

## ESTIMATING COST OF EQUITY CAPITAL WITH TIME-SERIES FORECASTS OF EARNINGS

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### ABSTRACT

When estimating firms' implied costs of equity capital, researchers commonly use analysts' forecasts of earnings as proxies for the market's expectations of earnings. I extend this line of research by examining whether researchers can also use time-series forecasts of earnings as an alternative input for the market's earnings expectations. Time-series forecasts allow implied cost of equity capital estimates to be calculated for a large sample of firms previously neglected by cost of equity capital research in accounting. Furthermore, Easton and Sommers (2007) suggest that well-documented optimism in analysts' forecasts may affect researchers' investigations. Time-series forecasts of earnings may not be subject to the same optimism. In this paper I find that cost of equity capital estimates based on time-series forecasts of earnings consistently and predictably relate to multiple measures of risk, particularly for firms not followed by analysts. Researchers can rely on these estimates to examine additional questions of significance in accounting by using broader samples of firms not followed by analysts.

## I – INTRODUCTION

Recent studies use a number of techniques to derive implied cost of equity capital by inverting the relation between share price and the market's expectations of future earnings. Typically, these studies assume analysts' forecasts constitute the best proxy for the market's expectations.<sup>1</sup> However, tests of market reactions to unexpected earnings, where both analysts' and time-series forecasts of earnings are used as expected earnings, provide mixed results that do not suggest that analysts' forecasts are the predominant proxy for the market's earnings expectations (O'Brien 1988; Schipper 1991; Walther 1997).<sup>2</sup> Furthermore, Easton and Sommers (2007) suggest that well-documented optimism in analysts' forecasts, and hence the likely optimism in estimates of expected rates of return, may be related to the factor that the researchers are investigating. Also, because firms followed by analysts differ from firms with no analyst following (Bhushan 1989), studies that only examine firms followed by analysts introduce a sampling bias into the research design that limits the generalizability of their findings.<sup>3</sup>

Time-series earnings forecasts offer an alternative, potentially more general and optimism-free, proxy for the market's expectations of future earnings in calculating implied cost of equity capital. To date, the properties of cost of equity capital estimates based on time-series earnings forecasts remain unexplored. I examine the question: Do time-series earnings forecasts yield estimates of firms' costs of equity capital that covary with risk? If these estimates covary

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<sup>1</sup> For example, Gode and Mohanram (2003, p. 399) use analysts' forecasts of earnings to calculate cost of equity capital estimates because "the closest publicly observable proxies for market expectations are earnings estimates from sell-side analysts."

<sup>2</sup> Easton (2006; 2008) note that implied expected rates of return may not be equal to the cost of capital if analyst earnings forecasts are not a reasonable proxy for the market's earnings expectations.

<sup>3</sup> This sampling bias also restricts our ability to test the relation between the cost of equity capital and accounting issues that may differ across firms with or without analyst following, such as financial reporting reputation, corporate governance structure, and regulatory changes. As an example, Watts and Zimmerman (1978) argue that the reaction to a proposed accounting standard depends upon the size of the firm (which is also related to analyst following) and whether the proposed standard increases or decreases the firm's reported earnings. Thus, research that examines whether a major regulatory change will impact firms' costs of equity capital could benefit from examining the effect on smaller, less followed firms.

with risk, then it may be fruitful to use cost of equity capital estimates calculated from time-series earnings forecasts to assess whether prior studies' results and conclusions generalize to firms not followed by analysts and to examine the effects of analyst forecast optimism on the prior estimates.

Researchers have not used time-series earnings forecasts to estimate the implied cost of equity capital, most likely because they believe these forecasts represent poor proxies for market earnings expectations. Kothari (2001, page 153) states that "in recent years it is common practice to (implicitly) assume that analysts' forecasts are a better surrogate for market's expectations than time-series forecasts." This implicit assumption is probably attributable to the well known finding that analysts' forecasts are more accurate than time-series forecasts.<sup>4</sup> However, it is not necessarily *ex post* accuracy that matters in estimating the implied cost of equity capital estimates. Rather, what matters most is how closely the earnings forecasts match the market's *ex ante* earnings expectations impounded in share price. This suggests that time-series-based forecasts may be suitable proxies for the market's earnings expectations, and therefore yield valid implied cost of equity capital estimates, even though the time-series forecasts are relatively less accurate.

Walther (1997) finds evidence suggesting that the relative weight placed on time-series forecasts as a proxy for the market's expectation for earnings is inversely related to the number of analysts following the firm. Thus, the validity of using time-series earnings forecasts as proxies for the market's earnings expectations will be negatively related to analyst following. Given this impetus, I hypothesize that cost of equity capital estimates based on time-series earnings forecasts covary with risk in a theoretically predictable manner, particularly for firms

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<sup>4</sup> Many studies document that analysts' forecasts are more accurate than time-series forecasts (e.g., Collins and Hopwood (1980) and Brown et al. (1987)). See Kothari (2001, p. 153) for further discussion.

not followed by analysts. This hypothesis stems from the theory that cross-sectional variation in estimates of expected rates of return should be associated with firm-specific risk factors in a consistent and predictable manner (Baginski and Wahlen, 2003; Botosan and Plumlee, 2005). Therefore, I examine the univariate and multivariate correlations between risk premia estimates based on time-series earnings forecasts and various firm-specific, systematic and unsystematic risk factors espoused in the accounting and finance literatures, including market beta, unsystematic risk, leverage, information risk, earnings variability, systematic risk in residual income, firm size, book-to-price, bankruptcy risk, business risk, and growth.

I use models derived by Easton (2004) to calculate firm- and year-specific market-implied cost of equity capital estimates for firms with at least five consecutive years of earnings. To remove the effects of changes in risk-free rates, I focus on risk premia, defined as the cost of equity capital less the risk-free rate of interest. As hypothesized, the risk premia estimates based on time-series earnings forecasts are associated with these firm risk factors in both univariate and multivariate settings and the results are stable across alternative specifications and accord with theory, particularly for firms not followed by analysts. To further test the validity of the risk premia estimates based on time-series earnings forecasts, I also benchmark their magnitudes with other firm risk premia measures to determine whether these estimates are in line with results from prior research. Based on theory and evidence in prior research, I hypothesize that implied risk premia for firms not followed by analysts will be larger than implied risk premia for firms followed by analysts.

I find that mean estimated risk premia are significantly higher (by about four percentage points) for firms not followed by analysts than for the firms followed by analysts. The higher risk premia for firms not followed by analysts seem appropriate, given that multiple measures of

risk suggest that these firms are indeed more risky.<sup>5</sup> This also suggests that using firms followed by analysts to establish a “reasonable upper bound for the equity premium” could be problematic (Claus and Thomas 2001, page 1630). Additionally, within firms followed by analysts, the mean risk premia estimates based on time-series earnings forecasts are not significantly different from risk premia estimates calculated using analysts’ earnings forecasts. Therefore, the benchmark tests find that the magnitudes of the risk premia for firms followed by analysts, but based on earnings-time-series forecasts, are in line with results from prior studies.

Graham and Harvey (2001) find that 73.5 percent of the CFOs they surveyed always or almost always use the CAPM to estimate cost of equity capital. Therefore, I also compare the risk premia estimates based on time-series earnings forecasts to cost of equity capital estimates based on the CAPM and the Fama and French (1992) three-factor model (hereafter referred to as “estimates of historical equity risk”). This analysis contributes to a better understanding of the extent to which cost of equity capital estimates based on time-series earnings forecasts capture elements of risk relative to other commonly-used measures of equity cost of capital. I find evidence consistent with Fama and French (1997) suggesting that the uncertainty about the magnitude of the risk premia—coupled with uncertainty on the risk loadings—implies imprecise estimates of historical equity risk. These estimates do not covary with the risk factors in the predicated manner, in striking contrast to the earnings-time-series implied risk premia estimates.

This study contributes new evidence on a methodology to derive cost of equity capital estimates based on time-series earnings forecasts. The results validate the use of time-series earnings forecasts to calculate cost of equity capital, particularly for firms not followed by analysts. Consequently, managers and investors can use time-series earnings forecasts to

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<sup>5</sup> For example, these firms are significantly smaller than the firms with sufficient analyst forecast information to calculate the risk premia. The median firm in the analyst-followed sample is more than 13 times larger than the median firm in the non-followed sample.

estimate the discount for firm risk implied by share price, while researchers can rely on these estimates to answer additional questions of significance to accounting. Estimates of cost of equity capital based on this methodology can be calculated for a broad range of firms that have not been examined by researchers using implied cost of equity capital estimates based on analysts' forecasts.<sup>6</sup> This conceptually sound, computationally simple methodology to estimate firms' costs of equity capital may be useful in future empirical accounting research, and in teaching courses in financial statement analysis and valuation (Baginski and Wahlen 2003).

In Section II, I describe the construction of risk premia estimates using the Easton (2004) model and the time-series forecasts of earnings. Section III explains the hypotheses, sample, and research design. In Section IV, I examine the properties of the risk premia estimates based on time-series forecasts of earnings. Section V reports the results of several sensitivity analyses including a section on forecasting earnings using portfolios. Section VI concludes the study and presents ideas for further research.

## **II – ESTIMATING THE COST OF EQUITY CAPITAL**

In this section I first discuss, briefly, my use of the Easton (2004) method for estimating cost of equity capital. Further description of how Easton (2004) adapts the Ohlson and Juettner-Nauroth (2005) model to determine cost of equity capital is in Appendix A. In this section I also describe my methodology for estimating time-series earnings forecasts.

### **Cost of Equity Capital Calculations**

Easton (2004) models the cost of equity capital as a function of earnings and earnings growth. Under this approach the firm-specific cost of equity capital estimate is the square root of the inverse of the price-earnings growth ratio as follows:

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<sup>6</sup> Additionally, these estimates are not optimistically biased and they could be used as a means of “mitigating the effects of bias” as suggested by Easton and Sommers (2007, pg. 1013).

$$r_{PEG_t} = \sqrt{\frac{EPS_{t+2} - EPS_{t+1}}{P_t}}, \quad (1)$$

where  $EPS_{t+2} - EPS_{t+1}$  is the forecasted growth in earnings,  $P_t$  is the price at time  $t$ , and  $r_{PEG_t}$  is the cost of equity capital. Additionally, Easton (2004) relaxes the assumption implicit in model (1) that dividends per share at time  $t + 1$  equal zero ( $DPS_{t+1} = 0$ ) and calculates  $r_{MPEG_t}$ , as follows:

$$r_{MPEG_t} = \sqrt{\frac{EPS_{t+2} + r_{MPEG_t} DPS_{t+1} - EPS_{t+1}}{P_t}}. \quad (2)$$

Easton (2004) uses the median analyst forecast of earnings growth ( $EPS_{t+2}$  and  $EPS_{t+1}$ ) and the assumption that  $DPS_{t+1} = DPS_t$  to calculate  $r_{PEG}$  and  $r_{MPEG}$  empirically. Based on theory and results from prior research that the market forms earnings expectations, at least partially, based on time-series earnings forecasts, I use time-series forecasts of earnings to calculate implied cost of equity capital estimates,  $r_{TSPEG_t}$  and  $r_{TSMPEG_t}$ , as follows:

$$r_{TSPEG_t} = \sqrt{\frac{TimeSeriesEPS_{t+2} - TimeSeriesEPS_{t+1}}{P_t}} \quad \text{and} \quad (3)$$

$$r_{TSMPEG_t} = \sqrt{\frac{TimeSeriesEPS_{t+2} + r_{TSMPEG_t} DPS_{t+1} - TimeSeriesEPS_{t+1}}{P_t}}. \quad (4)$$

To calculate  $r_{TSMPEG_t}$  I also assume that  $DPS_{t+1} = DPS_t$ . I convert the cost of equity capital estimates calculated using both analysts' and time-series earnings forecasts into risk premia estimates by deducting the risk-free rate of interest.<sup>7</sup> For brevity, the four implied risk premia estimates based on Easton (2004), after deducting the risk-free rate of interest, are referred to as  $r_{PEGPREM}$ ,  $r_{MPEGPREM}$ ,  $r_{TSPEGPREM}$ , and  $r_{TSMPEGPREM}$ .

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<sup>7</sup> I convert the cost of equity capital estimates to estimates of the risk premium because this is the metric that is most often employed in empirical research on risk.

I use the approach in Easton (2004) for two main reasons. First, the model focuses on earnings, which avoids the clean-surplus assumption in forecasting future book values and is more consistent with what “the street” uses.<sup>8</sup> Second, Botosan and Plumlee (2005) examine the relative reliability of five methods of estimating cost of equity capital using analysts’ forecasts as the proxy for the market’s earnings expectations and find that estimates computed using this approach are associated with directional predictions of several theoretically supported firm risk factors and are stable across alternative specifications. Based on their results, Botosan and Plumlee (2005) suggest that the approach in Easton (2004) is the preferred estimation method based on earnings forecasts.<sup>9</sup>

While the method outlined in Easton (2004) is focused on earnings, computationally simple, and empirically validated by Botosan and Plumlee (2005), there are drawbacks to using this method. Researchers cannot use this method to calculate cost of equity capital for firms when the forecast of the change in earnings (i.e.,  $EPS_{t+2} - EPS_{t+1}$ ) is negative. Therefore, while my methodology allows all firms to be eligible for inclusion in the sample regardless of analyst coverage, the choice of the Easton (2004) model limits the generalizability of the conclusions of this study to firms with an increasing time-series trend in earnings.

Research documents several difficulties in accurately estimating cost of equity capital using the CAPM and Fama-French three-factor model at both the firm level and industry level

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<sup>8</sup> I use income before extraordinary items and discontinued operations as my earnings number for forecasts. Analysts generally forecast earnings without special items and other one-time gains and losses. I/B/E/S apparently adjusts the actual reported earnings number for special items and/or one-time gains and losses to create an earnings number the firm would have reported consistent with an earnings number the analysts were forecasting (Abarbanell and Lehavy 2003). Income before extraordinary items and discontinued operations is my proxy for the analysts’ forecasted earnings number; although in untabulated results I find that analysts seem to exclude significantly more items from expenses and income than just extraordinary items and discontinued operations.

<sup>9</sup> I assume that the results in Botosan and Plumlee (2005), showing the superiority of the Easton (2004) model based on analysts’ forecasts, will be true for time-series earnings forecasts also. However, future research could examine whether time-series earnings forecasts work in models that have been shown to be less-effective with analysts’ forecasts of earnings. Botosan and Plumlee (2005) also find that a target price method based on forecasts of a target price and dividends provides another preferred estimation method. Target price forecasts are exclusive to Value Line and are not examined in this study.

(Fama and French 1997). However, Graham and Harvey (2001) find that 73.5 percent of the CFOs they surveyed always or almost always use the CAPM to estimate cost of equity capital. Thus, for comparison I also calculate historical equity risk premia estimates based on the CAPM and three-factor model described in Fama and French (1992). Specifically, I estimate the following firm-year regression

$$(R_{it} - R_{ft}) = c_0 + \sum_{k=1}^L \lambda_k \beta_{kit} + \varepsilon_{it} , \quad (5)$$

where  $R_{it}$  is the return for firm  $i$  at time  $t$ ,  $R_{ft}$  is the risk-free interest rate at time  $t$ ,  $\beta_{kit}$  is the loading for firm  $i$  at time  $t$  on factor  $k$ , and  $\lambda_k$  is the risk premium associated with factor  $k$ . I use CRSP data to estimate the two models with a minimum of 30 out of 60 monthly returns. To estimate the CAPM I include the return on the market portfolio ( $\lambda_{MKT}$ ) minus the risk-free interest rate at time  $t$  ( $R_{ft}$ ). To calculate the three-factor model I include the  $\lambda_{HML}$  and  $\lambda_{SMB}$  factors constructed by Fama and French (1992) in the market model with  $\lambda_{MKT} - R_{ft}$ .<sup>10</sup> I finally multiply the calculated  $\beta_{kit}$  by the prior ten-year average risk premium associated with each risk factor to get  $r_{CAPMPREM}$  and  $r_{FFPREM}$ .<sup>11</sup>

### Calculating the Time-Series Forecasts of Earnings

I calculate time-series forecasts of future earnings using the exponential smoothing method. The term exponential smoothing is derived from the computational scheme developed by Brown and Meyers (1961). This method computes estimates with updating formulas developed across the time-series in a manner similar to smoothing. This method fits a trend model and weights the most recent data more heavily than data early in the series. The weight of

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<sup>10</sup> I am grateful to Kenneth French for providing the data on the HML, SMB and market factors, as well as the risk-free rate, for calculation of these risk premia. Details on the properties of the series are provided at [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

<sup>11</sup> Results are qualitatively similar if I multiply the CAPM  $\beta$  by a constant 6 percent risk premium. Qualitatively similar is defined in this paper as no change from above (below) to below (above) a 0.05 significance level for rejecting the null.

an observation is a geometric (exponential) function of the number of periods that the observation extends into the past relative to the current period. The weight function is

$$\omega_{\tau} = \omega(1 - \tau)^{t - \tau} \quad (6)$$

where  $\tau$  is the observation number of the past observation,  $t$  is the current observation number, and  $\omega$  is the weighting constant.<sup>12</sup> The trend function specified in this research is a linear trend (double exponential smoothing) model which is, in fact, a special case of an ARIMA (0,2,2) model (McKenzie, 1984; Gardner and McKenzie, 1988).

I estimate the firm-specific predictions of  $EPS_{t+2}$  and  $EPS_{t+1}$  using the exponential smoothing method for each year for firms with at least five consecutive years of earnings. I chose this particular time-series model for several reasons. First, traditional exponential smoothing can be viewed as a simple, computationally efficient method of forecasting the equivalent ARIMA model.<sup>13</sup> The simplicity of the model minimizes the number of observations required to forecast earnings and therefore permits forecasts for a larger sample of firm-years.

Second, I use this model because prior research has shown that changes in annual earnings tend to follow a slowly changing trend, like a random walk with drift. The double exponential smoothing method is equivalent to a random walk with a linear drift and with significant negative autocorrelation in the residuals. This negative autocorrelation is consistent with the findings in Lipe and Kormendi (1994), among others, that changes in earnings tend to exhibit significant mean reversion in the higher-order properties of earnings. Finally, I chose this

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<sup>12</sup> Exponential smoothing forecasts are forecasts for an integrated moving-average process; however, the weighting parameter is specified by the researcher rather than estimated from the data. Research has shown that good values for the weight used in the process are between 0 and 0.30. As a general rule, smaller smoothing weights are appropriate for series with a slowly changing trend, while larger weights are appropriate for volatile series with a rapidly changing trend. I used a weight of 0.01 because research has shown that changes in earnings tend to follow a slowly changing trend which at times appears to be a random walk with drift. However, results are qualitatively similar with weights of 0.05, 0.10, and 0.15 (other weights were not examined).

<sup>13</sup> The exponential smoothing technique was developed in the 1960s before computers were widely available and before ARIMA modeling methods were developed. The use of the exponential smoothing method could be replaced by estimating the equivalent ARIMA model; however, the data requirements are much higher for ARIMA models.

time-series model because it has been used to predict earnings or components of earnings by numerous prior studies in the accounting and finance literature<sup>14</sup>

### **III – HYPOTHESES, SAMPLE, AND RESEARCH DESIGN**

#### **Hypotheses**

Financial statement analysis textbooks consistently emphasize the importance of using historical earnings to forecast future earnings. For example, Graham et al. (1962) underline the importance of the information in historical earnings for estimating firms' sustainable levels of earnings over the next five to ten years. Freeman and Tse (1989) find evidence that stock prices reflect at least some of the implications of current earnings for future earnings.<sup>15</sup> Accordingly, stock prices appear to reflect earnings expectations that are based, at least in part, on time-series earnings forecasts.

Easton (2008, page 8) notes that although the term cost of equity capital is commonly used in the accounting literature to describe the implied expected rates of return calculated using analysts' forecasts, they are not the cost of capital unless the market prices are efficient and the earnings forecasts are the market's earnings expectations. He suggests that a more precise term would be "the internal rate of return implied by market prices, accounting book values and analysts' forecasts of earnings." Researchers should recognize that analysts' forecasts do not uniquely represent the market's expectations for earnings (Walther 1997). Rather, the cross-sectional variation in the relative weights placed on different forecasts of earnings as the market's expectations for earnings is related to various firm-specific characteristics, like analyst following. Certainly, analysts' earnings forecasts are not the best proxy for the market's

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<sup>14</sup> For example, Kinney (1971), Collins (1976), Salamon and Smith (1977), Salamon and Smith (1979), and Chant (1980) all used the exponential smoothing model on earnings and earnings components.

<sup>15</sup> The evidence presented in Bernard and Thomas (1990) suggests that, while stock prices may *partially* reflect the cross-sectional differences in the time-series behavior of earnings, they evidently do not reflect *all* available information.

earnings expectations if a firm is not followed by analysts. Additionally, in the absence of analysts' earnings forecasts the market does not lack earnings expectations for the future.

Research investigating the best proxy for the market's earnings expectations has produced mixed evidence. For example, while Brown et al. (1987) and Hopwood and McKeown (1990) find the errors of analysts' forecasts to be more highly associated with abnormal returns than those of several time-series models, Hughes and Ricks (1987) and O'Brien (1988) find the opposite. Therefore, Schipper (1991, p. 108) suggests that since we do not completely understand what is driving the market response to earnings announcements, then perhaps we should be cautious in using that response to draw definitive conclusions about the preferred proxy for pre-announcement earnings expectations.

Analysts may influence investors' expectations with their forecasts. But, when relatively little analyst forecast information is available to the market, their influence is likely diminished. Walther (1997) demonstrates that the relative weight placed on time-series forecasts as a proxy for the market's earnings expectations increases as the number of analysts following the firm falls. Therefore, I hypothesize the market's use of time-series earnings expectations will result in risk premia estimates based on time-series earnings forecasts that covary with risk factors in a theoretically predictable manner, at least among firms not followed by analysts, but potentially also for firms with analysts' forecasts.

**H1: RISK PREMIA ESTIMATES BASED ON TIME-SERIES EARNINGS FORECASTS COVARY WITH RISK FACTORS IN A THEORETICALLY PREDICTABLE MANNER.**

Research has shown that firms followed by analysts systematically differ from firms not followed by analysts. Bhushan (1989) finds that analyst following varies by industry, size, ownership concentration, and voluntary disclosure levels. Analysts are more likely to follow larger firms because of the potential business that they bring to the analysts' brokerage.

Additionally, the demand for analysts' services likely increases with firm size because of increased benefits of private information for larger firms (Bhushan 1989; Easley and O'Hara 2004). Because analyst following has been found to be positively related to size and voluntary disclosure levels—and because prior work has also found a negative relation between these variables and risk (Botosan 1997; Botosan and Plumlee 2005)—I hypothesize that risk premia for firms not followed by analysts will be larger than risk premia for firms followed by analysts. This test will provide a benchmark for assessing whether the estimates' magnitudes are in line with expectations.

**H2: RISK PREMIA ESTIMATES FOR FIRMS NOT FOLLOWED BY ANALYSTS ARE HIGHER THAN RISK PREMIA ESTIMATES FOR FIRMS FOLLOWED BY ANALYSTS.**

Using analysts' forecasts might help increase the precision of cost of equity capital estimates because these forecasts can reflect a richer information set than simply the past earnings time-series. Cheng (2005) finds that analysts integrate a substantial amount of information besides the time-series properties of earnings into their forecasts. Lee et al. (1999) find that using analyst forecasts—rather than forecasts based on a time-series of historical earnings—improves valuation with the residual income model.<sup>16</sup> Notwithstanding the evidence of bias and sluggishness in analysts' forecasts described in Kothari (2001) and Guay et al. (2005), Botosan and Plumlee (2005) find evidence that the association among the risk premia estimates based on analysts' earnings forecasts and multiple firm-risk measures accord with theory and are stable across alternative specifications. Because of analysts' relative information advantage and based on the results in Botosan and Plumlee (2005) I predict the following:

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<sup>16</sup> Rather than testing the value based on analysts' forecasts with a value based on a time-series of historical earnings, however, Lee et al. (1999) use analysts' forecasts when they have them and only compare them to periods where analysts' forecasts were unavailable.

**H3: FOR FIRMS FOLLOWED BY ANALYSTS, RISK PREMIA ESTIMATES BASED ON ANALYSTS' EARNINGS FORECASTS WILL COVARY MORE CLOSELY WITH RISK FACTORS THAN WILL RISK PREMIA ESTIMATES BASED ON TIME-SERIES EARNINGS FORECASTS.**

**Sample Selection and Data Collection**

Table 1 summarizes the sample selection procedures. There are two samples in my study. I use the first sample to calculate risk premia estimates based on time-series earnings forecasts for firms not followed by analysts. For each firm-year, I require: (1) insufficient I/B/E/S forecast data to calculate the risk premia; (2) sufficient data to compute the time-series earnings forecasts; (3) a positive time-series forecast of the change in annual earnings;<sup>17</sup> and (4) sufficient data to compute the risk factors.<sup>18</sup>

The second sample has two data requirements that differ from the data requirements for the first sample. The firms in the second sample must have (1) *sufficient* I/B/E/S forecast data available to calculate the risk premia estimates based on analysts' earnings forecasts and (2) a positive analyst forecast of the change in annual earnings. I use this second sample to benchmark risk premia estimates based on time-series earnings forecasts and to test H2. I also compare how risk premia estimates based on time-series earnings forecasts and risk premia estimates based on analysts' earnings forecasts covary with the risk factors to test H1 and H3.

Table 1 describes the samples. Before requiring the calculation of the risk factors, the sample of firms not followed by analysts (6,367) has 44,809 firm/year observations.<sup>19</sup> This is much larger than the sample of firms (4,147) and firm/years (26,627) with both time-series and analyst forecast data. Analysts' choice to only follow certain types of firms results in a shortage

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<sup>17</sup> The results are qualitatively similar if I also require a positive time-series forecast of  $EPS_{t+1}$  and  $EPS_{t+2}$  as well.

<sup>18</sup> I limit my first sample to years after 1980 to coincide with the availability of analysts' forecasts. The results based on time-series forecasts are qualitatively similar if years from 1970 to 1980 are included.

<sup>19</sup> The number of firm-year observations for firms not followed by analysts is actually much larger if the years before I/B/E/S coverage of analyst forecast data (i.e., pre-1981) are included.

of forecast information for a broad range and large number of firms. If risk premia estimates based on time-series earnings forecasts are deemed acceptable for use in future research based on the results of this study then researchers could use the additional firm/year observations to test/extend the generalizability of existing research or study research questions that have not been feasible using only analysts' forecasts.<sup>20</sup>

Following Easton (2004), I use the median EPS forecast from the summary file of analysts' forecasts available through I/B/E/S on the third Thursday of the month of the end of the fiscal year. Easton (2004) includes only firms with December fiscal year-ends. I generalize this methodology to all firms regardless of fiscal year end. I convert the expected cost of equity capital estimates to estimates of risk premia by deducting the risk-free rate of interest ( $r_f$ ), for which I use the two-year Treasury Constant Maturity Rate. I collect these data from the U.S. Federal Reserve at <http://www.federalreserve.gov>.

### **Empirical Methodology**

I first calibrate the magnitudes of the risk premia estimates based on time-series forecasts of earnings to determine whether these estimates are in line with results from prior research. I include the risk premia estimates based on the CAPM and the three-factor model in this analysis. When analysts' forecasts are available I calculate risk premia estimates based on analysts' forecasts as well. Finally, I include one-year-ahead average realized risk premia in this analysis. Average realized risk premia are interesting comparisons to the expected risk premia, but they are problematic benchmarks because the expected cost of equity capital is relatively stable, while realized returns can vary significantly from year to year. I compute buy-and-hold returns for each firm-year beginning with the month in which I calculate the risk premia estimates. I adjust the

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<sup>20</sup> Further research could also examine an additional sample of nearly 10,000 firm-year observations in which analysts' forecasts of earnings predict a positive change in annual earnings which results in an implied cost of equity capital estimate, but time-series forecasts of earnings predict a negative change in annual earnings.

returns for delisting following the methodology in Beaver et al. (2007). Lastly, I calculate the realized risk premia ( $r_{\text{REALPREM}}$ ) by deducting the annualized risk-free rate of interest based on the last month of the firm-year from the buy-and-hold returns.

To test the validity of the risk premia estimates based on time-series earnings forecasts I also examine their associations with various risk factors in univariate and multivariate settings. A key problem in relating risk premia to a set of risk factors is that if the CAPM holds, systematic risk ( $\beta$ ) should be the only priced risk factor. From the viewpoint of this study, I am not concerned whether  $\beta$  is the sole factor reflecting risk; rather, it is sufficient for my purposes that I examine the degree to which a wide candidate set of risk factors (including other documented systematic risk factors such as size and book-to-market) covary with the risk premia estimates based on time-series earnings forecasts. Lacking theoretical models to help me decide on which risk factors to use, I draw a wide set of factors from empirical asset-pricing research. I use factors for firm risk drawn from Altman (1968), Beaver et al. (1970), Collins et al. (1999), Gebhardt et al. (2001), Baginski and Wahlen (2003), Gode and Mohanram (2003), and Botosan and Plumlee (2005). These include market beta, unsystematic risk, leverage, information risk, earnings variability, systematic risk in residual income, firm size, book-to-price, bankruptcy risk, business risk, and growth.

The CAPM predicts a positive association between a firm's  $\beta$  and risk premia. Several studies have shown a positive association between  $\beta$  and risk premia (Gebhardt et al., 2001 and Botosan and Plumlee 2005).<sup>21</sup> However, when levered beta is included in the model, the interpretation of the coefficient on levered beta is unclear because levered beta captures leverage risk as well as market risk (e.g., Hamada 1972; Botosan and Plumlee 2005). As such, I calculate unlevered beta (UBETA) by dividing the estimate of  $\beta$ , calculated by estimating equation (5) for

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<sup>21</sup> Easton and Monahan (2005) document a negative empirical relation between  $\beta$  and risk premia.

$r_{CAPMPREM}$  estimates, by the debt-to-equity ratio. I report simple statistics on levered beta (MBETA), but to circumvent the problems with levered beta, I use UBETA to assess the covariance between risk premia estimates based on time-series earnings forecasts and market beta.<sup>22</sup> Because finance theory clearly suggests  $\beta$  should increase with risk, I predict a positive coefficient on UBETA.

Although unsystematic risk should have no impact on the market's expected risk premia, prior studies have shown an association between unsystematic risk (UNSYST) and future stock returns and risk premia, so I include it in the candidate set as a risk factor (Malkiel and Xu 1997; Gode and Mohanram 2003). To extract unsystematic risk from total return volatility I regress *daily* returns for the preceding year against the daily value-weighted index for the NYSE/AMEX/NASDAQ and use the variance of the residuals from the regression as a proxy for unsystematic risk for the firm-year (Gode and Mohanram 2003). I predict the coefficient on UNSYST to be positive based on prior work.

Modigliani and Miller (1958) suggest that risk premia should be increasing in firm leverage (DM). Hamada (1972) explains that in the CAPM framework and using the Modigliani and Miller theory, borrowing while maintaining a fixed amount of equity increases the risk to the equity holders. Therefore, the covariance of the asset's rate of return with the market portfolio's rate of return ( $\beta$ ) should be increasing in the debt-equity ratio. Fama and French (1992) demonstrate a positive association between leverage and ex post returns. Therefore, I predict a positive coefficient on DM. DM is the ratio of the book value of long-term debt to the market value of common equity.

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<sup>22</sup> While both debt and  $\beta$  should be positively related to the risk premia, without using unlevered beta it would be impossible to identify whether the observed association was due to debt or the systematic market risk factor.

Theory suggests that greater information is associated with a lower risk premium through reduced transaction costs and/or reduced estimation risk.<sup>23</sup> The proxy I use in this analysis (INFO) is the standard deviation in the analysts' consensus  $EPS_{t+2}$  forecast reported by I/B/E/S.<sup>24</sup> Prior work uses forecast dispersion as a proxy for the uncertainty about future earnings or the degree of consensus among analysts or market participants (e.g., Barron et al., 1998). If INFO proxies for information risk associated with uncertainty about future earnings, I predict the coefficient on INFO to be positive.

Financial practitioners often regard the variability of reported earnings as a source of risk for firm valuation (e.g., Madden 1998). Beaver et al. (1970) suggest the need to control for the variability of the earnings stream of the firm. Consistent with Gebhardt et al. (2001) and Gode and Mohanram (2003), I examine the association between the variability of reported earnings and the risk premia. I measure variability in earnings as the standard deviation of earnings available to common stockholders before extraordinary items. I calculate this measure over a rolling 10-year period prior to forecasts of the firm's earnings. I require at least five observations to calculate  $\sigma_{EARN}$  and expect a positive coefficient.

The next risk factor is a residual income-based measure based on the systematic risk in abnormal return on equity (i.e., abnormal ROE beta). I calculate abnormal ROE as return on book value of equity minus the prevailing risk-free interest rate. Similar to Baginski and Wahlen (2003), I estimate the abnormal ROE beta as the covariation between abnormal ROE and a

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<sup>23</sup> See, for example, Demsetz (1968), Diamond and Verrecchia (1991), and Graham et al. (2005). Lambert et al. (2007) model how accounting information about a firm manifests itself in its cost of capital, despite the forces of diversification. They argue that the non-diversifiable effects stem from two sources: a direct effect and an indirect effect. The direct effect occurs because higher quality disclosures reduce the firm's assessed covariances with other firms' cash flows. The indirect effect occurs because higher quality disclosures affect a firm's real decisions, which likely changes the firm's ratio of expected future cash flows to the covariance of these cash flows with the sum of all the cash flows in the market.

<sup>24</sup> If analysts'  $EPS_{t+2}$  forecasts are unavailable or there are less than three observations available to calculate the standard deviation, I use the standard deviation of  $EPS_{t+1}$  to proxy for information risk.

market-wide index of abnormal ROE. This is analogous to the accounting earnings beta in Beaver et al. (1970), hence I label it ABETA. For each firm-year observation, I regress abnormal ROE on an equally weighted sample average abnormal ROE over the rolling ten-year window preceding the date on which I compute the risk premia. Baginski and Wahlen (2003) find their abnormal ROE beta is positively associated with risk. Therefore, I predict a positive sign on the coefficient of ABETA.

Fama and French (1992) find that size and book-to-price are related to returns in a systematic manner. Disclosure research argues that firms with better information intermediaries, such as analysts and institutional investors, have a lower risk premium because availability of information lowers the information asymmetry between a firm and its investors and lowers the informational risk for investors. Barth and Hutton (2000) and Mohanram (2000) show that the information environment is affected by many factors, including firm size. As a result, I expect a negative association for the coefficient between the size and the risk premia measures. I use the log of market capitalization of equity (LMKVL) as my proxy for size.

In addition to the findings in Fama and French (1992), Berk (1995) argues that book-to-price and risk premia should be positively associated because book-to-price is inversely related to the market value of equity. Empirically, Gebhardt et al. (2001), Gode and Mohanram (2003), and Botosan and Plumlee (2005) find that BP is positively associated with risk. Therefore, I predict a positive sign on the coefficient of the BP variable.

The probability of bankruptcy is a natural proxy for firm distress. The well-developed bankruptcy prediction literature provides powerful measures of ex ante bankruptcy risk. Altman (1968) presents a proxy for the *inverse* likelihood of bankruptcy (i.e., lower scores indicate poorer financial health), which has been termed Altman's Z. Like many of the other risk factors

used in this analysis, Altman's Z is an unsystematic risk factor and Dichev (1998) reveals that it is separate from the size and book-to-market factors. Altman's Z-score is measured in the year immediately prior to the forecast year.<sup>25</sup> I predict a negative coefficient on the Z-score.

Collins et al. (1999) argue that a continuous negative earnings stream for a firm could cause investors to assess a higher probability that the firm will abandon its resources. This relates negative earnings to business risk. I include a positive earnings indicator variable ( $POS_{EARN}$ ) equal to 1 if the firm has at least five straight years of positive earnings. I expect the coefficient on the variable  $POS_{EARN}$  to be negative to the degree it proxies for a firm's business risk.

One need not rely solely on the basis of business risk to motivate the inclusion of the  $POS_{EARN}$  variable as a risk factor. Graham et al. (2005) suggest that managers and CFOs want to meet or beat earnings benchmarks and smooth earnings because they believe that investors demand a lower risk premium if the earnings benchmarks are met. One common benchmark in the earnings benchmark literature is the positive earnings benchmark. There is also much anecdotal evidence that incentives to maintain positive earnings reduce a firm's risk premium. References to the desirability of "consistent profitability" are commonplace in annual reports, news releases, and press coverage, suggesting that there are incentives to avoid losses (Burgstahler and Dichev 1997).

I include expected earnings growth ( $EXGRW$  and  $EXGRW\_TS$ ) because Beaver et al. (1970) argue that abnormal profits arising from growth opportunities erode as competition enters the marketplace. Consequently, income derived from growth opportunities is riskier than "normal" earnings, thereby generating a positive association between growth and risk. La Porta (1996) and Botosan and Plumlee (2005) provide empirical evidence of such an association.

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<sup>25</sup> Following Altman (1968), the Z score equals  $1.2(\text{Net working capital}/\text{Total assets}) + 1.4(\text{Retained earnings}/\text{Total assets}) + 3.3(\text{Earnings before interest and taxes}/\text{Total assets}) + 0.6(\text{Market value of equity}/\text{Book value of liabilities}) + 0.999(\text{Sales}/\text{Total assets})$ .

Therefore, I predict the coefficient on growth to be positive. I use the proxy in Botosan and Plumlee (2005) for expected earnings growth. Specifically, I divide the difference in the forecasts of earnings two periods in the future and forecasted earnings one period in the future by the absolute value of forecasted earnings one period in the future.<sup>26</sup> I calculate EXGRW (EXGRW\_TS) based on analysts' (time-series) forecasts.

I estimate the following regression for the various risk premium estimates in year-by-year Fama-MacBeth (1973) regressions.<sup>27</sup>

$$r_{PREM_{it}} = \alpha_0 + \beta_1 UBETA_{it} + \beta_2 UNSYST_{it} + \beta_3 DM_{it} + \beta_4 INFO_{it} + \beta_5 \sigma_{EARN_{it}} + \beta_6 ABETA_{it} + \beta_7 LMKVL_{it} + \beta_8 BP_{it} + \beta_9 Z_{it} + \beta_{10} POS_{EARN_{it}} + \beta_{11} EXGRW_{it} + \varepsilon_{it} \quad (7)$$

#### IV – RISK PREMIA ESTIMATES BASED ON TIME-SERIES FORECASTS OF EARNINGS

##### Magnitudes of the Risk Premia

Table 2, Panel A provides descriptive statistics of the firm-specific risk factors for firms not followed by analysts, while Panel B does the same for firms followed by analysts. As documented in prior work, firms not followed by analysts appear to be significantly riskier than firms with analyst following (i.e., Bhushan 1989). Panel C reports that a majority of the nine risk factors that are comparable across the samples is significantly different at the 0.01 level for both means and medians. However, MBETA (levered beta) and  $\sigma_{EARN}$  are significant in the opposite direction expected based on the results in Bhushan (1989).

In untabulated results I find that the significant difference between samples for  $\sigma_{EARN}$  is due to the size of the earnings numbers for firms followed by analysts being significantly larger

<sup>26</sup> There is a risk of tautology here, given that this is basically the scaled numerator in the PEG model. However, my results are qualitatively similar if I exclude this variable from the multivariate regression.

<sup>27</sup> Botosan and Plumlee (2005) run a series of regression models that incorporate a systematically expanding set of risk factors. They do this because much of the variation in the cost of capital estimates examined in their study derives from variation in the terminal value assumptions. There is no difference in the terminal value assumptions between my cost of equity capital measures because I use the same model. For this reason, it is not particularly important to assess the robustness of the association between the cost of capital estimates and firm-specific risk to the inclusion of potential candidates for induced spurious correlation. Unless reported, results are qualitatively similar to alternative specifications of the model presented.

than for firms not followed by analysts. The year-by-year correlation (reported later in Table 4 Panel B) between  $\sigma_{\text{EARN}}$  and size is 0.78. Therefore, it appears that we must examine this variable in a multivariate setting and not rely on simple descriptive statistics.

Panel C shows that the average (median) firm not followed by analysts is 15 percent (6 percent) more highly levered, one-quarter (one-tenth) the size, and trading at a 30 percent (22 percent) discount in terms of market values in excess of book values when compared to firms with analyst following.<sup>28</sup> Bankruptcy risk appears to be high for firms not followed by analysts. The Altman Z statistic for the median firm is in the “gray area” (i.e., between 1.81 and 3.0 as suggested by Stickney et al. 2007).<sup>29</sup>

Less than half of firms not followed by analysts have five consecutive years of positive earnings ( $\text{POS}_{\text{EARN}}$ ), while nearly three-fourths of firms with analyst following have a five-year positive earnings string. Expected earnings growth based on the time-series forecasts is significantly lower for firms followed by analysts (and much higher based on analysts’ forecasts— $\text{EXGRW}$ ), suggesting that firms not followed by analysts are more likely to be growth firms (and that analysts predict higher expected earnings growth). While the  $\text{UNSYST}$  and  $\text{ABETA}$  risk factors are more difficult to interpret, they too suggest that firms not followed by analysts are more risky. Based on the simple statistics from the risk factors, and as predicted in H2, one would expect that firms followed by analysts would have significantly smaller risk premia than the firms for which analysts’ forecasts are not available.

O’Brien and Bhushan (1990) find evidence supporting an association between institutional investors’ decisions to hold firms’ common stock and changes in firm size and prior analyst following. Therefore, I examine whether the marginal investor in the firms not followed

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<sup>28</sup> I deleted firms with negative book values because they affected the results in later analyses.

<sup>29</sup> Results with Altman’s Z are not affected by outliers and are qualitatively similar if firms with values above the 95<sup>th</sup> percentile and below the 5<sup>th</sup> percentile are winsorized.

by analysts is significantly different for firms followed by analysts. As seen in Panel D of Table 2, I find that firms not followed by analysts have significantly lower transient, quasi-indexer, and dedicated institutional investor holdings as defined in Bushee (1998). On average, approximately one-quarter of outstanding shares are owned by institutional investors for firms not followed by analysts while institutional investors own nearly half of the outstanding shares for firms followed by analysts.

Table 3, Panel A provides descriptive statistics for the risk premia estimates based on time-series earnings forecasts ( $r_{TSPEGPREM}$  and  $r_{TSMPEGPREM}$ ), the historical equity risk premia ( $r_{CAPMPREM}$  and  $r_{FFPREM}$ ) and the realized return premia ( $r_{REALPREM}$ ) for the firms not followed by analysts. The implied risk premia estimates based on time-series forecasts of earnings have a mean (median) of 7.7 (4.9) percent for  $r_{TSPEGPREM}$  and 8.8 (6.1) percent for  $r_{TSMPEGPREM}$ . Historical estimates for  $r_{CAPMPREM}$  are similar with a mean (median) estimated risk premia of 7.5 (6.5) percent.  $r_{FFPREM}$  estimates are much larger than all of the other estimates in terms of mean risk premia (10.8 percent) and median risk premia (9.5 percent). As discussed earlier the  $r_{REALPREM}$  estimates are highly variable with a mean risk premia of 11.0 percent and a median of only 0.6 percent. Figure 1 (2) graphs the annual mean (median) risk premia estimates produced by each method for firms not followed by analysts. The figures collectively show that the mean and median risk premia estimates based on time-series earnings forecasts and the historical equity risk premia estimates can be very different from year-to-year and often are inversely related.<sup>30</sup>

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<sup>30</sup> Both figures show that the larger magnitudes reported in Table 3 for  $r_{FFPREM}$  are primarily due to a large increase in risk premia from 1983 to 1986. This is because the 10 year average of the risk premia associated with each factor is at an all time high for these years. Specifically, the three combined factors are greater than 20 percent for the years from 1983 to 1986.

Table 3, Panel B provides descriptive statistics pertaining to the six risk premia and the realized return premia ( $r_{\text{REALPREM}}$ ) for firms followed by analysts. There is no statistical difference between the mean risk premia estimates based on analysts' earnings forecasts and the mean risk premia estimates based on time-series earnings forecasts. This not only gives legitimacy to risk premia estimates based on time-series earnings forecasts (i.e., the use of time-series earnings forecasts as proxies for the market's earnings expectations), but also suggests that estimates based on time-series forecasts and unbiased by analyst forecast optimism have similar average magnitudes as estimates based on analysts' forecasts in the prior literature. Future research could examine this result in light of Easton and Sommers (2007) findings that when estimates of the expected rate of return in the extant literature are adjusted to remove the effect of optimistic bias in analysts' forecasts, the equally weighted estimate of the equity risk premium appears to be close to zero. This result is likely due to observations in which analysts' forecasts of earnings predict a positive change in annual earnings but time-series forecasts of earnings predict a negative change in annual earnings being excluded from this analysis due to constraints within the Easton (2004) model.

However, consistent with the results in Easton and Sommers (2007) the median risk premia estimates based on analysts' earnings forecasts are statistically larger than the median risk premia estimates based on time-series earnings forecasts. This difference could be partially attributable to analyst forecast optimism. As with the prior risk premia estimates, risk premia estimates that include dividends are about one percent higher than the estimates that exclude dividends.

Table 3, Panel C reports the differences in medians between the samples are also significant. With a mean of about three and a half percent for  $r_{\text{TSPEGPREM}}$  and  $r_{\text{PEGPREM}}$  and four

and a half percent for  $r_{TSMPEGPREM}$  and  $r_{MPEGPREM}$ , these estimates are approximately four percent lower than the estimates calculated for firms not followed by analysts. Consistent with H2 the difference is statistically significant which suggests that the risk premia for firms not followed by analysts are larger than risk premia for firms followed by analysts. Inconsistent with H2,  $r_{CAPMPREM}$ ,  $r_{FFPREM}$ , and  $r_{REALPREM}$  are significantly smaller for the firms not followed by analysts than for firms followed by analysts. While this is not surprising for  $r_{CAPMPREM}$  given the results in Panel C of Table 2, it is somewhat surprising for the three-factor model. This raises questions about the validity of these measures, but is consistent with research documenting difficulties in accurately estimating cost of equity capital using these methods at the firm and industry level (Fama and French 1997).

Figures 3 and 4 graph the annual mean and median risk premia estimates produced by each method for firms with analyst coverage and provide further calibrating evidence regarding the comparability of the average estimates produced by time-series and analysts' forecasts of earnings. Mean and median estimates for risk premia estimates based on time-series earnings forecasts and risk premia estimates based on analysts' earnings forecasts have similar magnitudes for the year-by-year estimates, but both are significantly smaller than the historical equity risk premia. Overall, these figures and descriptive statistics show that time-series earnings forecasts produce implied risk premia with magnitudes in line with expectations and comparable to other estimates of risk premia.

### **Covariance of the Risk Premia among the Risk Factors**

In this section, I examine my primary research question: Do time-series earnings forecasts yield estimates of firm-specific cost of equity capital that covary with risk? Panel A of Table 4 presents the average of the year-by-year correlation coefficients among the risk premia

estimates for firms without analyst coverage. The risk premia estimates based on time-series earnings forecasts and estimates of historical equity risk are significantly correlated with each other in a majority of the years examined, although the correlations are low (about 0.07 on average). Panel B of Table 4 presents Spearman correlation coefficients among the risk factors. The correlation coefficients between the risk factors are in line with expectations and similar to those presented in Botosan and Plumlee (2005). The univariate correlations reported in Panel C of Table 4 show that risk premia estimates based on time-series earnings forecasts are significantly correlated with all of the risk factors in the predicted directions, except for the correlation between the risk premia estimates based on time-series earnings forecasts and  $\sigma_{\text{EARN}}$  and UBETA and  $r_{\text{TSMPEGPREM}}$ . Neither of these is particularly surprising given the univariate results in Table 2. This gives initial support to H1. The estimates of historical equity risk are not significantly correlated with many of the risk factors in the predicted direction and in some cases the risk premia are statistically significant in the opposite direction predicted by theory.

Table 5 presents the results of estimating equation (7) for firms without analyst coverage. For the Fama-MacBeth regressions using  $r_{\text{TSPPEGPREM}}$  and  $r_{\text{TSMPEGPREM}}$ , as dependent measures all of the variables are statistically significant in the predicted direction, except for ABETA and UBETA in the model where  $r_{\text{TSMPEGPREM}}$  is the dependent variable.  $\sigma_{\text{EARN}}$  as expected is positively correlated with the risk premia based on time-series earnings forecasts when controlling for the size effects in the measure.

The lack of significance of the ABETA variable is not surprising in that Baginski and Wahlen (2003, page 349) find that abnormal ROE beta is significantly positively related to risk in univariate settings, but in the multivariate setting provides only limited explanatory power “indicating that abnormal ROE beta is, at best, a weak indicator of risk.” Additionally, the

problems with UBETA are not surprising given the results on MBETA in the simple statistics and UBETA in the univariate correlations. In untabulated results, the significance of the coefficients remains stable across alternate specifications of the model; except, when UNSYST is excluded, all of the variables are significant in the predicted direction in both regressions, including UBETA.

The evidence from Tables 3, 4, and 5 strongly supports H1 for firms not followed by analysts—risk premia estimates based on time-series earnings forecasts covary with risk in a theoretically predictable manner. Table 5 also demonstrates that the risk premia estimates based on historical equity returns are not significantly correlated with many of the risk factors in the predicted directions and are often significantly correlated in the opposite direction predicted.

Buoyed by the consistent relation among the risk premia estimates based on time-series earnings forecasts and firm risk measures for firms not followed by analysts, I further examine whether risk premia estimates based on time-series earnings forecasts covary with the risk premia estimates based on analysts' earnings forecasts and the firm risk factors for firms followed by analysts. Panel A of Table 6 presents correlations among the risk premia estimates for firms followed by analysts. The correlation coefficients between ( $r_{\text{PEGPREM}}$  and  $r_{\text{TSPEGPREM}}$ ) and ( $r_{\text{MPEGPREM}}$  and  $r_{\text{TSMPEGPREM}}$ ) are 0.274 and 0.299, respectively. Thus the estimates reflect some variation in a common underlying construct, but also exhibit significant unique variation.<sup>31</sup> The estimates of historical equity risk have low correlations with the other risk premia, although the correlation between  $r_{\text{PEGPREM}}$  and  $r_{\text{CAPMPREM}}$  is relatively strong (0.221). The correlations among  $r_{\text{REALPREM}}$  and the other risk premia estimates are significantly *negative* in a majority of the years in the sample. This suggests that  $r_{\text{REALPREM}}$  and the other risk premia estimates do not

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<sup>31</sup> This unique variation is not surprising given that Livnat and Mendenhall (2006) and Lerman et al. (2007) find that forecast errors from time-series forecast models and analysts' forecasts do not subsume each other.

capture the same underlying construct. Botosan and Plumlee (2005) suggest that this is most likely due to the relative instability of the unexpected component in firms' annual return.

Panel B of Table 6 provides the univariate correlations between the risk premia and risk factors for all risk premia estimates for firms followed by analysts.  $r_{\text{PEGPREM}}$  and  $r_{\text{MPEGPREM}}$  are significantly correlated in the predicted direction with all of the risk factors, except for  $\sigma_{\text{EARN}}$  and  $r_{\text{MPEGPREM}}$  and UBETA. Additionally, with the exception of the EXGRW\_TS risk factor, the correlations among  $r_{\text{PEGPREM}}$  and  $r_{\text{MPEGPREM}}$  and the risk factors are higher than their risk premia counterparts based on time-series forecasts of earnings. As with the firms not followed by analysts,  $r_{\text{TSPEGPREM}}$  and  $r_{\text{TSMPEGPREM}}$  are significantly correlated in the predicted direction with all of the risk factors, with the same exceptions.

Table 7 presents the results of estimating equation (7) for all six risk premia estimates for firms with analyst following. For  $r_{\text{PEGPREM}}$  all of the variables are significant in the predicted direction. The results are very similar for  $r_{\text{MPEGPREM}}$  except the coefficient on UBETA is insignificant.<sup>32</sup> This is not surprising given the univariate results reported in Table 6. Table 7 also shows that  $r_{\text{PEGPREM}}$  (and to some extent  $r_{\text{MPEGPREM}}$ ) are significantly related to the ABETA measure. This suggests that the lack of significance between ABETA and the risk premia estimates based on time-series earnings forecasts in Table 5 and observed here in Table 7 could be due to the inadequacy of the risk premia estimates based on time-series earnings forecasts to capture systematic risk in residual income.

The two risk premium estimates based on time-series forecasts of earnings are also largely correlated with the risk factors in the hypothesized directions. However, in the regressions for  $r_{\text{TSPEGPREM}}$  and  $r_{\text{TSMPEGPREM}}$ , the estimates are now *negatively* related to UBETA and ABETA continues to be insignificant. Similar to the univariate results,  $r_{\text{CAPMPREM}}$  is not

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<sup>32</sup> In untabulated results I find that the inclusion of UNSYST causes UBETA to lose its significance.

significantly correlated with many of the risk factors in the predicted direction, while  $r_{FFPREM}$  is predictably related to a majority of the factors.

The most striking results in Table 7 are the statistically significant differences in the adjusted R-squares between the regressions of risk premia estimates based on analysts' earnings forecasts and the other risk premia estimates. This supports my third hypothesis (H3). Thus, evidence supports the use of time-series forecasts of earnings only when analysts' forecasts are unavailable.

## V – SENSITIVITY ANALYSES

### Ex Post Forecast Errors (Accuracy) and the Risk Premia

When estimating implied cost of capital, recent research has tried to adjust for biases in analysts' forecasts which might affect the cost of equity capital estimates (Guay et al. 2005; Hail and Leuz 2006). This suggests that researchers assume accuracy affects how well the consensus earnings projections reflect the true market expectations of future earnings implied in price.<sup>33</sup> However, what matters most to assessing the validity of a proxy for the market's earnings expectations is how closely the earnings expectations match the market's expectations in price regardless of ex post accuracy. Analysts are more accurate than time-series models, but it is not clear how this will affect implied cost of equity capital estimates. Accordingly, Walther (1997) finds no evidence that the market's earnings expectations resemble the ex post more accurate forecast.<sup>34</sup> I therefore examine whether the forecast error in earnings forecasts has an effect on the associations among the risk premia and the firm risk factors.

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<sup>33</sup> Alternatively, it could suggest that researchers need to adjust for the optimism in analysts' forecasts because such optimism is not inherent in the market's expectations for earnings.

<sup>34</sup> Wiedman (1996), however, finds conflicting evidence that suggests that the characteristics of the information environment related to analyst forecasting superiority are also relevant in explaining analyst superiority in association tests with abnormal returns.

Untabulated results suggest that the forecast error in earnings forecasts has an effect on the associations among the risk premia and the firm risk factors. While this provides valuable information to researchers in calculating implied cost of equity capital estimates, it doesn't provide an answer to whether forecast accuracy is driving the difference in the explanatory power of risk premia estimates based on analysts' earnings forecasts for H3 or whether the difference is attributable to the market relying more on these estimates as the expectations for firms' earnings growth. Future research could examine the main cause in the observed difference. However, it does give credence to arguments regarding managements' incentives to keep their firm's earnings predictable. For example, Graham et al. (2005) find that executives believe that their firm's estimation risk is an important determinant of the risk premium.

### **Systematic Risk in Income**

As in Baginski and Wahlen (2003) I investigate whether a risk measure based on reported net income exhibits a greater association with the risk premia than the relation found for ABETA, which was based on residual income. When I repeat the multivariate regression analyses reported in Tables 5 and 7, substituting an ROE beta for the abnormal ROE beta (i.e., systematic risk in income measured using ROE rather than abnormal ROE) I find that the ROE beta is also significant in its associations with  $r_{PEGPREM}$  and  $r_{MPEGPREM}$  and that systematic risk based on ROE is not consistently related to the risk premia based on time-series earnings forecasts in the year-by-year Fama-MacBeth regressions.

### **Portfolio Forecasting Analysis**

Finally, I examine whether combining firms into portfolios and calculating firms' costs of equity capital based on their portfolio assignment each year and the portfolios pooled time-series earnings forecast can create viable risk premia estimates. This methodology may reduce some of

the noise inherent in the firm-specific time-series earnings forecasts by offsetting much of the idiosyncratic noise in firms' individual earnings streams. Additionally, a portfolio analysis allows nearly all firms with earnings data to be included in the sample, regardless of whether firms have data sufficient to calculate the independent variables for the regression analyses.<sup>35</sup> Thus, this methodology is even more generalizable than the model proposed earlier and could be potentially useful in future research.

I perform three types of portfolio-earnings forecasting analyses. The first earnings forecasting portfolio is based on the industry of the firm as defined in Fama and French (1997). I assign each firm year to one of 48 industry groups based on their SIC code recorded by Compustat. I then forecast the time-series earnings ( $EPS_{t+1}$  and  $EPS_{t+2}$ ) needed for the Easton (2004) model for each industry and year. Thus, for each industry year, I calculate the risk premia for that portfolio of firms in a manner similar to the firm-specific analysis. I also group the firms into portfolios based on size and growth of the firm when compared to all other firms with earnings, prior-year market value, and prior-year abnormal ROE growth data for each firm fiscal year. As with the earlier analyses, all firms are eligible to be included in the sample of firms examined, but some firms are excluded because their industry, size, or growth portfolio change-in-earnings forecasts are not positive.

I then calculate the risk proxies for these firms on a portfolio level. For some of the factors I compute a simple average of the individual firm-level characteristics across the portfolio. For example, the portfolio bankruptcy risk factor used in the portfolio forecasting analyses is an average of the firm-specific Altman's Z statistic for the portfolio. The leverage, firm size, book-to-price, bankruptcy risk, and business risk factors are all calculated in this

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<sup>35</sup> Not all firms can be included in my analysis because the Easton (2004) model still requires a positive forecast of the change in earnings for each portfolio, which wasn't always the case in my analysis.

manner. However, for other factors, such as market beta, unsystematic risk, earnings variability, systematic risk in residual income, and growth, the variable is calculated at the portfolio level based on the methodology described earlier. Thus, market beta for the portfolio analyses is the degree to which the *portfolios'* returns covary with the market.

Table 8 reports the descriptive statistics of the risk premia based on the various portfolio earnings forecasts. The mean (median) risk premia for the industry portfolios is 4.5 (3.3) percent for the  $r_{TSPEGPREM}$  estimates and 5.6 (4.3) percent for the  $r_{TSMPEGPREM}$  estimates. These numbers are in line with expectations based on magnitudes observed from prior studies. The median risk premia estimates for the other two portfolio forecasting groups are similar in magnitude, but the means are about one to two percent lower than the industry portfolio forecasting group.

Table 8 also reports the descriptive statistics for the firms used in each portfolio analysis. When compared to the firm-specific risk factors reported in Table 2 Panel A, for firms not followed by analysts, the benefits of grouping firms into portfolios is clear. As demonstrated by the decrease in standard deviation in nearly every risk factor category. This benefit will hopefully translate into better time-series earnings forecasts for the group. However, whether this forecast is representative of the market's expectations for earnings growth for each firm individually remains an unexplored issue.

Table 9 reports the Fama-Macbeth annual regressions for the portfolio-based risk premia estimates derived using portfolio-time-series earnings forecasts and the risk factors for each portfolio. While the estimates based on the size and growth do not covary with the risk factors in the manner expected, the estimates based on industry portfolios covary with a majority of the risk factors as predicted. Future research could examine whether combining firms into portfolios

based on more specific characteristics, such as size *and* industry, could benefit researchers and teachers in calculating more generalizable cost of equity capital estimates.

## **VI – CONCLUSION**

I calculate firm- and year-specific market-implied cost of equity capital estimates for firms with at least five consecutive years of earnings in order to answer the question: Do time-series forecasts of earnings yield estimates of a firm's cost of equity capital that covary with risk? I address this question because limited evidence exists on firms' costs of equity capital that extends beyond firms followed by analysts. In addition, evidence is mixed on the best proxy for the market's earnings expectations and using time-series forecasts as a proxy for the market's expectations seems appropriate, especially for firms not followed by analysts.

I find that in the absence of analysts' forecasts of earnings, time-series forecasts of earnings appear to yield cost of equity capital estimates with magnitudes in line with expectations based on prior research and that covary with risk as predicted. The average estimated risk premium is significantly higher (by about four percentage points on average) for firms not followed by analysts than for firms followed by analysts. In addition, the association among the cost of equity estimates based on time-series forecasts of earnings and the firm risk factors accord with theory both in univariate and multivariate settings.

This study contributes new evidence on a methodology to derive a time-series implied cost of equity capital estimate using the exponential smoothing method. Using time-series forecasts of earnings, managers can calculate their firm's cost of equity capital for capital structure decisions and budgeting, even if they are not followed by analysts. Investors can use the estimation methodology in valuation. Academic researchers can exploit the methodology to address a wide range of questions in accounting and finance, particularly on broader samples that

include smaller firms not followed by analysts.

Prior research examines the effects of financial reporting reputation, corporate governance structure, and regulatory changes on firms' costs of equity capital. Future research could use cost of equity capital estimates based on time-series forecasts of earnings to determine whether these results generalize to firms without analyst coverage. Research could also examine the effect of alternate time-series forecasting methodologies on the estimates. Walther (1997) finds that the market's earnings expectations do not consistently resemble either analyst or time-series forecasts. Rather, the cross-sectional variation in the relative weights placed on these two forecasts is related to the sophistication of the marginal investor. Accordingly, research could also examine whether joint analyst *and* time-series cost of equity capital estimates, weighted by investor sophistication proxies, covary with risk factors more than they covary with the risk factors when calculated based only on analyst or time-series forecasts.

Finally, recent research by Easton and Sommers (2007) suggests cross-sectional differences in analysts' forecasts (e.g., bias) may lead to the erroneous conclusion that cost of capital differs across samples because the bias differs with other firm characteristics like firm size and with analysts' buy-sell recommendation. Future research could examine whether cost of equity capital estimates based on time-series forecasts of earnings could be used to control for this issue.

**Appendix A:  
Calculating an Accounting Earnings-Based Cost of Equity Capital Estimate**

Traditionally, accounting cost of equity capital models are derived from the dividend discount model (Williams 1938). To calculate cost of equity capital Easton (2004) begins with the dividend discount model shown below as,

$$P_t = \sum_{i=1}^{\infty} \frac{E_t[DPS_{t+i}]}{(1+r_E)^i} \quad (I)$$

where  $P_t$  denotes share price at time  $t$ ,  $E_t$  represents the expectation as of time  $t$ ,  $DPS_{t+i}$  represents dividends per share at time  $t+i$ , and  $r_E$  denotes the cost of equity capital. Ohlson and Juettner-Nauroth (2005) derive an alternative accounting-based valuation model based on (I). First, they restate the equation into an algebraic identity as

$$0 = y_t + \frac{(y_{t+1} - r_E y_t)}{(1+r_E)} + \frac{(y_{t+2} - r_E y_{t+1})}{(1+r_E)^2} + \dots \quad (II)$$

where  $\{y_t\}_{t=0}^{\infty}$  can be any sequence of numbers that follows the mild transversality condition,

$$\frac{y_T}{r_E^T} \rightarrow 0 \text{ as } T \rightarrow \infty. \quad (IIa)$$

Combining Model (I) and Equation (II) yields

$$P_t = y_t + \sum_{i=1}^{\infty} \frac{(y_{t+i} - r_E y_{t+i-1} + DPS_{t+i})}{(1+r_E)^i}. \quad (III)$$

Ohlson and Juettner-Nauroth (2005) then equate  $y_{t+1}$  to  $\frac{EPS_{t+1}}{r_E}$  and relate the difference between  $P_t$  and  $\frac{EPS_{t+1}}{r_E}$  as expected growth beyond the next-period expected earnings-per-share capitalized. To more easily formalize this EPS growth they re-write (III) as

$$P_t = \frac{EPS_{t+1}}{r_E} + \sum_{i=1}^{\infty} \frac{z_t}{(1+r_E)^i} \quad (IV)$$

where

$$z_t \equiv \frac{1}{r_E} [EPS_{t+1} + r_E DPS_t - (1+r_E)EPS_t] \quad t = 0, 1, 2, \dots$$

A series of assumptions applied to (IV) are described in detail in Ohlson and Juettner-Nauroth (2005). These assumptions are near-term earnings ( $EPS_{t+1}$ ) greater than zero, abnormal earnings ( $z_t$ ) greater than zero, growth in fiscal year  $t+2$  ( $\hat{g}_2$ ) equal to  $g_2 - r$ , and  $z_{t+1} = \gamma z_t$  for  $t = 1, 2, \dots$  and  $1 \leq \gamma \leq (1+r_E)$ .<sup>36</sup> Imposing these assumptions yields

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<sup>36</sup> Where  $g_2 = \frac{EPS_{t+2} - EPS_{t+1}}{EPS_{t+1}} + \frac{r_E DPS_{t+1}}{EPS_{t+1}}$

$$P_t = \frac{EPS_{t+1}}{r_E} + \frac{EPS_{t+1} \left( \frac{EPS_{t+2} - EPS_{t+1}}{EPS_{t+1}} + \frac{r_E DPS_{t+1}}{EPS_{t+1}} - r_E \right)}{r_E((1 + r_E) - \gamma)} \quad (V)$$

which can be solved for the Ohlson and Juettner-Nauroth (2005) cost of equity capital measure,  $r_{OJN}$ , suggested in their paper and used in Botosan and Plumlee (2005) as

$$r_{OJN} = A + \sqrt{A^2 + \frac{EPS_{t+1}}{P_t} * \left( \frac{EPS_{t+2} - EPS_{t+1}}{EPS_{t+1}} - (\gamma - 1) \right)} \quad (VI)$$

where  $A = \frac{1}{2} \left( (\gamma - 1) + \frac{DPS_{t+1}}{P_t} \right)$ .

Easton (2004) imposes two additional assumptions on Model (IV):  $DPS_{t+1} = 0$  and,  $\gamma = 1$  (i.e., no growth in abnormal earnings beyond the forecast horizon). The resulting formula for  $r_{PEG}$ , the name of the Easton (2004) cost of equity capital estimate because of its correspondence with the price-to-earnings growth ratio, is a primary basis for calculating cost of equity capital in this paper and can be calculated as

$$r_{PEG} = \sqrt{\frac{EPS_{t+2} - EPS_{t+1}}{P_t}} \quad (VII)$$

Additionally, Easton (2004) relaxes the assumption that  $DPS_{t+1} = 0$  and calculates  $r_{MPEG}$ , as follows:

$$r_{MPEG} = \sqrt{\frac{EPS_{t+2} + r_{MPEG} DPS_{t+1} - EPS_{t+1}}{P_t}} \quad (VIII)$$

where  $DPS_t$  is used as a forecast of  $DPS_{t+1}$  and analysts forecasts of earnings ( $EPS_{t+2}$  and  $EPS_{t+1}$ ) are used to solve the following quadratic equation,

$$r_{MPEG}^2 - r_{MPEG} \left( \frac{DPS_{t+1}}{P_t} \right) - \frac{(EPS_{t+2} - EPS_{t+1})}{P_t} = 0. \quad (IX)$$

This alternate version of cost of capital, adjusted for dividend payout, is the other primary basis for calculating cost of capital in this paper.

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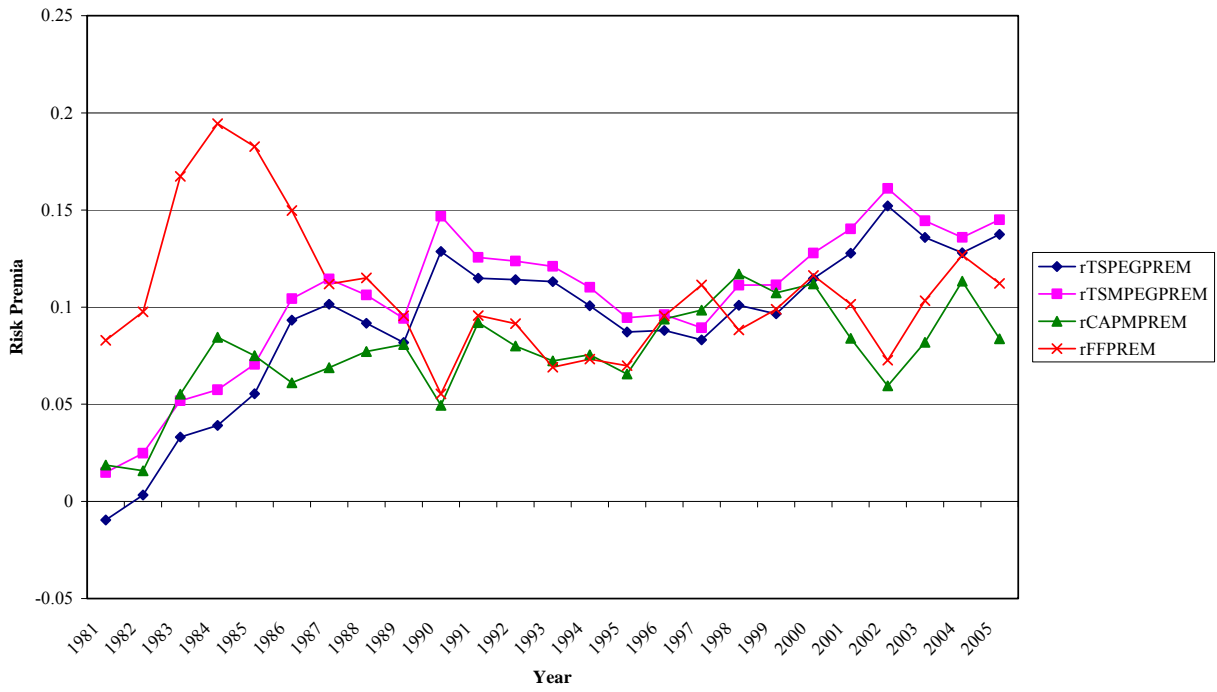
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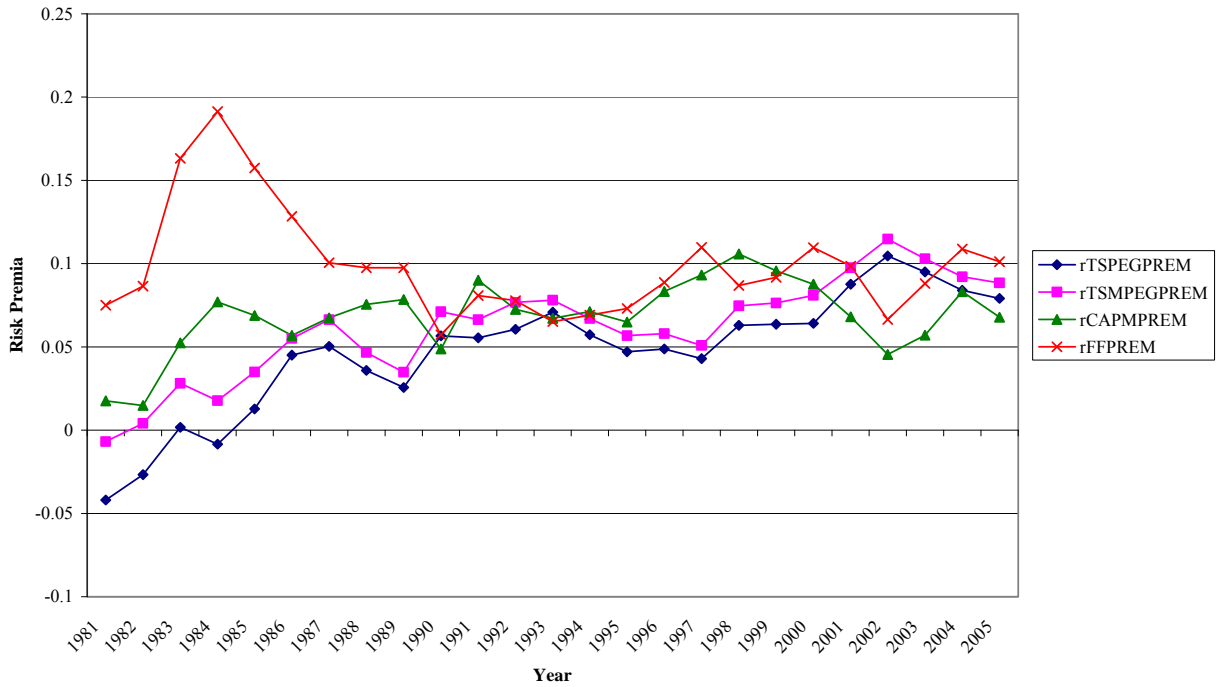
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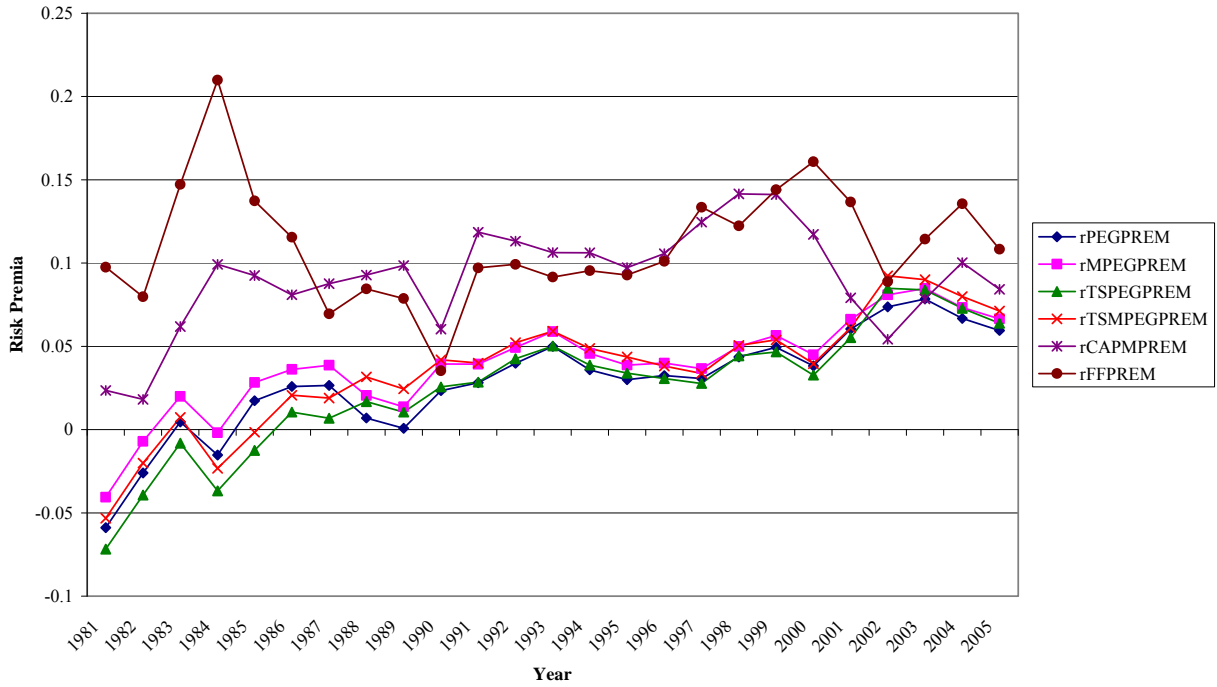
**Figure 1**  
**Mean Risk Premia for Firms Not Followed By Analysts**



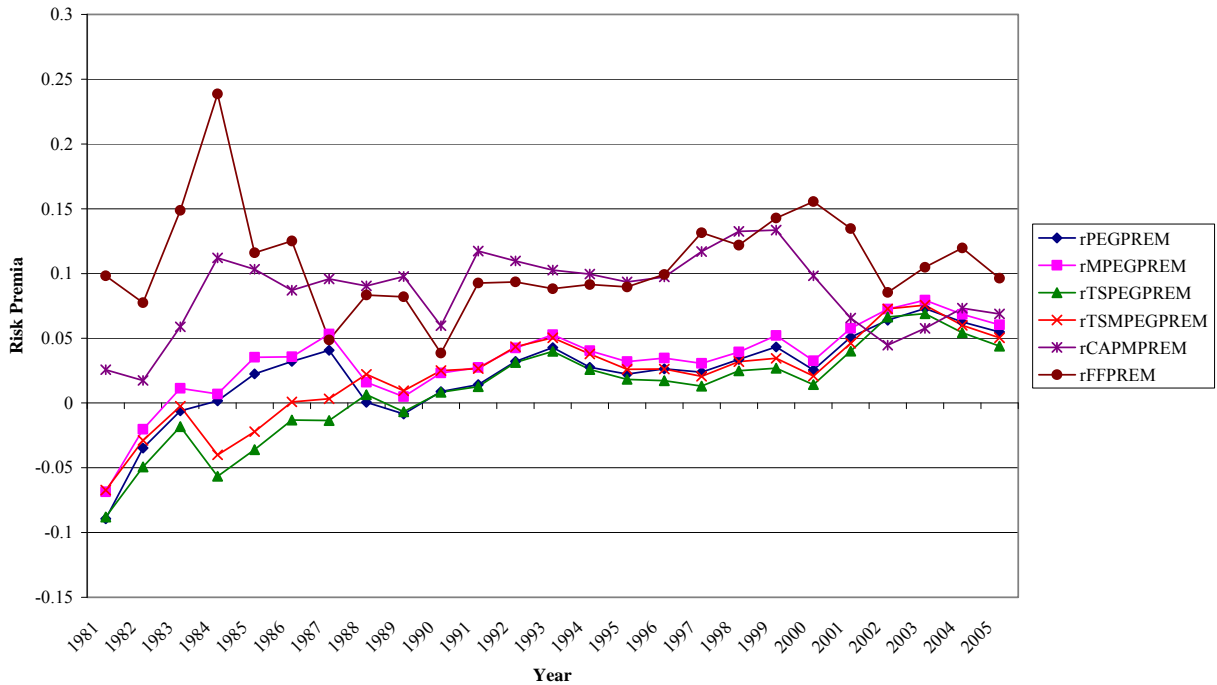
**Figure 2**  
**Median Risk Premia for Firms Not Followed By Analysts**



**Figure 3**  
**Mean Risk Premia for Firms Followed By Analysts**



**Figure 4**  
**Median Risk Premia for Firms Followed By Analysts**



**Table 1****Derivation of Samples, 1981 to 2005**

	<b>Firms Not Followed by Analysts</b>	<b>Firms Followed by Analysts</b>
	<b>Firm-Years</b>	<b>Firm-Years</b>
	<b>(Firms)</b>	<b>(Firms)</b>
Number of observations available in COMPUSTAT with earnings per share data	204,135 (21,875)	204,135 (21,875)
<b>Samples</b>		
Insufficient/Sufficient I/B/E/S forecast data to calculate the cost of equity capital estimates	145,729 (20,790)	58,406 (10,533)
Sufficient data to compute the time-series earnings forecasts	96,679 (14,111)	51,221 (8,171)
Positive forecast of the change in annual earnings	44,809 (6,367)	26,627 (4,147)
Sufficient data to compute all of the risk proxies	<b>24,707</b> <b>(3,739)</b>	<b>18,132</b> <b>(2,752)</b>

## Table 2

### Descriptive Statistics for the Risk Proxies and Institutional Ownership

#### Panel A: Firms Not Followed by Analysts<sup>a</sup>

	MBETA	UNSYST	DM	INFO	$\sigma_{EARN}$	ABETA	MKVL	BP	Z	POS <sub>EARN</sub>	EXGRW_TS	EXGRW
Mean	0.94	0.04	0.48	—	0.34	0.900	1,203	0.87	4.76	0.46	0.10	—
StDev	0.72	0.03	0.60	—	1.31	4.64	6,554	0.74	9.78	0.50	0.22	—
Percentiles												
1%	-0.57	0.01	0.00	—	0.00	-13.177	1	0.04	-4.21	0	0.00	—
25%	0.46	0.02	0.02	—	0.01	-0.539	17	0.42	1.44	0	0.04	—
50%	0.88	0.03	0.23	—	0.04	0.725	57	0.71	2.79	0	0.06	—
75%	1.33	0.04	0.69	—	0.14	2.401	289	1.09	4.72	1	0.09	—
99%	3.09	0.12	2.00	—	5.90	15.501	23,964	3.67	52.37	1	0.96	—

#### Panel B: Firms Followed By Analysts<sup>b</sup>

	MBETA	UNSYST	DM	INFO	$\sigma_{EARN}$	ABETA	MKVL	BP	Z	POS <sub>EARN</sub>	EXGRW_TS	EXGRW
Mean	1.06	0.02	0.33	0.12	0.87	0.767	4,524	0.56	5.72	0.71	0.06	0.35
StDev	0.62	0.01	0.44	0.26	2.51	3.51	18,953	0.38	8.41	0.45	0.10	1.72
Percentiles												
1%	-0.06	0.01	0.00	0.00	0.01	-9.588	28	0.07	0.24	0	0.00	0.02
25%	0.64	0.01	0.03	0.03	0.07	-0.385	243	0.31	2.23	0	0.03	0.12
50%	1.00	0.02	0.17	0.06	0.19	0.634	764	0.49	3.70	1	0.04	0.17
75%	1.38	0.03	0.43	0.14	0.61	1.838	2,485	0.71	6.08	1	0.07	0.27
99%	3.03	0.06	2.00	0.75	11.84	11.856	73,699	1.86	42.81	1	0.27	3.00

#### Panel C: Statistical Differences for the Risk Proxies between Samples<sup>c</sup>

	MBETA	UNSYST	DM	INFO	$\sigma_{EARN}$	ABETA	MKVL	BP	Z	POS <sub>EARN</sub>	EXGRW_TS	EXGRW
Mean	-0.11	0.01	0.15	—	-0.529	0.132	-3,320	0.30	-0.96	-0.25	0.04	—
t-statistic <sup>d</sup>	-17.6 ***	72.5 ***	29.4***	—	26.0***	3.4 ***	-22.6 ***	55.6 ***	-10.9 ***	-54.1 ***	24.4 ***	—
Median	-0.12	0.01	0.06	—	-0.156	0.091	-707	0.22	-0.90	-1.00	0.01	—
z-statistic	-19.9 ***	60.7 ***	14.8***	—	86.5***	5.3 **	-110.1***	51.7 ***	37.1 ***	-51.6 ***	38.6 ***	—

#### Panel D: Institutional Ownership<sup>e</sup>

	Insufficient Analyst Data			Sufficient Analyst Data			Differences		
	TRA	QIX	DED	TRA	QIX	DED	TRA	QIX	DED
Mean	7.2%	12.2%	8.3%	13.9%	25.7%	10.5%	-6.6%	-13.5%	-2.2%
StDev	0.10	0.13	0.09	0.12	0.13	0.10	Student's t <sup>d</sup>		
N	13,910	17,237	12,395	16,413	16,630	15,028	-53.4 ***	-95.4 ***	-19.3 ***
Percentiles									
1%	0.0%	0.0%	0.0%	0.2%	1.5%	0.0%			
25%	0.9%	2.6%	1.8%	4.8%	15.8%	3.4%			
50%	3.6%	7.8%	5.6%	10.4%	24.9%	8.1%	-6.8%	-17.1%	-2.4%
75%	9.8%	17.9%	11.6%	19.8%	34.4%	15.0%	Wilcoxon Z		
99%	44.4%	55.6%	40.3%	51.8%	60.3%	43.5%	-63.4 ***	-93.5 ***	-24.5 ***

Note for Table 2:

<sup>a</sup> The sample contains 24,707 observations for 3,739 firms.

<sup>b</sup> The sample contains 18,132 observations for 2,752 firms.

<sup>c</sup> Differences are taken by subtracting the value for the sample with both risk premia from the time-series only sample.

<sup>d</sup> Satterthwaite t-statistics are used if there is an inequality in variance.

<sup>e</sup> Reported by Thompson Financial.

\*\* = Significant at the 5 percent level.

\*\*\* = Significant at the 1 percent level.

Variables are defined as follows:

MBETA	=	Estimated via the market model with a minimum of 30 monthly returns over the 60 months prior to the estimation period of the expected cost of equity capital ( $r$ ) using a value-weighted NYSE/AMEX/NASDAQ market index return;
UNSYST	=	Unsystematic risk as measured by the residual from the regression over the previous year of a firm's daily return on the daily market return;
DM	=	Long-term liabilities at the end of the fiscal year prior to the date $r$ is estimated, scaled by the market value of equity at the close of the fiscal year prior to when $r$ is estimated;
INFO	=	The standard deviation in the analysts' consensus $EPS_{t+2}$ forecast reported by IBES;
$\sigma_{EARN}$	=	The standard deviation of earnings (i.e., income available for common stockholders before extraordinary items), calculated over the rolling prior 10-year period with a minimum of five observations for the calculation;
ABETA	=	A proxy for the unsystematic risk in abnormal return on equity obtained by regressing abnormal return on equity on the market-wide average abnormal ROE over the ten-year period preceding the year in which $r$ is estimated with a minimum of five observations for the calculation;
MKVL	=	The market value of equity at the close of the fiscal year prior to when $r$ is estimated, stated in millions of dollars;
BP	=	The book value of equity at the end of the most recent quarter prior to the date $r$ is estimated, scaled by the market value of equity at the close of the fiscal year prior to when $r$ is estimated;
Z	=	Altman's Z-score measured in the year immediately prior to the forecasted year. Following Altman (1968), the Z score equals $1.2(\text{Net working capital}/\text{Total assets})+1.4(\text{Retained earnings}/\text{Total assets})+3.3(\text{Earnings before interest and taxes}/\text{Total assets})+0.6(\text{Market value of equity}/\text{Book value of liabilities})+.999(\text{Sales}/\text{Total assets})$ . Lower Altman's Z-scores indicate poorer financial health;
$POS_{EARN}$	=	An indicator variable coded 1 if the firm had five years of positive earnings prior to when $r$ is estimated;
EXGRW_TS	=	Earnings growth computed with time-series forecasts by dividing the difference in forecasted earnings two periods in the future less one period in the future by the absolute value of forecasted earnings one period in the future;
EXGRW	=	Earnings growth computed with analysts' forecasts by dividing the difference in forecasted earnings two periods in the future less one period in the future by the absolute value of forecasted earnings one period in the future;
TRA	=	Average percentage of common shares held by "transient" institutions as defined in Bushee (1998);
QIX	=	Average percentage of common shares held by "quasiindex" institutions as defined in Bushee (1998);
DED	=	Average percentage of common shares held by "dedicated" institutions as defined in Bushee (1998).

## Table 3

### Descriptive Statistics for the Risk Premia

#### Panel A: Firms with Insufficient Analyst Forecast Data to Calculate Firm-Specific Risk Premia<sup>a</sup>

	Analyst Estimates		Time-Series Estimates		Historical Estimates		Realized
	$r_{\text{PEGPREM}}$	$r_{\text{MPEGPREM}}$	$r_{\text{TSPEGPREM}}$	$r_{\text{TSMPEGPREM}}$	$r_{\text{CAPMPREM}}$	$r_{\text{FFPREM}}$	$r_{\text{REALPREM}}$
Mean	—	—	7.7%	8.8%	7.6%	10.8%	11.0%
StDev	—	—	0.11	0.11	0.07	0.11	0.73
Percentiles							
1%	—	—	-9.6%	-8.2%	-5.6%	-15.5%	-88.6%
25%	—	—	-0.1%	1.2%	2.8%	4.4%	-25.5%
50%	—	—	4.9%	6.1%	6.5%	9.5%	0.6%
75%	—	—	13.1%	14.0%	10.9%	16.0%	30.3%
99%	—	—	42.9%	44.3%	30.8%	45.7%	269.8%

#### Panel B: Firms with Sufficient Analyst Forecast Data to Calculate Firm-Specific Risk Premia<sup>b</sup>

	Analyst Estimates		Time-Series Estimates		Historical Estimates		Realized
	$r_{\text{PEGPREM}}$	$r_{\text{MPEGPREM}}$	$r_{\text{TSPEGPREM}}$	$r_{\text{TSMPEGPREM}}$	$r_{\text{CAPMPREM}}$	$r_{\text{FFPREM}}$	$r_{\text{REALPREM}}$
Mean	3.4%	4.4%	3.4%	4.5%	9.3%	11.2%	11.1%
StDev	0.06	0.05	0.07	0.07	0.06	0.08	0.49
Percentiles							
1%	-9.6%	-7.9%	-9.6%	-8.0%	-0.6%	-7.2%	-73.2%
25%	-0.2%	0.9%	-1.0%	0.0%	4.7%	6.1%	-15.4%
50%	3.4%	4.3%	2.3%	3.3%	8.3%	10.5%	5.5%
75%	6.6%	7.4%	6.4%	7.3%	12.4%	15.6%	29.5%
99%	18.4%	19.4%	29.9%	30.9%	30.2%	34.3%	163.4%

#### Panel C: Statistical Differences for the Risk Premia between Samples<sup>c</sup>

	Analyst Estimates vs. Analyst Estimates		Time-Series Estimates vs. Time-Series Estimates		Historical Estimates vs. Historical Estimates		Realized
	$r_{\text{PEGPREM}}$	$r_{\text{MPEGPREM}}$	$r_{\text{TSPEGPREM}}$	$r_{\text{TSMPEGPREM}}$	$r_{\text{CAPMPREM}}$	$r_{\text{FFPREM}}$	$r_{\text{REALPREM}}$
Mean	—	—	4.3%	4.4%	-1.6%	-0.4%	-0.1%
Students' $t^d$	—	—	47.5 ***	49.5 ***	-24.6 ***	-4.0 ***	0.2
Median	—	—	2.6%	2.7%	-1.8%	-1.0%	-4.9%
Wilcoxon Z	—	—	37.6 ***	40.5 ***	-29.8 ***	-10.3 ***	-12.9 ***

#### Panel D: Statistical Differences for the Risk Premia within the Firms Followed by Analysts<sup>e</sup>

	Analyst Estimates vs. Time-Series Estimates		Time-Series Estimates vs. Historical CAPM		Time-Series Estimates vs. Historical Fama-French	
	w/o Dividends	Dividends	w/o Dividends	Dividends	w/o Dividends	Dividends
Mean	0.0%	-0.1%	-5.8%	-4.8%	-7.7%	-6.7%
Students' $t^d$	-0.6	-0.8	-80.5 ***	-67.1 ***	-95.4 ***	-83.5 ***
Median	1.0%	1.0%	-5.9%	-4.9%	-8.1%	-7.1%
Wilcoxon Z	10.5 ***	10.8 ***	-88.5 ***	-76.5 ***	-98.2 ***	-89.1 ***

Note for Table 3:

<sup>a</sup> The sample contains 24,707 observations for 3,739 firms.

<sup>b</sup> The sample contains 18,132 observations for 2,752 firms.

<sup>c</sup> Differences are taken by subtracting value for the sample with both risk premia from the time-series only sample.

<sup>d</sup> Satterthwaite t-statistics are used if there is an inequality in variance.

<sup>e</sup> Differences are taken by subtracting the time-series based premia ( historical premia) from the analyst based premia (time-series based premia) for the columns, respectively.

\* = Significant at the 10 percent level.

\*\* = Significant at the 5 percent level.

\*\*\* = Significant at the 1 percent level.

Variables are defined as follows:

$r_{\text{PEGPREM}}$  = the estimated risk premium based on the PEG formula (Easton 2004);

$r_{\text{MPEGPREM}}$  = the estimated risk premium based on the method outlined in Easton 2004 which adjusts  $r_{\text{PEGPREM}}$  for dividends;

$r_{\text{TSPEGPREM}}$  = the estimated risk premium based on the PEG formula (Easton 2004) using time-series forecasts of EPS instead of analysts' forecasts;

$r_{\text{TSMPEGPREM}}$  = the estimated cost of equity capital based on the method outlined in Easton (2004) using time-series forecasts of EPS instead of analysts' forecasts;

$r_{\text{CAPMPREM}}$  = the estimated cost of equity capital based on the market model with a minimum of 30 monthly returns over the 60 months prior to the estimation period of the expected cost of equity capital using a value-weighted NYSE/AMEX/NASDAQ market index return and a ten year average of the historical risk premium for the market index;

$r_{\text{FFPREM}}$  = the estimated cost of equity capital based on the three-factor market model with a minimum of 30 monthly returns over the 60 months prior to the estimation period of the expected cost of equity capital using a value-weighted NYSE/AMEX/NASDAQ market index return and a ten year average of the historical benchmark returns for each factor;

$r_{\text{REALPREM}}$  = computed as buy-and-hold returns for each firm-year beginning with the month in which the risk premia are calculated. Estimates are adjusted for delisting returns following the methodology in Beaver et al. (2007). Finally, the annualized risk free rate of interest based on the last month of the firm-year for which the risk premia is calculated is deducted.

## Table 4

### Mean of Year-by-Year Spearman Correlation Coefficients between Various Specifications of Risk Premia and the Risk Proxies for Firms Not Followed by Analysts

#### Panel A: Correlations among Expected, Historical, and Realized Risk Premia

	$\Gamma_{\text{TSMPEGPREM}}$	$\Gamma_{\text{CAPMPREM}}$	$\Gamma_{\text{FFPREM}}$	$\Gamma_{\text{REALPREM}}$
$\Gamma_{\text{TSMPEGPREM}}$	0.966 (25/0)	0.109 (17/1)	0.088 (16/0)	-0.050 (1/10)
$\Gamma_{\text{TSMPEGPREM}}$	—	0.035 (8/6)	0.058 (12/0)	-0.024 (4/10)
$\Gamma_{\text{CAPMPREM}}$		—	0.453 (24/0)	-0.084 (2/12)
$\Gamma_{\text{FFPREM}}$			—	-0.014 (4/5)
$\Gamma_{\text{REALPREM}}$				—

#### Panel B: Correlations among Risk Proxies

	UNSYST	DM	$\sigma_{\text{EARN}}$	ABETA	LMKVL	BP	Z	POS <sub>EARN</sub>	EXGRW_TS
UBETA	0.261 (21/0)	-0.476 (0/25)	0.106 (13/0)	0.054 (11/1)	0.058 (11/0)	-0.127 (0/20)	0.315 (25/0)	-0.128 (0/10)	0.161 (24/0)
UNSYST	—	-0.169 (0/17)	-0.302 (0/24)	0.128 (17/4)	-0.562 (0/25)	-0.032 (7/8)	-0.039 (3/10)	-0.499 (0/25)	0.419 (25/0)
DM		—	0.193 (24/0)	0.014 (6/1)	0.084 (16/0)	0.305 (25/0)	-0.636 (0/25)	-0.005 (7/10)	-0.159 (0/25)
$\sigma_{\text{EARN}}$			—	0.023 (7/1)	0.779 (25/0)	-0.065 (0/13)	-0.186 (0/25)	0.009 (15/6)	-0.247 (0/21)
ABETA				—	-0.066 (5/10)	0.064 (11/2)	-0.031 (5/11)	-0.160 (6/16)	0.046 (10/4)

**Panel B: Correlations among Risk Proxies (Continued)**

	UNSYST	DM	$\sigma_{\text{EARN}}$	ABETA	LMKVL	BP	Z	POS <sub>EARN</sub>	EXGRW_TS
LMKVL					—	-0.294 (0/25)	0.067 (15/0)	0.355 (25/0)	-0.332 (0/25)
BP						—	-0.240 (0/25)	-0.056 (2/12)	-0.135 (0/20)
Z							—	0.171 (21/0)	-0.031 (0/7)
POS <sub>EARN</sub>								—	-0.282 (0/25)
EXGRW_TS									—

**Panel C: Correlations among Risk Premium Estimates and Risk Proxies**

	UBETA	UNSYST	DM	$\sigma_{\text{EARN}}$	ABETA	LMKVL	BP	Z	POS <sub>EARN</sub>	EXGRW_TS
$r_{\text{TSMPEGPREM}}$	0.071 (9/2)	0.409 (25/0)	0.028 (10/4)	-0.066 (5/17)	0.092 (14/6)	-0.380 (0/25)	0.183 (22/0)	-0.181 (0/25)	-0.358 (0/25)	0.553 (25/0)
$r_{\text{TSMPEGPREM}}$	0.000 (5/8)	0.310 (25/0)	0.080 (19/3)	-0.027 (5/13)	0.067 (14/7)	-0.322 (0/25)	0.215 (23/0)	-0.232 (0/25)	-0.286 (0/25)	0.481 (25/0)
$r_{\text{CAPMPREM}}$	0.840 (25/0)	0.305 (21/1)	-0.107 (0/12)	0.226 (23/0)	0.089 (16/1)	0.113 (17/0)	-0.178 (0/24)	0.041 (5/0)	-0.209 (0/23)	0.176 (22/0)
$r_{\text{FFPREM}}$	0.357 (23/1)	0.136 (16/3)	0.049 (14/4)	0.150 (16/5)	0.089 (16/0)	0.040 (14/8)	-0.003 (6/5)	-0.046 (3/12)	-0.147 (0/20)	0.050 (10/2)
$r_{\text{REALPREM}}$	-0.060 (3/11)	-0.158 (2/19)	0.042 (9/4)	0.045 (14/3)	-0.020 (3/6)	0.055 (14/4)	0.094 (18/2)	0.003 (5/5)	0.113 (18/2)	-0.105 (2/18)

Note for Table 4:

Table values on top are the mean of year-by-year correlations. Numbers in parentheses are the number of times the correlation is significant (positive/negative) in year-by-year correlations. The sample contains 24,707 observations for 3,739 firms.

UBETA = MBETA divided by the debt-to-equity ratio.

All other variables defined in Tables 2 and 3.

## Table 5

### Regressions of Various Specifications of Risk Premia on Risk Proxies for Firms Not Followed by Analysts

$$r_{PREM_{it}} = \alpha_0 + \beta_1 UBETA_{it} + \beta_2 UNSYST_{it} + \beta_3 DM_{it} + \beta_4 INFO_{it} + \beta_5 \sigma_{EARN_{it}} + \beta_6 ABETA_{it} + \beta_7 LMKVL_{it} + \beta_8 BP_{it} + \beta_9 Z_{it} + \beta_{10} POS_{EARN_{it}} + \beta_{11} EXGRW_{it} + \varepsilon_{it}$$

Models:	Predicted	$\Gamma_{TSPEGPREM}$	$\Gamma_{TSMPEGPREM}$	$\Gamma_{CAPMPREM}$	$\Gamma_{FFPREM}$
$\alpha_0$ - Intercept	NA	0.068 6.63 ***	0.076 7.52 ***	0.032 5.23 ***	0.101 17.52 ***
$\beta_1$ - UBETA	+	0.009 3.16 ***	0.003 1.17	—	—
$\beta_2$ - UNSYST	+	0.986 14.93 ***	0.868 13.45 ***	0.688 5.75 ***	0.482 2.78 **
$\beta_3$ - DM	+	0.009 6.25 ***	0.012 7.71 ***	-0.006 -3.34 ***	0.005 2.44 **
$\beta_4$ - INFO	+	—	—	—	—
$\beta_5$ - $\sigma_{EARN}$	+	0.008 8.77 ***	0.008 7.94 ***	-0.004 -6.41 ***	-0.002 -0.45
$\beta_6$ - ABETA	+	0.001 1.45	0.001 1.26	0.001 3.05 ***	0.001 1.73 *
$\beta_7$ - LMKVL	-	-0.010 -12.47 ***	-0.009 -10.88 ***	0.008 9.40 ***	—
$\beta_8$ - BP	+	0.018 14.31 ***	0.020 13.14 ***	-0.007 -4.30 ***	—
$\beta_9$ - Z	-	-0.0011 -11.00 ***	-0.0011 -10.57 ***	0.0000 -0.36	0.0001 1.43
$\beta_{10}$ - $POS_{EARN}$	-	-0.028 -17.03 ***	-0.021 -12.09 ***	-0.023 -6.81 ***	-0.022 -7.95 ***
$\beta_{11}$ - EXGRW	+	0.103 3.39 ***	0.098 3.42 ***	0.017 3.66 ***	-0.003 -0.20
Adjusted R <sup>2</sup>		29.3%	24.6%	18.1%	6.0%

Note for Table 5:

Table values on top are mean parameter estimates from 25 year-by-year regressions. Fama-MacBeth t-statistics are reported below the means. The sample contains 24,707 firm/year observations from 3,739 firms.

Variables defined in Tables 2, 3, and 4.

\* = Significant at the 10 percent level.

\*\* = Significant at the 5 percent level.

\*\*\* = Significant at the 1 percent level.

## Table 6

### Mean of Year-by-Year Spearman Correlation Coefficients between Various Specifications of Risk Premia and the Risk Proxies for Firms Followed by Analysts

#### Panel A: Correlations among Expected Risk Premia Estimates and the Realized Risk Premia

	$\Gamma_{\text{PEGPREM}}$	$\Gamma_{\text{MPEGPREM}}$	$\Gamma_{\text{TSPEGPREM}}$	$\Gamma_{\text{TSMPEGPREM}}$	$\Gamma_{\text{CAPMPREM}}$	$\Gamma_{\text{FFPREM}}$	$\Gamma_{\text{REALPREM}}$
$\Gamma_{\text{PEGPREM}}$	—	0.952 (25/0)	0.274 (25/0)	0.241 (25/0)	0.221 (25/0)	0.154 (17/0)	-0.172 (1/19)
$\Gamma_{\text{MPEGPREM}}$		—	0.261 (25/0)	0.299 (25/0)	0.101 (15/0)	0.129 (18/0)	-0.150 (1/19)
$\Gamma_{\text{TSPEGPREM}}$			—	0.960 (25/0)	0.112 (15/0)	0.109 (14/0)	-0.022 (4/6)
$\Gamma_{\text{TSMPEGPREM}}$				—	-0.001 (4/2)	0.093 (13/0)	-0.001 (4/5)
$\Gamma_{\text{CAPMPREM}}$					—	0.374 (19/2)	-0.076 (4/10)
$\Gamma_{\text{FFPREM}}$						—	0.013 (4/5)

#### Panel B: Correlations among Risk Premia Estimates and Risk Proxies

	UBETA	UNSYST	DM	INFO	$\sigma_{\text{EARN}}$	ABETA	LMKVL	BP	Z	POS <sub>EARN</sub>	EXGRW_TS	EXGRW
$\Gamma_{\text{PEGPREM}}$	0.097 (12/1)	0.395 (25/0)	0.160 (22/0)	0.287 (25/0)	-0.135 (0/23)	0.131 (16/0)	-0.320 (0/25)	0.246 (24/0)	-0.155 (0/22)	-0.304 (0/25)	0.153 (24/0)	0.572 (25/0)
$\Gamma_{\text{MPEGPREM}}$	-0.021 (4/6)	0.259 (25/0)	0.247 (25/0)	0.271 (25/0)	-0.087 (0/12)	0.108 (15/1)	-0.279 (0/25)	0.326 (25/0)	-0.252 (0/25)	-0.272 (0/25)	0.053 (10/0)	0.456 (25/0)
$\Gamma_{\text{TSPEGPREM}}$	0.053 (7/1)	0.261 (25/0)	0.101 (19/0)	0.192 (25/0)	-0.079 (0/13)	0.078 (13/4)	-0.246 (0/25)	0.231 (25/0)	-0.103 (0/18)	-0.183 (0/24)	0.628 (25/0)	0.132 (21/0)
$\Gamma_{\text{TSMPEGPREM}}$	-0.061 (4/13)	0.133 (20/0)	0.186 (25/0)	0.176 (23/0)	-0.029 (0/5)	0.056 (12/5)	-0.203 (0/25)	0.306 (25/0)	-0.195 (0/25)	-0.154 (0/23)	0.503 (25/0)	0.030 (8/3)
$\Gamma_{\text{CAPMPREM}}$	0.805 (25/0)	0.465 (25/0)	-0.146 (0/16)	0.208 (25/0)	0.007 (6/4)	0.141 (19/0)	-0.055 (3/9)	-0.112 (0/17)	0.121 (14/0)	-0.187 (0/23)	0.277 (25/0)	0.357 (25/0)
$\Gamma_{\text{FFPREM}}$	0.227 (16/4)	0.134 (13/2)	0.121 (19/3)	0.142 (20/0)	0.014 (14/6)	0.112 (14/0)	-0.092 (9/12)	0.130 (19/1)	-0.118 (0/16)	-0.158 (0/22)	0.057 (14/5)	0.094 (12/0)
$\Gamma_{\text{REALPREM}}$	-0.066 (3/12)	-0.117 (4/16)	0.038 (7/2)	-0.052 (5/13)	0.047 (10/4)	-0.023 (3/6)	0.038 (9/4)	0.063 (11/4)	-0.038 (2/7)	0.036 (8/4)	-0.061 (4/13)	-0.087 (2/13)

Note for Table 6:

Table values on top are the mean of year-by-year correlations. Numbers in parentheses are the number of times the correlation is significantly (positive/negative) in year-by-year correlations. The sample contains 18,132 firm/year observations from 2,752 firms. Variables defined in Tables 2, 3, and 4.

## Table 7

### Regressions of Various Specifications of Risk Premia on Risk Proxies for Firms Followed by Analysts

$$r_{PREM_{it}} = \alpha_0 + \beta_1 UBETA_{it} + \beta_2 UNSYST_{it} + \beta_3 DM_{it} + \beta_4 INFO_{it} + \beta_5 \sigma_{EARN_{it}} + \beta_6 ABETA_{it} + \beta_7 LMKVL_{it} + \beta_8 BP_{it} + \beta_9 Z_{it} + \beta_{10} POS_{EARN_{it}} + \beta_{11} EXGRW_{it} + \varepsilon_{it}$$

Models:		$\Gamma_{PEMPREM}$	$\Gamma_{MPEMPREM}$	$\Gamma_{TSPEMPREM}$	$\Gamma_{TSMPEMPREM}$	$\Gamma_{CAPMPREM}$	$\Gamma_{FFPREM}$
$\alpha_0$ - Intercept	NA	0.011 1.22	0.031 3.66 ***	-0.001 -0.08	0.021 2.08 **	0.066 6.14 ***	-0.015 -0.41
$\beta_1$ - UBETA	+	0.006 3.82 ***	0.000 0.34	-0.008 -3.97 ***	-0.013 -5.07 ***	—	—
$\beta_2$ - UNSYST	+	1.254 12.24 ***	0.787 8.11 ***	1.143 12.66 ***	0.685 7.41 ***	-0.017 -2.07 **	0.102 14.54 ***
$\beta_3$ - DM	+	0.012 9.14 ***	0.014 10.27 ***	0.004 2.19 **	0.006 2.86 ***	2.600 10.36 ***	0.891 3.00 ***
$\beta_4$ - INFO	+	0.0004 2.53 **	0.0004 2.38 **	0.000 -0.25	0.000 -0.29	-0.004 -3.38 ***	0.017 8.09 ***
$\beta_5$ - $\sigma_{EARN}$	+	0.002 2.77 **	0.003 4.45 ***	0.003 6.28 ***	0.004 7.43 ***	0.000 0.29	0.000 -0.01
$\beta_6$ - ABETA	+	0.001 2.40 **	0.001 1.83 *	0.001 1.56	0.001 1.37	-0.002 -4.43 ***	-0.007 -1.97 *
$\beta_7$ - LMKVL	-	-0.004 -10.70 ***	-0.004 -11.22 ***	-0.003 -7.27 ***	-0.003 -7.16 ***	0.001 2.28 **	—
$\beta_8$ - BP	+	0.015 8.56 ***	0.021 9.58 ***	0.033 14.17 ***	0.039 16.50 ***	0.008 8.08 ***	—
$\beta_9$ - Z	-	-0.0003 -10.55 ***	-0.0003 -10.31 ***	-0.0002 -2.43 **	-0.0002 -2.16 **	-0.0005 -0.34	0.0008 1.24
$\beta_{10}$ - $POS_{EARN}$	-	-0.013 -12.79 ***	-0.012 -10.31 ***	-0.009 -6.89 ***	-0.008 -5.40 ***	0.000 0.92	-0.0003 -3.18 ***
$\beta_{11}$ - EXGRW	+	0.020 5.12 ***	0.020 5.27 ***	0.322 4.91 ***	0.299 4.91 ***	-0.007 -3.02 ***	-0.018 -5.86 ***
Adjusted R <sup>2</sup>		36.1%	32.3%	22.8%	20.8%	28.5%	11.6%

Note for Table 7:

Table values on top are mean parameter estimates from 25 year-by-year regressions. Fama-MacBeth t-statistics are reported below the means. The sample contains 18,132 firm/year observations from 2,752 firms.

Variables defined in Tables 2, 3, and 4.

\* = Significant at the 10 percent level.

\*\* = Significant at the 5 percent level.

\*\*\* = Significant at the 1 percent level.

## Table 8

### Descriptive Statistics for the Portfolio Risk Premia

#### Panel A: Firms Forecasted based on Year-Industry as per Fama and French (1997) Industry Classification<sup>a</sup>

	$r_{TSPEGPREM}$	$r_{TSMPEGPREM}$	MBETA	UNSYST	DM	$\sigma_{EARN}$	ABETA	MKVL	BP	Z	POS <sub>EARN</sub>	EXGRW_TS
Mean	4.5%	5.6%	0.96	0.04	0.38	33.65	0.998	219,357	0.52	5.29	0.46	0.04
StDev	0.08	0.08	0.30	0.01	0.31	74.74	1.05	404,465	0.22	3.26	0.18	0.02
Percentiles												
1%	-9.4%	-7.9%	0.15	0.02	0.05	0.58	-1.753	1,123	0.17	0.22	0	0.00
25%	-1.0%	-0.1%	0.79	0.03	0.17	3.29	0.424	21,993	0.37	3.46	0	0.03
50%	3.3%	4.3%	0.98	0.04	0.29	10.27	1.078	73,179	0.48	4.65	0	0.04
75%	8.2%	9.3%	1.12	0.05	0.49	30.77	1.615	206,203	0.64	6.23	1	0.05
99%	35.3%	37.1%	1.82	0.09	1.44	455.28	3.406	2,070,883	1.23	18.25	1	0.08

#### Panel B: Firms Forecasted based on their Year-Size Ranking ( $\approx 100$ Portfolios per Year)<sup>b</sup>

	$r_{TSPEGPREM}$	$r_{TSMPEGPREM}$	MBETA	UNSYST	DM	$\sigma_{EARN}$	ABETA	MKVL	BP	Z	POS <sub>EARN</sub>	EXGRW_TS
Mean	3.3%	4.3%	1.00	0.04	0.55	13.03	1.059	103,781	0.72	6.00	0.51	0.04
StDev	0.05	0.05	0.18	0.02	0.45	56.47	0.62	540,609	0.27	2.46	0.21	0.01
Percentiles												
1%	-7.7%	-5.8%	0.53	0.01	0.19	0.14	-0.461	121	0.34	1.12	0	0.01
25%	0.4%	1.4%	0.89	0.02	0.34	0.61	0.662	1,485	0.54	4.42	0	0.03
50%	2.9%	3.8%	1.00	0.03	0.45	1.62	1.009	6,183	0.67	5.77	1	0.04
75%	5.6%	6.6%	1.11	0.05	0.62	5.74	1.439	31,997	0.82	7.30	1	0.05
99%	20.6%	21.7%	1.42	0.09	1.95	233.04	2.723	1,886,508	1.69	13.05	1	0.08

#### Panel C: Firms Forecasted based on their Year-Growth Ranking ( $\approx 100$ Portfolios per Year)<sup>a</sup>

	$r_{TSPEGPREM}$	$r_{TSMPEGPREM}$	MBETA	UNSYST	DM	$\sigma_{EARN}$	ABETA	MKVL	BP	Z	POS <sub>EARN</sub>	EXGRW_TS
Mean	2.6%	3.9%	0.98	0.04	0.50	23.72	1.151	107,717	0.58	5.64	0.54	0.06
StDev	0.05	0.08	0.23	0.01	0.62	26.48	0.63	159,369	0.29	1.95	0.32	0.77
Percentiles												
1%	-6.9%	-4.8%	0.50	0.02	0.06	2.18	0.000	1,274	0.13	2.27	0	0.01
25%	0.3%	1.4%	0.84	0.03	0.25	8.36	0.748	20,186	0.39	4.29	0	0.03
50%	2.5%	3.4%	0.97	0.03	0.38	16.83	0.988	53,728	0.54	5.32	1	0.04
75%	4.8%	5.7%	1.10	0.04	0.57	27.02	1.332	121,263	0.71	6.67	1	0.05
99%	18.4%	20.4%	1.75	0.08	2.27	138.47	3.278	797,292	1.52	11.37	1	0.12

Note for Table 8:

Variables defined in Tables 2, 3, and 4.

<sup>a</sup> The sample contains approximately 204,135 observations for 21,875 firms placed into 1,050 portfolios (approx. 42 per year for 25 years).

<sup>b</sup> The sample contains approximately 204,135 observations for 21,875 firms placed into 2,300 portfolios (approx. 92 per year for 25 years).

## Table 9

### Fama-MacBeth Regressions where Risk Premia is Regressed on the Risk Proxies for Portfolio Based Forecasts of Earnings

#### Panel A: Firms Forecasted based on Year-Industry as per Fama and French (1997) Industry Class<sup>a</sup>

	Int	UBETA	UNSYST	DM	INFO	$\sigma_{\text{EARN}}$	ABETA	LMKVL	BP	Z	POS <sub>EARN</sub>	EXGRW_TS	Adj. R <sup>2</sup>
$r_{\text{TSPEGPREM}}$	0.223	-0.017	-1.082	0.003	—	0.001	-0.001	-0.021	0.049	-0.004	-0.021	2.783	71.9%
	6.72 ***	-2.90 **	-4.73 ***	0.24		4.67 ***	-0.35	-9.22 ***	3.93 ***	-6.45 ***	-1.92 *	17.06 ***	
$r_{\text{TSMPEGPREM}}$	0.229	-0.029	-1.134	0.016	—	0.001	-0.002	-0.020	0.052	-0.004	-0.015	2.732	70.6%
	6.48 ***	-4.65 ***	-4.32 ***	1.31		4.47 ***	-0.66	-8.28 ***	3.92 ***	-5.74 ***	-1.21	17.74 ***	

#### Panel B: Firms Forecasted based on Year-Size ( $\approx 100$ Portfolios per Year)<sup>b</sup>

	Int	UBETA	UNSYST	DM	INFO	$\sigma_{\text{EARN}}$	ABETA	LMKVL	BP	Z	POS <sub>EARN</sub>	EXGRW_TS	Adj. R <sup>2</sup>
$r_{\text{TSPEGPREM}}$	-0.109	0.006	0.230	0.005	—	0.000	0.000	-0.002	-0.001	-0.001	-0.005	3.481	64.9%
	-5.39 ***	1.47	1.24	1.28		-0.11	-0.36	-1.26	-0.05	-1.02	-0.90	21.29 ***	
$r_{\text{TSMPEGPREM}}$	-0.094	-0.002	0.201	0.007	—	0.000	-0.001	-0.002	0.002	-0.001	-0.003	3.467	62.1%
	-3.43 ***	-0.30	0.92	1.75		-0.39	-0.87	-0.92	0.15	-1.10	-0.52	20.42 ***	

#### Panel C: Firms Forecasted based on Year-Growth ( $\approx 100$ Portfolios per Year)<sup>c</sup>

	Int	UBETA	UNSYST	DM	INFO	$\sigma_{\text{EARN}}$	ABETA	LMKVL	BP	Z	POS <sub>EARN</sub>	EXGRW_TS	Adj. R <sup>2</sup>
$r_{\text{TSPEGPREM}}$	0.036	0.005	-0.092	0.002	—	0.000	0.003	-0.011	-0.001	0.001	0.018	2.116	49.8%
	1.46	0.82	-0.46	0.74		-0.10	0.61	-6.12 ***	-0.13	1.15	2.57 ***	9.69 ***	
$r_{\text{TSMPEGPREM}}$	0.004	-0.004	1.229	0.003	—	0.000	-0.004	-0.004	-0.011	0.000	0.002	1.022	40.0%
	0.06	-0.42	0.91	1.26		-1.16	-0.57	-0.60	-1.03	-0.16	0.11	1.02	

Note for Table 9:

<sup>a</sup> The sample contains approximately 204,135 observations for 21,875 firms placed into 1,050 portfolios (approx. 42 per year for 25 years).

<sup>b</sup> The sample contains approximately 204,135 observations for 21,875 firms placed into 2,300 portfolios (approx. 92 per year for 25 years).

<sup>c</sup> The sample contains approximately 204,135 observations for 21,875 firms placed into 1,050 portfolios (approx. 80 per year for 25 years).

All variables defined in Tables 2, 3, and 4 except:

Firm size is defined as prior-year market value for each firm.

Abnormal Growth is defined as prior-year abnormal growth in equity (abnormal ROE) computed as the return on book value of equity minus the prevailing risk-free interest rate for each firm (Baginski and Wahlen 2003).

Coefficient values are mean parameter estimates from 25 year-by-year regressions. Fama-MacBeth t-statistics are not reported for the sample which ranges from 1981—2005, but the significance of the coefficients is indicated as follows:

\* = Significant at the 10 percent level.

\*\* = Significant at the 5 percent level.

\*\*\* = Significant at the 1 percent level.