON, DISP and VOL. The three measures come from three independent sets of data and are supplied by different agents in the economy (consumers, equity analysts and investors (via option and share price data)). Table 4 provides summary data on all four of our risk measures.

Table 5 replicates and updates earlier analysis.[9] The results confirm the earlier patterns. For the entire sample period, Panel A shows that risk premia are negatively related to interest rates. This negative relationship is also true for both the 1980's and 1990's as displayed in Panels B and C. For the entire 1982 to 1998 period, the addition of the yield spread risk proxy to the regressions lowers the magnitude of the coefficient on government bond yields, as can be seen by comparing Equations 1 and 2 of Panel A. Furthermore, the coefficient of the yield spread (0.487) is itself significantly positive. This pattern suggests that a reduction in the risk differential between investment in government bonds and in corporate activity is translated into a lower equity market risk premium.

In major respects, the results in Table 5 parallel earlier findings. The market risk premium changes over time and appears inversely related to government interest rates but positively related to the bond yield spread, which proxies for the incremental risk of investing in equities as opposed to government bonds. One striking feature is the large negative coefficients on government bond yields. The coefficients indicate the equity risk premium declines by over 70 basis points for a 100 basis point increase in government interest rates.[10] This inverse

---

premia are significantly positively correlated to beta.

[9] OLS regressions with levels of variables generally showed severe autocorrelation. As a result, we used the Prais-Winsten method (on levels of variables) and also OLS regressions on first differences of variables. Since both methods yielded similar results and the latter had more stable coefficients across specifications, we report only the results using first differences. Tests using Durbin-Watson statistics from regressions in Tables 5 and 6 do not accept the hypothesis of autocorrelated errors (tests at .01 significance level, see Johnston 1984, pp. 321-325).

[10] The Table 5 coefficients on i are significantly different from -1.0 suggesting that equity required returns do respond to interest rate changes. However, the large negative coefficients imply only minor adjustments of required

relationship suggests much greater stability in equity required returns than is often assumed. For instance, standard application of the CAPM suggests a one-to-one change in equity returns and government bond yields.

Table 6 introduces three additional proxies for risk and explores whether these variables, either individually or collectively, are correlated with the market premium. Since our estimates of implied volatility start in May 1986, the table shows results for both the entire sample period and for the period during which we can introduce all variables. Entered individually each of the three variables is significantly linked to the risk premium with the coefficient having the expected sign. For instance, in regression (1) the coefficient on CON is -.014 which is significantly different from zero (t = -3.50). The negative coefficient signals that higher consumer confidence is linked to a lower market premium. The positive coefficients on VOL and DISP indicate the equity risk premium increases with both market volatility and disagreement among analysts. The effects of the three variables appear largely unaffected by adding other variables. For instance, in regression (4) the coefficients on CON and DISP both remain significant and are similar in magnitude to the coefficients in single variable regressions.

Even in the presence of the new risk variables, Table 6 shows that the market risk premium is affected by interest rate conditions. The large negative coefficient on government bond rates implies large reductions in the equity premium as interest rates rise. One feature of our data may contribute to the observed negative relationship between the market risk premium and the level of interest rates. Specifically, if analysts are slow to report updates in their growth forecasts, changes in our estimated *k* would not adjust fully with changes in the interest rate even if the true risk premium were constant. To address the impact of "stickiness" in the measurement of *k*, we formed "quarterly" measures of the risk premium which treat *k* as an average over the

---

returns to interest rate changes since the risk premium declines. In earlier work (Harris and Marston (1991)) the coefficient was significantly negative but not as large in absolute value. In that earlier work we reported results quarter. Specifically, we take the value of k at the end of a quarter and subtract from it the average value of i for the months ending when k is measured. For instance, to form the risk premium for March 1998 we take the March value of k and subtract the average value of i for January, February and March. This approach assumes that in March k still reflects values of g that have not been updated from the prior two months. We then pair our quarterly measure of risk premium with the average values of the other variables for the quarter. For instance, the March 1998 "quarterly" risk premium would be paired with averaged values of BSPREAD over the January through March period. To avoid overlapping observations for the independent variables, we use only every third month (March, June, September, December) in the sample.

As reported in Table 7, sensitivity analysis using "quarterly" observations suggests that delays in updating may be responsible for a portion, but not all, of the observed negative relationship between the market premium and interest rates. For example, when we use quarterly observations the coefficient on i in regression (2) of Table 7 is -.527, well below the earlier estimates but still significantly negative[11].

As an additional test, we look at movements in the bond risk premium (BSPREAD). Since BSPREAD is constructed directly from bond yield data it does not have the potential for reporting lags that may affect analysts' growth forecasts. Regression 3 in Table 7 shows BSPREAD is negatively linked to government rates and significantly so[12]. While the equity premium need not move in the same pattern as the corporate bond premium, the negative coefficient on BSPREAD suggests that our earlier results are not due solely to "stickiness" in measurements of market required returns.

---

using the Prais-Winsten estimators. When we use that estimation technique and recreate the second regression in Table 5, the coefficient for i is -.584 (t = 12.23) for the entire sample period 1982-1998.

[11] Sensitivity analysis for the 1982-1989 and 1990-1998 subperiods yields results similar to those reported.

[12] We thank Bob Conroy for suggesting use of BSPREAD. Regression 3 in Table 7 appears to have autocorrelated errors: the Durbin-Watson (DW) statistic rejects the hypothesis of no autocorrelation. However, in subperiod analysis, the DW statistic for the 1990-98 period is consistent with no autocorrelation and the coefficient on i is essentially the same (-.24, t = -8.05) as reported in Table 7.

The results in Table 7 suggest that the inverse relationship between interest rates and the market risk premium may not be as pronounced as suggested in earlier tables. Still, there appears to be a significant negative link between the equity risk premium and government interest rates. The quarterly results in Table 7 would suggest about a 50 basis point change in risk premium for each 100 basis point movement in interest rates.

Overall, our ex ante estimates of the market risk premium are significantly linked to ex ante proxies for risk. Such a link suggests that investors modify their required returns in response to perceived changes in the environment. The findings provide some comfort that our risk premium estimates are capturing, at least in part, underlying economic changes in the economic environment. Moreover, each of the risk measures appears to contain relevant information for investors. The market risk premium is negatively related to the level of consumer confidence and positively linked to interest rate spreads between corporate and government debt, disagreement among analysts in their forecasts of earnings growth and the implied volatility of equity returns as revealed in options data.

II. Conclusions

Shareholder required rates of return and risk premia are based on theories about investors' expectations for the future. In practice, however, risk premia are typically estimated using averages of historical returns. This paper applies an alternate approach to estimating risk premia that employs publicly available expectational data. The resultant average market equity risk premium over government bonds is comparable in magnitude to long-term differences (1926 to 1998) in historical returns between stocks and bonds. As a result, our evidence does not resolve the equity premium puzzle; rather, our results suggest investors still expect to receive large spreads to invest in equity versus debt instruments.

There is strong evidence, however, that the market risk premium changes over time. Moreover, these changes appear linked to the level of interest rates as well as ex ante proxies for risk drawn from interest rate spreads in the bond market, consumer confidence in future economic conditions, disagreement among financial analysts in their forecasts and the volatility of equity returns implied by options data. The significant economic links between the market premium and a wide array of risk variables suggests that the notion of a constant risk premium over time is not an adequate explanation of pricing in equity versus debt markets.

Our results have implications for practice. First, at least on average, our estimates suggest a market premium roughly comparable to long-term historical spreads in returns between stocks and bonds. Our conjecture is that, if anything, our estimates are on the high side and thus establish an upper bound on the market premium. Second, our results suggest that use of a constant risk premium will not fully capture changes in investor return requirements. As a specific example, our findings indicate that common application of models such as the CAPM will overstate changes in shareholder return requirements when government interest rates change. Rather than a one-for-one change with interest rates implied by use of constant risk premium, our results indicate that equity required returns for average risk stocks likely change by half (or less) of the change in interest rates. However, the picture is considerably more complicated as shown by the linkages between the risk premium and other attributes of risk.

Ultimately, our research does not resolve the answer to the question "What is the right market risk premium?" Perhaps more importantly, our work suggests that the answer is conditional on a number of features in the economy—not an absolute. We hope that future research will harness ex ante data to provide additional guidance to best practice in using a market premium to improve financial decisions.

Table 1. Variable Definitions

k	=	Equity required rate return.
P_0	=	Price per share.
D_1	=	Expected dividend per share measured as current indicated annual dividend from COMPUSTAT multiplied by $(1 + g)$.
g	=	Average financial analysts' forecast of five-year growth rate in earnings per share (from IBES).
i	=	Yield to maturity on long-term U.S. government obligations (source: Federal Reserve, 30-year constant maturity series).
rp	=	Equity risk premium calculated as $rp = k - i$.
BSPREAD	=	spread between yields on corporate and government bonds, BSPREAD = yield to maturity on long-term corporate bonds (Moody's average across bond rating categories) minus i.
CON	=	Monthly consumer confidence index reported by the Conference Board (divided by 100).
DISP	=	Dispersion of analysts' forecasts at the market level.
VOL	=	Volatility for the SP500 index as implied by options data.

Table 2. Bond Market Yields, Equity Required Return, and Equity Risk Premium, 1982-1998

Values are averages of monthly figures in percent. *i* is the yield to maturity on long-term government bonds, *k* is the required return on the SP500 estimated as a value weighted average using a discounted cash flow model with analysts' growth forecasts. The risk premium $rp = k - i$. The average of analysts' growth forecasts is *g*. *Div yield* is expected dividend per share divided by price per share.

Year	*Div yield*	*g*	*K*	*i*	$rp = k - i$
1982	6.89	12.73	19.62	12.76	6.86
1983	5.24	12.60	17.86	11.18	6.67
1984	5.55	12.02	17.57	12.39	5.18
1985	4.97	11.45	16.42	10.79	5.63
1986	4.08	11.05	15.13	7.80	7.34
1987	3.64	11.01	14.65	8.58	6.07
1988	4.27	11.00	15.27	8.96	6.31
1989	3.95	11.08	15.03	8.45	6.58
1990	4.03	11.69	15.72	8.61	7.11
1991	3.64	11.99	15.63	8.14	7.50
1992	3.35	12.13	15.47	7.67	7.81
1993	3.15	11.63	14.78	6.60	8.18
1994	3.19	11.47	14.66	7.37	7.29
1995	3.04	11.51	14.55	6.88	7.67
1996	2.60	11.89	14.49	6.70	7.79
1997	2.18	12.60	14.78	6.60	8.17
1998	1.80	12.95	14.75	5.58	9.17
Average	3.86	11.81	15.67	8.53	7.14

Table 3. Average Historical Returns on Bonds, Stocks, Bills, and Inflation in the U.S., 1926-1998

Historical Return Realizations	Geometric Mean	Arithmetic Mean
Common Stock (large company)	11.2%	13.2%
Long-term government bonds	5.3%	5.7%
Treasury bills	3.8%	3.8%
Inflation rate	3.1%	3.2%

Source: Ibbotson Associates, Inc., *1999 Stocks, Bonds, Bills and Inflation*, 1999 Yearbook.

Table 4. Descriptive Statistics on Ex Ante Risk Measures

Entries are based on monthly data. BSPREAD is the spread between yields on long-term corporate and government bonds. CON is the consumer confidence index. DISP measures the dispersion of analysts' forecasts of earnings growth. VOL is the volatility on the SP500 index implied by options data. Variables are expressed in decimal form, e.g., 12% = .12.

A. Variable Monthly Levels

	Mean	Standard Deviation	Minimum	Maximum
BSPREAD	.0123	.0040	.0070	.0254
CON	.9500	.2240	.473	1.382
DISP	.0349	.0070	.0285	.0687
VOL	.1599	.0696	.0765	.6085

B. Variable Monthly Changes

	Mean	Standard Deviation	Minimum	Maximum
BSPREAD	-.00001	.0011	-.0034	.0036
CON	.0030	.0549	-.2300	.2170
DISP	-.00002	.0024	-.0160	.0154
VOL	-.0008	.0592	-.2156	.4081

C. Correlation Coefficients for Monthly Changes
*significantly different from zero at the .05 level
**significantly different from zero at the .01 level

	BSPREAD	CON	DISP	VOL
BSPREAD	1.00	-.16*	.05	.22**
CON	-.16*	1.00	.07	-.09
DISP	.05	.07	1.00	.03
VOL	.22**	-.09	.03	1.00

Table 5. Changes in the Market Equity Risk Premium Over Time

The table reports regression coefficients (*t*-values). Regression estimates use all variables expressed as monthly changes to correct for autocorrelation. The dependent variable is the market equity risk premium for the SP500 index. BSPREAD is the spread between yields on long-term corporate and government bonds. The yield to maturity on long-term government bonds is denoted as *i*. For purposes of the regression, variables are expressed in decimal form, e.g., 12% = .12.

Time period	Intercept	*i*	BSPREAD	R^2
A. 1982-1998	-.0002	-.8696		.57
	(-1.49)	(-16.54)		
	-.0002	-.749	.487	.59
	(-1.11)	(-11.37)	(2.94)	
B. 1980's	-.0005	-.887		.56
	(-1.62)	(-10.97)		
	-.0004	-.759	.508	.57
	(-1.24)	(-7.42)	(1.99)	
C. 1990's	-.0000	-.840		.64
	(-0.09)	(-13.78)		
	-.0000	-.757	.347	.65
	(0.01)	(-9.85)	(1.76)	

Table 6. Changes in the Market Equity Risk Premium Over Time and Selected Measures of Risk

The table reports regression coefficients (*t*-values). Regression estimates use all variables expressed as monthly changes to correct for autocorrelation. The dependent variable is the market equity risk premium for the SP500 index. BSPREAD is the spread between yields on long-term corporate and government bonds. The yield to maturity on long-term government bonds is denoted as *i*. CON is the change in consumer confidence index. DISP measures the dispersion of analysts' forecasts of earnings growth. VOL is the volatility on the SP500 index implied by options data. For purposes of the regression, variables are expressed in decimal form, e.g., 12% = .12.

Time period		Intercept	*i*	BSPREAD	CON	DISP	VOL	*Adj.* R^2
A. 1982-1998								
	(1)	0.0002 (.97)			-0.014 (-3.50)			0.05
	(2)	-0.0001 (-.96)	-0.737 (-11.31)	0.453 (2.76)	-0.007 (-2.48)			0.60
	(3)	0.0002 (.78)				0.244 (2.38)		0.02
	(4)	-0.0001 (-.93)	-0.733 (-11.49)	0.433 (2.69)	-0.007 (-2.77)	0.185 (3.13)		0.62
B. May 1986-1998								
	(5)	0.0000 (.03)	-0.821 (-11.16)	0.413 (2.47)	-0.005 (-2.22)	0.376 (3.74)		0.68
	(6)	0.0001 (.53)					0.011 (2.89)	0.05
	(7)	0.0000 (.02)	-0.831 (-11.52)	0.326 (1.95)	-0.005 (-2.12)	0.372 (3.77)	0.006 (2.66)	0.69

Table 7. Regressions Using Alternate Measures of Risk Premia to Analyze Potential Effects of Reporting Lags in Analysts' Forecasts

The table reports regression coefficients (*t*-values). Regression estimates use all variables expressed as changes (monthly or quarterly) to correct for autocorreclation. BSPREAD is the spread between yields on long-term corporate and government bonds. *rp* is the risk premium on the SP500 index. The yield to maturity on long-term government bonds is denoted as *i*. For purposes of the regression, variables are expressed in decimal form, e.g., 12% = .12.

Dependent Variable	Intercept	*i*	BSPREAD	*Adj.* R^2
(1) Equity Risk Premium (*rp*) Monthly Observations (same as Table 5)	-.0002 (-1.11)	-.749 (-11.37)	.487 (2.94)	.59
(2) Equity Risk Premium (*rp*) "Quarterly" nonoverlapping observations to account for lags in analyst reporting	-.0002 (-.49)	-.527 (-6.18)	.550 (2.20)	.60
(3) Corporate Bond Spread (BSPREAD) Monthly Observations	-.0001 (-1.90)	-.247 (-11.29)		.38

REFERENCES

R.B. Boebel, "The Information Content of Financial Analysts' Forecasts: Short-term vs. Long-term," University of North Carolina at Chapel Hill, Dissertation, 1991. University Microfilms International order number 9207936.

R.B. Boebel, M.N. Gultekin and R.S. Harris, "Financial Analysts' Forecast of Corporate Earnings Growth: Top Down Versus Bottom Up," in *Handbook of Security Analyst Forecasting and Asset Allocation*, John B. Guerard, Jr. and Mustafa N. Gultekin (eds.), London, JAI Press, 1993, pp. 185-192.

D. Brigham, D. Shome, and S. Vinson, "The Risk Premium Approach to Measuring A Utility's Cost of Equity," *Financial Management* (Spring 1985), pp. 33-45.

L.D. Brown, " Earnings Forecasting Research: Its Implications for Capital Market Research," *International Journal of Forecasting* (November 1993), pp. 295-320.

L.D. Brown, "Analyst Forecasting Errors: Additional Evidence," *Financial Analysts Journal* (November/December 1997), pp. 81-90.

R.F. Bruner, K. Eades, R. Harris and R. Higgins, Best Practices in Estimating the Cost of Capital: Survey and Synthesis," *Financial Practice and Education* (Spring/Summer 1998), pp. 13-28.

W.T. Carleton and J. Lakonishok, "Risk and Return on Equity: The Use and Misuse of Historical Estimates," *Financial Analysts Journal* (January/February 1985), pp. 38-47.

L. Chan, Y. Hamao, and J. Lakonishok, "Fundamental and Stock Returns in Japan," *Journal of Finance*, 46, (5), (December 1991) pp. 1739-64.

J. Cragg and B.G. Malkiel, *Expectations and the Structure of Share Prices*, National Bureau of Economic Research, Chicago, University of Chicago Press, 1982.

Goldman Sachs, *EVA Company Analysis*, January 1999.

R.S. Harris, "Using Analysts' Growth Forecasts to Estimate Shareholder Required Rates of Return," *Financial Management* (Spring 1988), pp. 58-67.

Ibbotson Associates, Inc., *1998 Cost of Capital Quarterly*, 1998 Yearbook

Ibbotson Associates, Inc., *1997 Stocks, Bonds, Bills, and Inflation*, 1997 Yearbook.

J. Johnston, *Econometric Methods*, New York, McGraw-Hill, 3rd edition, 1984.

P. Kennedy, *A Guide to Econometrics*, Cambridge, MIT Press, 2nd edition, 1985.
G.S. Madalla, *Econometrics*, New York, McGraw-Hill, 1977.

B. Malkiel, "Risk and Return: A New Look," in *The Changing Role of Debt and Equity in Financing U.S. Capital Formation*, B.B. Friedman (ed.), National Bureau of Economic Research, Chicago, University of Chicago Press, 1982.

B. Malkiel, "The Capital Formation Problem in the United States," *Journal of Finance* (May 1979), pp. 291-306.

F. Marston, R. Harris, and P. Crawford, "Risk and Return in Equity Markets: Evidence Using Financial Analysts' Forecasts," in *Handbook of Security Analysts' Forecasting and Asset Allocation*, J. Guerard and M. Gultekin (eds.), Greenwich, CT, JAI Press, 1992, pp. 101-122.

F. Marston and R.S. Harris, "Risk, Return, and Equilibrium: A Revisit Using Expected Returns," *Financial Review*, (February 1993).

J. Siegel and R. Thaler, "Anomalies: The Equity Premium Puzzle," *Journal of Economic Perspectives*, 11 (1), (1997), pp. 191-200.

J. VanderWeide and W.T. Carleton, "Investor Growth Expectations: Analysts vs. History," *Journal of Portfolio Management* (Spring 1988), pp. 78-82.

I. Welch, "Views of Financial Economists on the Equity Premium and Other Issues," UCLA/Anderson Finance Working Paper 10-98, May 18, 1998.