Toward an Implied Cost of Capital

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Toward an Implied Cost-of-Capital

Abstract

In this study, we propose an alternative technique for estimating the cost of equity capital. Specifically, we use a discounted residual income model to generate a market implied cost-of-capital. We then examine firm characteristics that are systematically related to this estimate of cost-of-capital. We show that a firm's implied cost-of-capital is a function of its industry membership, B/M ratio, forecasted long-term growth rate, and the dispersion in analyst earnings forecasts. Together, these variables explain around 60% of the cross-sectional variation in future (two-year-ahead) implied costs-of-capital. The stability of these long-term relations suggests they can be exploited to estimate future costs-of-capital. We discuss the implications of these findings for capital budgeting, investment decisions, and valuation research.

1. Introduction

This study presents a new approach to estimating the cost of equity capital. We use a discounted residual income model (RIM) and market prices to estimate an implied cost-of-capital for a large sample of U. S. stocks. We then document the cross-sectional relation between the implied cost-of-capital and various firm and industry characteristics. We identify several firm characteristics that exhibit a systematic relationship to next year's implied cost-of-capital, and show that these characteristics also have strong predictive power for two-year-ahead implied cost-of-capital.

Our primary goal is to understand the market's perception of the risk associated with investing in a firm's stock, and to examine how this perception varies systematically across firms and industries. We are interested also in exploring the feasibility of a cost-of-capital estimation procedure that incorporates systematic relations between the implied cost-of-capital and ex ante firm or industry characteristics. If the market tends to consistently assign a higher (or lower) discount rate to certain firms and industries, we believe such relations should be exploited in deriving a cost-of-capital estimate for valuation and investment purposes.

Our approach is distinct from most of the prior empirical work on asset pricing in that it does not rely on average realized returns. Tests of asset pricing theory call for measures of ex ante (expected) returns. However, previous academic studies have generally used ex post (average realized) returns to estimate the cost-of-capital, and to test asset-pricing models.[1] The widespread use of realized returns is necessitated, in part, by the fact that expected returns are not observable. Moreover, as the argument goes, in an efficient market where risk is appropriately priced, the average ex post realized returns should be an *unbiased* estimator of the unobservable ex ante expected returns.[2]

Unfortunately, the cost-of-capital estimates derived from average realized returns have proven disappointing in many regards. For example, after extensive testing of CAPM and three-factor based industry costs-of-capital, Fama and French [1997] conclude that these cost-of-capital estimates are "unavoidably imprecise." They identify three potential problems with risk premia computed from past realized returns: 1) difficulties in identifying the right asset pricing model, 2) imprecision in the estimates of factor loadings, and 3) imprecision in the estimates of factor risk premia. In their tests, these problems lead to market equity premium estimates that range from less than zero to more than 10% (using a confidence band of +/- two standard errors).

In this study, we estimate expected returns without relying on average realized returns or traditional asset pricing models. Specifically, we use a discounted residual income model to estimate an implied cost-of-capital, defined as the internal rate of return (IRR) that equates the current stock price to the present value of all future cash flows to common shareholders.[3] In other words, we estimate the rate-of-return that the market implicitly uses to discount the expected future cash flows of the firm. We then examine the relation between these implied discount rates and various ex ante firm characteristics that have either been suggested as risk proxies, or are known to be correlated with average realized returns.[4]

The academic literature currently offers little evidence on how implied cost-of-capital varies across firms and industries. Financial practitioners have long used different versions of discounted cash flow models to infer implied cost-of-capital from the current stock price.[5] However, few academics have employed this technique in their studies.[6] The extensive literature in finance that explores the association between firm characteristics and expected returns has almost uniformly used average realized returns as proxy for expected returns. But, as Elton [1999] observes, average realized returns could be a poor proxy for expected returns, particularly among common stocks.[7]

Consistent with Claus and Thomas [1998], we find that the average implied risk premium for stocks in the U. S. equity market during 1979-95 was much lower than the ex post risk premium. [8] More to the point of this paper, we document a significant industry effect in the implied risk premium. Over our sample period, the market consistently ascribes a higher discount rate to certain industries (Table II). We show that, due to the more volatile nature of average realized returns, these industry effects are obscured, or are statistically insignificant, when realized returns are used as proxy for expected returns.

We find that the implied risk premium is consistently higher for firms in some industries, such as: sports and leisure (Toys), tobacco (Smoke), commercial lending (Banks), electronic technology (Comps and ElcEq), and automotive (Autos). Conversely, the implied risk premium is consistently lower for firms in other industries, such as: real estate (RlEst), precious metals (Gold), financial services (Fin), and medical equipment (MedEq). The difference across these industry groupings is economically significant, and the robustness of these effects over our 17-year sample period suggests industry membership should be an important characteristic in cost-of-capital estimations.

We also examine the cross-sectional relation between the implied risk premium and 14 firm characteristics covering five risk categories: Market Volatility;

Leverage; Liquidity and Information Environment; Variability and Predictability of Earnings; and other Pricing Anomalies (see Table IV). While many of these variables are significantly correlated with the implied risk premium in univariate tests, three variables standout in our multivariate analysis. Specifically, controlling for industry effects, we find that the market consistently assigns a higher risk premium to firms with higher book-to-market ratios (B/M), higher forecasted growth rates (Ltg), and lower dispersion in analyst forecasts (Disp) (see Table VII).

We find that the correlation between the implied risk premium and a firm's beta is surprisingly weak.[9] In univariate tests, beta is not significantly correlated with the implied risk premium. In multivariate tests, after controlling for B/M (or leverage), firm size, and forecasted growth rate, we do find a positive relation between beta and a firm's implied risk premium. However, this relation disappears once we control for industry membership (Table VII). We conclude that beta is only of limited importance in the market's assessment of a stock's systematic risk.

Finally, we develop a multivariate model for explaining (and predicting) the implied risk premium. We show that a simple model consisting of four variables performs well when explaining cross-sectional variations in sample, and when predicting future risk premium out-of-sample. Specifically, we find that a model combining the book-to-market ratio (B/M), the dispersion in analyst forecasts (Disp), the long-term consensus analyst growth forecast (Ltg), and the industry mean risk premium from the prior year (Indus), has consistent predictive power in explaining cross-sectional variations in the implied risk premium. In year-by-year tests, we find that the implied cost-of-capital predicted from previous year's multivariate regressions consistently explains around 60% of the cross-sectional variation in this year's implied cost-of-capital.[10]

The stability of the multivariate results over time suggests a regression-based cost-of-capital estimation procedure that does not depend on current stock prices. Specifically, ex ante measures of these four variables can be used to generate an "expected" cost-of-capital. The cost-of-capital estimates derived in this manner reflect the large-sample relation between each firm characteristic and the implied cost-of-capital, and are less sensitive to the day-to-day volatility in individual stock prices.

We believe this approach paves the way for an alternative to current methods of estimating cost-of-capital without direct appeal to average realized returns or even the current stock price. In the last section of the paper, we discuss implications of this technique for capital budgeting and investment applications. We also highlight some important caveats and limitations to our approach, and suggest directions for future research.

2. Research Design Issues

2.1 Empirical Asset Pricing Methodology

Most asset pricing models begin by assuming that a linear multi-factor model describes asset returns. For instance, the arbitrage pricing theory (APT) of Ross [1976] assumes the following (we suppress the time subscripts for ease of notation):

$$r_i = a_i + \sum_{j=1}^{N} \beta_{ij} F_j + u_i \tag{1}$$

where r_i is the realized return on asset *i*, F_j , j=1,..N are orthogonal zero-mean systematic risk factors, u_i is the zero-mean idiosyncratic error term, and β_{ij} is asset *i*'s factor loading (beta) with respect to factor F_j.

Given the linear factor structure in (1), and under the *no risk-free arbitrage* condition, the expected return on the risky asset can be expressed as:[11]

$$E(r_i) = \lambda_o + \sum_{j=1}^{N} \beta_{ij} \lambda_j \tag{2}$$

where λ_0 is the expected return on a zero-beta portfolio and λ_j is the factor risk premium corresponding to factor *j*.

Empirical tests of the asset pricing relation in equation (2) generally involve the following steps (see Fama and MacBeth (1973)): (a) identify the systematic risk factors, (b) estimate the factor loadings through time-series regressions, (c) estimate the factor risk premia in equation (2) from cross-sectional regressions of *ex-post* mean returns on estimated factor loadings, and (d) evaluate whether the factors are priced by testing whether factor risk premia are significantly different from zero.

More recently, some researchers have skipped steps (a) and (b). Rather than identifying factor loadings from time-series regressions, these authors assume that the factor loadings are a linear combination of firm characteristics such as beta, firm size, book-to-price, trading volume, etc (see Rosenberg [1974]), Fama [1976] and (Fama and French [1992]). Accordingly, ex post mean returns are directly regressed on these firm characteristics to determine whether the firm characteristics are priced.[12]

We follow a similar approach. However, instead of using ex post mean returns, we use an implied cost-of-capital computed from a discounted residual income valuation model. In the next two subsections, we describe in detail the methodology we use to estimate the implied cost-of-capital.

2.2 The Residual Income Valuation Model

We compute the implied cost-of-capital (equity) for each firm as the internal rate of return that equates the present value of expected future cash flows to the current stock price. This requires forecasting cash flows up to a terminal period and the determination of an appropriate terminal value at the terminal period to capture the value of cash flows beyond the terminal period. We implement this procedure using a version of the discounted cash flow model referred to as the *residual income model*.[13] The residual income model is algebraically equivalent to the familiar dividend discount model, but provides better intuition on the role of economic profits on stock valuation. We now derive the residual income model from the dividend discount model.

According to the dividend discount model, the stock price is the present value of its expected future dividends (free cash flows to equity) based on all currently available information. Thus:

$$P_t = \sum_{i=1}^{\infty} \frac{E_t(D_{t+i})}{(1+r_e)^i} \tag{3}$$

where P_t is the current stock price, $E_t(D_{t+i})$ is the expected future dividends for period $t+i$ conditional on information available at time t, and r_e is the cost of equity capital based on the information set at time t. This definition assumes a flat term-structure of discount rates.

It is not difficult to show that, provided a firm's earnings and book value are forecast in a manner consistent with "clean surplus" accounting,[14] the stock price defined in equation (1) can be rewritten as the reported book value, plus an infinite sum of discounted residual income (economic profits):

$$P_t = B_t + \sum_{i=1}^{\infty} \frac{E_t\left[NI_{t+i} - r_e\, B_{t+i-1}\right]}{(1+r_e)^i}$$

$$= B_t + \sum_{i=1}^{\infty} \frac{E_t\left[(ROE_{t+i} - r_e\,)B_{t+i-1}\right]}{(1+r_e)^i} \qquad (4)$$

where B_t = book value at time t

$E_t[.]$ = expectation based on information available at time t

NI_{t+i} = Net Income for period $t+i$

r_e = cost of equity capital

ROE_{t+i} = the after-tax return on book equity for period $t+i$

This equation is identical to the dividend discount model, but expresses firm value in terms of accounting numbers. Therefore, equation (4) relies on the same theory and is subject to the same theoretical limitations as the dividend discount model.

2.3 Forecast horizons and Terminal values

Equation (4) expresses firm value in terms of an infinite series, but for practical purposes, an explicit forecast period must be specified. This limitation necessitates a "terminal value" estimate -- an estimate of the value of the firm based on the residual income earned after the explicit forecasting period. We use a two-stage approach to estimate the intrinsic value: 1) we forecast earnings explicitly for the next three years, and 2) we forecast earnings beyond year three implicitly, by mean reverting the period $t+3$ ROE to the median industry ROE (described below) by period $t+T$.[15] The mean reversion is achieved through simple linear interpolation between period $t+3$ ROE and the industry median ROE. The mean reversion in ROE attempts to capture the long-term erosion of abnormal ROE over time and the notion that, in the long-run, individual firms tend to become more like their industry peers. We estimate the terminal value beyond period T by computing the present value of period T residual income as a perpetuity. This does not imply that earnings or cash flows do not grow after period T. Rather, it assumes that any incremental economic profits (those from net new investments) after year T are zero. In other words, any growth in earnings or cash flows after year T is value neutral.[16]

We compute the following finite horizon estimate for each firm:[17]

$$P_t = B_t + \frac{FROE_{t+1} - r_e}{(1+r_e)} B_t + \frac{FROE_{t+2} - r_e}{(1+r_e)^2} B_{t+1} + TV \qquad (5)$$

where:

B_t = book value from the most recent financial statement divided by the number of shares outstanding in the current month from I/B/E/S

r_e = the cost of equity (discussed below)

$FROE_{t+i}$ = forecasted ROE for period $t+i$. For the first three years, we compute this variable as $FEPS_{t+i}/B_{t+i-1}$, where $FEPS_{t+i}$ is the I/B/E/S mean forecasted EPS for year $t+i$ and B_{t+i-1} is the book value per share for year $t+i$-1. Beyond the third year, we forecast *FROE* using a linear interpolation to the industry median ROE.

B_{t+i} = $B_{t+i-1} + FEPS_{t+i} - FDPS_{t+i}$, where $FDPS_{t+i}$ is the forecasted dividend per share for year $t+i$, estimated using the current dividend payout ratio (k). Specifically, we assume $FDPS_{t+i}$ = $FEPS_{t+i} * k$.

For any horizon T, The terminal value calculation is given below:

$$TV = \sum_{i=3}^{T-1} \frac{FROE_{t+i} - r_e}{(1+r_e)^i} B_{t+i-1} + \frac{FROE_{t+T} - r_e}{r_e(1+r_e)^{T-1}} B_{t+T-1} \qquad (6)$$

For the results reported in this paper, we forecast earnings up to 12 future years and estimate a terminal value TV for cash flows beyond year 12 (T=12). However, we have also computed implied cost-of-capital using T=6, 9, 15, 18 or 21 and the cross-sectional results are very similar. To compute a target industry ROE, we group all stocks into the same 48 industry classifications as Fama and French (1997). The industry target ROE is a moving median of past ROEs from all firms in the same industry. We exclude loss firms on the basis that the population of profitable firms better reflects long-term industry equilibrium rates of returns. We use at least five years, and up to ten years, of past data to compute this median.[18]

2.4 Explicit Earnings Forecasts

We use data from I/B/E/S to obtain earnings forecasts for the next three years. I/B/E/S analysts supply a one-year-ahead ($FEPS_{t+1}$) and a two-year-ahead

($FEPS_{t+2}$) EPS forecast, as well as an estimate of the long-term growth rate (*Ltg*). We use the mean one- and two-year-ahead EPS forecasts ($FEPS_{t+1}$ and $FEPS_{t+2}$). In addition, we use the long-term growth rate to compute a three-year-ahead earnings forecast: $FEPS_{t+3} = FEPS_{t+2}\ (1+ Ltg)$.[19] These earnings forecasts, combined with the dividend payout ratio, allow us to generate explicit forecasts of future book values and ROEs, using clean-surplus accounting.

2.5 Matching book value to I/B/E/S forecasts

I/B/E/S provides monthly consensus forecasts as of the third Thursday of each month. To ensure their forecasts are current, I/B/E/S "updates" (that is, "rolls forward" by one year) the fiscal year-end of all their forecasts in the month that the actual annual earnings are announced. For example, a December year-end firm may announce its annual earnings in the second week of February. In response to the announcement, I/B/E/S forecasts for that month will be moved to the next fiscal year. This ensures that the one-year-ahead forecast is always available for the next unannounced fiscal year-end.

A particular problem arises when I/B/E/S has updated its forecast, but the company has not yet released its annual report. Because earnings announcements precede the release of financial statements, book value of equity for the fiscal year just ended may not be available when I/B/E/S updates its forecasting year-end.

To ensure that our value estimates are based only on publicly available information, we create a synthetic book value using the clean surplus relation. Specifically, from the month of the earnings announcement until four months after the fiscal year end, we estimate the new book value using book value data for year t-1 plus earnings minus dividends ($B_t = B_{t-1} + EPS_t - D_t$). From the fourth month after the fiscal year end until the following year's earnings forecast is made, we use the actual reported book value from Compustat.

2.6 Dividend payout ratios

To compute future book values or free cash flows, the model calls for an estimate of the expected proportion of earnings to be paid out in (net) dividends. We estimate this ratio by dividing actual dividends from the most recent fiscal year by earnings over the same time period. We exclude share repurchases due to the practical problems associated with determining the likelihood of their recurrence in future periods (we have more to say on the consequences of such simplifying assumptions in Section 4.3). For firms experiencing negative earnings, we divide the dividends paid by (0.06*total assets) to derive an estimate of the payout ratio.[20] We assign payout ratios of less than zero (greater than one) a value of zero (one). We compute future book values using the dividend payout ratio and earnings forecasts as follows: $B_{t+1} = B_t + NI_{t+1} (1 - k)$, where k is the dividend payout ratio.

2.7 Examples

Appendices A and B provide a more detailed illustration of the valuation model for two firms. We deliberately chose two firms with strikingly different implied cost of equity. The computation in Appendix A shows that as of November 30th, 1995, the market used a discount rate of 13.94% for General Motors (GM). Conversely, Appendix B shows that the market used a discount rate of 7.12% for Johnson and Johnson (JNJ). At the time of this example, the yield on 10-year government bonds was 6.19%. Hence the implied risk premium for GM was 7.75% while the corresponding risk premium for JNJ was 0.93%. Historically, the implied risk premium for pharmaceuticals has always been much lower than for automotive stocks. For example, Table II shows that the average risk premium for pharmaceuticals ("Drugs") is only 1.75%, while it is 4.31% for automotive stocks.

3. Data and Sample Description

Our sample of firms consists of all U.S. companies (excluding ADRs) at the intersection of (a) the NYSE and AMEX return files from the Center for Research in Security Prices (CRSP) and (b) a merged COMPUSTAT annual industrial file, including PST, full coverage and research files. We require firms to have book values, earnings, dividends, and long-term debt in COMPUSTAT and have the necessary CRSP stock prices, trading volume, and shares outstanding information. Furthermore, we require firms to have a one-year-ahead and a two-years-ahead earnings-per-share (EPS) forecast from I/B/E/S. The I/B/E/S availability requirement limits our sample time period to 1979-95. The total number of firms in the sample varies from around 1,000 in 1979 to around 1,300 in 1995. The number of firms for which an implied risk premium can be calculated each year is reported in Table 1.

We estimate the IRR for each firm at the end of June each year by substituting the forecasted future earnings, book values, and terminal values into equation (5) and solving the resulting non-linear equation. We then subtract the end-of-month yield on long-term (10-year) Treasury bonds from the IRR measure to obtain an (annualized) implied risk premium for each firm in the sample.

In the following subsections, we describe the various risk and firm characteristics that we use in our cross-sectional analysis. We use 14 firm characteristics, which we group into five categories: 1) market volatility, 2) leverage, 3) liquidity and information environment, 4) earnings variability, and 5) other pricing anomalies. We compute all firm characteristics based on data available prior to June 30 of each year.

3.1 Market Volatility

The Capital Asset Pricing Model (CAPM) suggests a stock's market beta should be positively correlated with its cost-of-equity. Some prior studies also suggest a positive relation between a firm's future returns and the standard deviation of its returns (e.g., Malkiel [1997]). We estimate the market beta of each stock based on a five-year rolling regression using monthly data and the value-weighted CRSP (NYSE/AMEX) index as the market proxy. We compute the standard deviation from previous year's daily returns.

3.2 Financial Leverage

In theory, a firm's cost-of-equity should be an increasing function of the amount of debt in its capital structure (see Modigliani and Miller [1958]). Using an extensive set of historical returns, Fama and French [1992] document a positive relation between market leverage and ex post mean stock returns. However, the relation between leverage and implied risk premia has not been examined. We use two measures of firm leverage: 1) book leverage, D/B, the ratio of total long-term debt to total book value of equity from the most recent fiscal year end, and 2) market leverage, D/M, the ratio of total long-term debt from the last fiscal year end to the total market value of equity as of the portfolio formation date. Modigliani and Miller (1958) nominates market leverage, not book leverage.

3.3 Information Environment and Liquidity

We hypothesize that the risk of investing in a firm increases when information about the firm is more difficult to obtain. Because information is more available for larger firms than for smaller firms, firm size (market capitalization of equity) could be used as one proxy for the availability of information.[21] In addition, Brennan, Jegadeesh and Swaminathan [1993] report that stocks with greater analyst coverage react faster to market-wide common information compared to those with less analyst coverage. Therefore, we use number of analysts as another proxy of availability of information. Specifically, we expect larger firms and firms with greater analyst coverage to have a lower cost-of-capital.

Amihud and Mendelson [1986] suggest that cross-sectional differences in liquidity affect expected returns. The existing literature suggests several possible proxies for liquidity. Brennan and Subrahmanyam [1995] document that stocks with greater analyst coverage are more liquid. Also, smaller firms are generally more illiquid. Thus, size and number of analysts, which were included as proxies of information availability, may also proxy for illiquidity. In addition, Brennan, Chordia, and Subrahmanyam [1998] show that average dollar trading volume is negatively correlated with future returns and report that the size effect is attenuated in the presence of this trading volume measure.[22] Therefore, we include average dollar trading volume as a direct proxy of liquidity. The inclusion of dollar trading volume is likely to help clarify the role of firm size and number of analysts as proxies of information availability. We expect stocks with high trading volume to have lower cost-of-capital.

3.4 Earnings Variability

Financial practitioners often regard the variability of reported earnings as a source of risk for firm valuation (e.g., Madden [1998]). In addition, earnings variability is likely to capture fundamental cash flow risk. However, we know of no large sample academic study relating earnings variability to cost-of-capital. Our goal is to examine the extent to which such a relation exists. We use three empirical constructs to capture the variability of a firm's earning stream:

a) *MAE of Forecasts* – the average mean absolute error of the last five annual I/B/E/S consensus forecasts. To compute this number, we take the absolute value of the difference between the mean FY1 estimate and the realized earnings (from I/B/E/S) for each of the past five years. We average these absolute errors, and divide the average by the average earnings per share over the past five years. This variable captures a firm's proclivity to report earnings that surprise the analysts.

b) *Earnings Variability* – this number is the coefficient of variation of annual earnings over the past five years. It is computed as the standard deviation of annual earnings, divided by the mean over the past five years.

c) *Dispersion of Analyst Forecasts* – this is the coefficient of variation of the current FY1 forecast as of the June statistical period. It captures the dispersion of analyst earnings forecasts for the current fiscal year.

3.5 Market Anomaly Variables

We also include four variables that have been associated with cross-sectional realized returns in prior studies. These variables are not nominated by risk theory, but may nevertheless be important in implied cost-of-capital estimations. The variables are:

a) *Long Term Growth in Earnings (Ltg)* – this variable is the mean long-term earnings growth rate from I/B/E/S, if available.[23] We include this variable for two reasons. First, La Porta (1996) show that high (low) Ltg firms earn lower (higher) subsequent returns. He attributes this to analyst over-optimism in the higher Ltg firms. If high (low) Ltg firms tend to have optimistic (pessimistic) earnings forecasts and hence stock prices that are too high (low), we expect these firms to have *abnormally* low implied risk premium. Secondly, if our valuation model understates the expected cash flows of growth (high Ltg) firms, these firms will appear to have (abnormally) lower implied discount rates. These effects would lead to a negative relation between Ltg and the implied risk premium.

b) *Book/Market (B/M)* – Prior research (see Fama and French [1992] and Lakonishok, Shleifer, and Vishny [1994]) has shown that high B/M firms earn higher ex post returns than low B/M firms. If stocks with high B/M ratios are under valued these stocks should earn an *abnormally* high implied risk premium until the mispricing is corrected. On the other hand if these stocks face high systematic risk as suggested by Fama and French [1992] and Berk, Green, and Naik [1999], these stocks should earn an appropriately high risk premium. It is difficult if not impossible to empirically disentangle the two interpretations.[24]

c) *Price Momentum* – This variable is defined as a stock's past six-month return and is based on the Jegadeesh and Titman [1993] price momentum effect. Specifically, they find that past winners (ranked on the basis of returns over the past 3 to 12 months) earn substantially higher returns than past losers over the next 3 to 12 months. Fama and French [1996] find that their three-factor risk model cannot explain this phenomenon. However, if this variable is a risk proxy, high momentum stocks (stocks with higher past realized returns) should also have high implied risk premia.

d) *Turnover* – Lee and Swaminathan [2000] find that average daily turnover (defined as daily shares traded divided by daily shares outstanding) provides information on the level of investor neglect or attention in a stock and, therefore, on whether a stock is undervalued or overvalued. Unlike average dollar trading volume, the average daily turnover is not highly correlated with firm size (11.5% rank correlation). If average daily turnover is a risk proxy, high turnover firms (i.e. firm that earn lower subsequent realized returns) should have lower ex ante implied risk premia.

Should any of these *mispricing* variables be included in the estimation of cost-of-capital? That depends (a) on one's view of the *risk* versus *mispricing* debate (see Fama and French [1992, 1993, 1996]), and (b) on the time it takes for any mispricing to be corrected (see Stein [1996]). If the mispricing corrects over relatively short-horizons (compared to the life of a capital budgeting project), the variable should probably be excluded in the estimation of cost-of-capital. On the other hand, if the mispricing is unlikely to be corrected during the life of the project, it seems sensible to include the mispricing variable in estimating the cost-of-capital. In our regressions below, we include B/M as a predictor variable mainly because of the possibility that it is a risk proxy, but also because of evidence that the B/M effect has a relatively long reversion horizon (see Frankel and Lee [1998]).

3.6 Preliminary Statistics

Table I reports the median and mean (equal-weighted) implied risk premium for each year from 1979 to 1995. We also report annual excess returns earned by an equal weighted portfolio of all stocks in the sample for comparison. The number of firms each year varies from 1018 to 1333. Recall that the implied risk premium is the IRR that equates the value from the residual income model to the June 30th stock price, minus the ex ante yield on the 10-year treasury bond on June 30th. This number is not cumulative, and reflects market expectations as of June 30th each year.

The average annual excess return (ex post risk premium) over 1979-95 is 6.2% for the stocks in our sample. In contrast, the average implied risk premium the risk premium on the market, $E(r_m - r_f)$, over the same time period is between 2% and 3% depending on whether we are averaging cross-sectional means or medians. These results confirm the Claus and Thomas [1998] finding that the implied risk premium for the market is significantly lower than the estimate obtained from ex post returns.

Is the average market risk premium in the range of 2% to 3% too low, too high, or just right? The answer to this question depends on one's priors. For instance, Ibbotson Associates [1999] argue that the market risk premium (estimated from ex-post returns during 1926-1998) is in the range of 7% to 8%. In contrast, Siegel [1999] argues that the market risk premium (based on historical returns from 1802-1998) should be in the range of 2% to 4%.

The objective of this paper is to explain cross-sectional variation in risk premia, not the level of the aggregate market risk premium. Therefore, we do not take a view on whether the aggregate market risk premium should be 3%, 5%, or 7%. We provide guidance on how much higher (or lower) an asset's risk premium should be relative to the market risk premium. In actual implementation, readers can choose their own market risk premium (based on their priors) and make an upward or downward adjustment for their asset or portfolio based on our results.

4. Empirical Results

In this section, we discuss the key empirical findings of the paper. There are three sets of results: (a) variation in implied risk premium across industries, (b) univariate tests of the correlation between ex ante firm characteristics and the implied risk premium, and (c) multivariate tests of the cross-sectional relationship between ex ante firm characteristics and the implied risk premium.

4.1 Industry Risk Premia

Table II reports implied risk premia for the 48 industry groups classified by Fama and French (1997). We compute equal-weighted average risk premium for each industry group each year, and then average the annual cross-sectional means over time to produce a final number. For comparison, we also provide the risk premium computed from historical returns over 1979-1995 for each industry group. In addition, we report the time-series standard error of the mean, which is useful for constructing confidence intervals around the mean. The implied industry risk premia are presented in descending order in Table II.

In Table II, the 5 industries with the highest (mean) implied risk premia are *Recreational Products (Toys), Tobacco Products (Smoke), Banks, Computers (Comps),* and *Automobile and Truck (Autos)* industries. Investors demanded risk premia of 8.38%, 7.90%, 6.27%, 5.70%, and 4.31% for these industries. The 5 industries with the lowest implied risk premia are *Real Estate (RlEst), Precious Metals (Gold), Agriculture (Agric), Trading (Fin),* and *Medical Equipment (MedEq)* industries. Investors demanded –2.79%, -0.73%, 0.08%, 0.31%, and 0.82% risk premia for these industries. The average implied risk premium across all industries was 2.50% during this time period. In comparison, the average risk premium based on ex post mean returns over this period is 7.16%.

Table II also reports industry risk premia measured relative to that of the market as a whole, where the market risk premia is an average of all the individual stock risk premia for a given year. The relative risk premia allow us to compute an industry risk premium given an estimate of current market risk premium. This two-stage technique, used by some practitioners, takes into account intertemporal variation in the overall market risk premium. For our purpose, it also abstracts from the debate on the level of market risk premium and focuses on cross-sectional variation in industry risk premia.

If market prices reflect fundamental value, on average, the implied cost-of-capital and ex post realized returns should be positively correlated. The evidence in Frankel and Lee [1998] and Dechow et al. [1999] suggests such a relation.[25] Table III provides direct evidence for our sample. Panel A reports the average implied and historical risk premium for firms sorted into quintiles on the basis of their implied risk premium as of June 30th of each year. This panel shows that firms with higher implied risk premium (Q5) earn higher average realized returns over each of the next three years than firms with lower implied risk premium (Q1). As in Frankel and Lee, the effect is stronger over longer horizons (i.e., in Year 2 and Year 3). The effect is generally monotonic across the quintiles, even though the t-statistics are marginal in significance.

Panel B reports the results of a simple regression of average realized returns on the implied cost-of-capital across the 48 industry portfolios. At the industry level, we find a significantly positive slope coefficient of 0.87, with an r-squared of 12%.[26] However, these results are sensitive to outliers: removing the tobacco industry results in a positive but statistically insignificant slope estimate of only 0.31. The main problem appears to be a lack of power. Mean realized returns should probably be measured over longer horizons. But if we use, say, a ten-year horizon, we would have at most two independent observations. Alternatively, if average realized returns are a poor measure of expected returns (as suggested by Elton [1999]) these weak correlations are not surprising.

4.2 Univariate Tests

Table IV reports results of the univariate relationship between various risk and firm characteristics and the implied risk premium. Specifically, we form five portfolios (quintiles) as of June 30 each year based on each firm characteristic and compute the mean and median implied risk premium for firms in each portfolio. To minimize spurious correlation between these characteristics and the dependent variable, we measure the implied risk premium as of June 30 next year. Thus, there is a one-year gap between firm characteristics and the implied risk premium. We compute the ex post excess returns for a 12-month period following the portfolio formation date, i.e., July 1 to June 30 next year. We then compute a time-series average of cross-sectional means and medians and report a Newey-West [1987], autocorrelation corrected, t-statistic for the difference in risk premia across the two extreme portfolios, Q1 and Q5.

Panel A presents results for market beta and standard deviation of daily returns. The results indicate that market beta is not positively correlated with the implied risk premium. In fact there seems to be an inverse relationship between beta and the implied risk premium. The results regarding standard deviation of daily returns are similar. The univariate tests reject CAPM and show that the market beta alone cannot explain the cross-sectional variation in implied risk premia. On the other hand as we show in Section 4.3, in multivariate tests there is a significant positive relationship between beta and the implied risk premium, which suggests that there may be a role for beta in a multi-factor world.

Panel B presents evidence on the relation between financial leverage and the implied risk premium. The book leverage measure, D/B, and the market leverage measure, D/M, both exhibit a significant positive correlation with the implied risk premium, although the correlation between market leverage and the implied risk premium is much stronger. The difference in median risk premia between Q1 and Q5 firms is 1.18% per annum for book leverage and 2.66% per annum for market leverage. These differences are both economically and statistically significant and suggest that investors demand high risk premia for firms with high leverage. These results are consistent with the predictions of Modigliani and Miller [1958] that cost-of-equity should increase with financial leverage.

Panel C summarizes evidence on information and liquidity variables. As expected, large firms, firms followed by more analysts, and firms with higher dollar trading volume, all have a lower implied risk premium. The difference in medians between Q5 and Q1 for number of analysts, dollar trading volume, and firm size are -0.71%, -0.70%, and -1.31% per annum. These differences are statistically significant. The differences in average realized returns between Q5 and Q1 have the right sign and are also comparable in magnitude (-1.79%, -3.77%, and –1.96%). However, they are not statistically significant. This result again highlights the lack of power inherent in tests based on realized returns.

Panel D reports the cross-sectional relation between the implied risk premium and measures of earnings variability (see section 3.4 for description of the three measures). Results based on all three measures of earnings variability indicate that investors demand a higher risk premium for stocks with higher earnings variability. The difference in median risk premia between the extreme quintiles is around 0.80%. Interestingly, while investors appear to demand a higher risk premium for stocks with greater earnings variability, in general, these stocks earn lower returns ex post. The differences in the realized risk premium (Q5-Q1) for the three measures of earnings variability range from –3.5% to -4.0% per year, although they not statistically distinguishable from zero. Taken together, this evidence suggests that the market's ex ante expectations of high returns for high earnings variability firms are not realized ex post.

Panel E presents evidence with respect to other pricing anomalies. As expected, we find that the implied risk premia for low B/M stocks and high long-term growth stocks are lower. These results are not surprising given prior findings on the average realized returns associated with these variables. However, we find that stocks with higher recent price momentum also have lower cost-of-capital. This is more difficult to explain in a risk context, because higher momentum stocks have higher realized returns. The difference in implied risk premia across extreme quintiles (Q5-Q1) is significant for all three characteristics.

By far the biggest difference in implied risk premium is found across high and low B/M stocks with a difference in median of 4.32% per annum. On the other hand, the difference in realized risk premium across high and low B/M stocks is only 2.40%. This is probably because the bulk of the returns for book-to-market strategies are earned in years 2 and 3 after the portfolio formation. The difference in implied risk premia for price momentum is –0.38% per annum while the difference in ex post risk premia for price momentum strategies is 7.77%. This difference is mostly due to the fact that there is a 1-year gap between the time the past momentum was measured and the time the implied risk premium is computed (price momentum tends to be a medium-horizon effect, exhausting itself within a year).

The results with respect to the turnover ratio are also interesting. Ex ante, we find a small positive relationship between implied risk premium and turnover. It appears that investors pay only slight attention to differences in turnover across stocks in setting prices. On the other hand, ex post, low turnover (neglected) stocks outperform high turnover (glamour) stocks to the tune of 3.77% per annum. This evidence supports the Lee and Swaminathan [2000] argument that trading volume is unlikely to be a risk proxy.

4.3 Measurement Errors

Empirical implementation of any discounted cash flow valuation model involves simplifying assumptions. The most important of these pertain to earnings forecasts, dividend payout ratios and terminal value calculations. Some of these assumptions may introduce measurement errors in the implied cost-of-capital estimates. Because we use a portfolio approach, idiosyncratic measurement errors should average out. The remaining concern is with measurement errors that are systematically correlated with our explanatory variables.

Of particular concern to us is the possibility of a bias in the cost of capital estimation of growth (versus mature) firms. We assume a fixed 12-year forecast horizon years (accompanied by a terminal value for residual income beyond year 12) for all firms in the sample. If this fixed forecast horizon is too short (long) for growth (mature) firms, we will underestimate implied risk premia for growth firms and overestimate implied risk premia for mature firms. If some of our firm characteristics are correlated with growth, it is possible that the observed empirical relationships are spurious. That is, they are caused by this particular measurement error.

We attempt to deal with the problem in two ways. First, we estimate the implied risk premium using forecast horizons of 6, 9, 15, 18, and 21 years. We find that all results are insensitive to the use of these alternate risk premium measures. Second, we re-perform our tests using portfolios sorted by expected growth. Specifically, for each year, we form five portfolios based on analyst long-term growth estimates, with approximately equal number of firms in each portfolio. Our goal is to reduce the dispersion in long-term growth within each portfolio. We then divide each long-term growth portfolio into five portfolios based on the firm characteristic of interest, for instance firm size. Finally, we compute the difference in risk premia between the largest size portfolio (Q5) and the smallest size portfolio (Q1) within each long-term growth portfolio. We compute mean and median differences (Q5-Q1) for each firm characteristic and report them in Table IV, along with t-statistics to test the significance of the differences.[27]

Our procedures successfully minimize the correlation between long-term growth and each of the firm characteristics within each long-term growth portfolio. We find that within each long-term growth portfolio, the correlation between long-term growth and various firm characteristics is extremely low. The difference in Ltg across the extreme firm characteristic portfolios (Q5-Q1) is less than 0.5% for more than ¾ of the cells in the table. In no case is the difference in Ltg across extreme portfolios more than 2%. Thus, within each Ltg category, the firms in Q5 and Q1 have essentially the same forecasted long-term earnings growth rate.

The results in Table V show that the implied risk premium is significantly related (in the hypothesized direction) to the various firm characteristics (confirming Table IV results) in all but the lowest long-term growth portfolio. For instance, the differences in risk premia between and high and low beta portfolios are positive and significant (at least at the 10% level based on a one-sided test) in all but the lowest long-term growth portfolio. Similar patterns are also found with respect to other firm characteristics. Overall, the evidence in Table V suggests the findings in Table IV are unlikely to be driven by measurement errors alone.

Note also that this measurement error is a problem only if the direction of the potential bias (from the fixed horizon) is the same as the direction of our results. For some of our earlier results, the bias appears to work against our findings. For instance, we find that lower earnings variability is associated with lower risk premia. This could be the result of measurement error only if growth firms generally have lower earnings variability. This strikes us as being unlikely. In the more likely scenario, growth firms have greater earnings variability and greater absolute earnings forecast errors. In that case, the bias would cause our results to be understated.

Two other assumptions in our valuation approach also merit discussion. First, we estimate expected dividend payout rates based on prior years' payout patterns. Others use similar procedures (e.g., Dechow et al. [1999], Frankel and Lee [1998], and Lee, Myers and Swaminathan [1999]). In theory, share repurchases and new equity issues that can be anticipated in advance should also be included in the dividend payout estimate. However, we know of no reliable technique for making these forecasts for large samples. This is a potential area for future research.

Second, we assume that firms' ROEs mean revert toward the median ROE of the industry. Our use of an industry median reflects our desire to capture risk and accounting differences that are more likely to be homogenous within each industry group. However, it might be argued that certain types of firms (e.g., market leaders in well-protected niches) deserve special treatment, and perhaps merit a higher target ROE. Again, we have made no industry or firm level adjustments for the mean reversion in ROE, because we know of no reliable technique for doing so. We highlight this potential problem, and hope future work will lead to improvements in this area.

4.4 Multivariate Regression Tests

The evidence in Tables IV and V focuses on the univariate relationship between the implied risk premium and various firm characteristics. Now, we turn to examining the multivariate relation between the implied risk premia and the various firm characteristics. The multivariate relations provide a better sense of the incremental explanatory power of each firm characteristic, controlling for common effects. Measuring these incremental effects is also more relevant from an asset pricing perspective, because we learn which characteristics are more important in explaining the cross-sectional variation in implied risk premia.

Due to the correlation between firm characteristics, it would be difficult to drawn inferences if all fourteen variables were included in the regression. To derive a more parsimonious model, we first examine their pair-wise correlations. Table VI reports the time-series average of (cross-sectional) Spearman rank correlations computed annually among the various firm characteristics. This table shows a high degree of correlation among firm characteristics within each of the four risk categories that we discussed in Section IV. For instance beta and standard deviation of daily returns have a correlation of 54.2%. The number of analysts, firm size, and dollar trading volume are all highly correlated, with pair-wise rank correlations on the order of 80%-90%. Similarly, the three earnings variability variables also exhibit strong positive correlation with one another. On the other hand, correlations across the risk groups are not as high, implying that each group of firm characteristics contains relatively independent information about the firm.

Based on the correlations in Table VI, we choose the following parsimonious set of firm characteristics: beta, firm size, dispersion in analyst forecasts, consensus analyst forecasts of long-term growth, and the B/M ratio (or book and market financial leverage measures), as explanatory variables in the multiple regression. Our strategy is to select one representative variable from each risk category. The variable selected is based on the strength of its univariate correlation with the implied cost-of-capital. We exclude price momentum and trading volume on the basis that our prior results suggest they are clearly mispricing variables, and on the empirical fact that momentum effects last 12 months or less.

Table VII examines the cross-sectional relation between the implied risk premium and the set of firm characteristics listed above. In Panel A, we use natural log transformations of the explanatory variables to minimize the influence of outliers. In Panel B, we use standardized measures of each characteristic rather than the characteristic itself (except Beta and the Industry Risk Premium). The standardization process is performed in cross-section at a given point in time. It generates a normalized variable with a mean of zero and a standard deviation of one. This procedure allows us to compare the estimated coefficients across different independent variables. We run annual Fama-MacBeth regressions using data from 1979 to 1995. Table VII presents time-series means of the slope coefficients for each firm characteristic, with the corresponding Newey-West autocorrelation adjusted t-statistics reported in parentheses.

Each panel of Table VII reports multiple regression results for four different model specifications. Model 1 involves beta, market leverage (D/M), firm size, dispersion in analyst forecasts (Disp), and the consensus long-term growth estimate (Ltg). Model 2 adds the book-to-market ratio (B/M) to Model 1. As discussed earlier, B/M finds a risk interpretation in Fama and French [1992] and

Berk, Green, and Naik [1999]. Model 3 adds last year's average industry risk premium to Model 2. One way to interpret Model 3 is that this model makes firm-specific adjustments to the industry risk premium to arrive at a firm-specific risk premium. Finally, Model 4 drops the three least important explanatory variables, retaining the remaining four variables.

Table VII shows that B/M is the single most important variable in explaining cross-sectional variations in next year's implied cost-of-capital. The other three variables that play a significant role are the dispersion in analyst forecasts (Disp), the long-term growth estimate (Ltg), and the mean industry implied risk premium (Indus). As in the univariate tests, the market consistently assigns a higher discount rate to firms with higher B/M ratios and a higher average industry risk premium. We observe a sign reversion on the growth variable (Ltg), so that, in the multivariate setting, growth firms are assigned a higher risk premium. Similarly, the sign on the analyst dispersion variable (Disp) also reverses, so that conditional on the other variables, firms with wider analyst dispersion have lower implied costs-of-capital.

Models 2, 3 and 4 have comparable explanatory power -- each can explain close to 60% of the cross-sectional variation in the implied risk premium. Beta and B/M have the expected positive relationship with the implied risk premium. The positive relation between beta and the implied risk premium is somewhat surprising, given the univariate results in table IV. However, beta appears to be an industry-related risk proxy, as it loses statistical significance with the inclusion of the industry measure. Our finding suggests a limited role for beta in a multi-factor framework.

In this multivariate analysis, we find that firm size does not have the expected negative relation with the implied risk premium. The coefficients corresponding to firm size are generally positive, but insignificant. Dispersion of analyst forecasts, on the other hand, is significantly related to the implied risk premium, although with the opposite sign.[28] Controlling for the forecasted growth, firms that have greater disagreement about their earnings seem to command a lower risk premium.[29] Finally, the lagged industry risk premium is significantly positively related to the implied risk premium, suggesting an industry-related risk component even after controlling for the other variables in the regression.

4.5 Large Sample Approach to Estimating Implied Cost-of-capital

In this subsection, we examine whether the implied risk premium estimated from Model 4 regressions can predict the subsequent year's actual implied risk premium. This analysis offers an alternative approach to estimating the implied cost-of-capital; an approach that uses large sample regression results as opposed to the firm-specific IRR approach used thus far. An attractive feature of this approach is that it is less sensitive to the daily price fluctuations of individual firms.

The results are reported in Table VIII. Panel A reports annual cross-sectional regressions based on the Model 4 specification. Panel B reports the findings of the forecasting regressions. The forecasting regressions involve two key steps. First, we use the regression coefficients from Panel A, along with current firm characteristics, to estimate an implied cost-of-capital. Next, we regress next year's implied cost-of-capital on the implied cost-of-capital predicted from this year's regression. For convenience in hypothesis testing, we also report the slope coefficient from regressing the next year's forecast error on this year's implied cost-of-capital. If the forecasts are unbiased, the intercept and the slope coefficient from this regression should be close to zero.

The results in Panel A show that the explanatory power of Model 4 is robust over time, with the adjusted R-square ranging from 38% to 70%. In Panel B, we estimate the regression coefficients in three different ways: (a) we use the coefficients from last year's regression, (b) we use a moving average of last five year's coefficients and (c) we use an average of all prior years' regression coefficients. The results in Panel B are, in general, robust to these different ways of estimating the regression coefficients. These results indicate that he intercepts are close to zero and the slope coefficients are close to 1 (although we cannot reject the null hypothesis that the slope coefficient is 1 only for (a) using coefficients from last year's regression). In other words, the prediction regression does a good job of forecasting next year's implied cost-of-capital. We regard this finding as encouraging, because it suggests a large sample approach to estimating the implied cost-of-capital is viable. We discuss this possibility in the concluding section.

5. Concluding Remarks

In this study, we compute an implied risk premium for a large sample of U. S. firms. More importantly, we provide evidence on the cross-sectional relation between our estimated risk premium and various firm and industry characteristics. We show that the implied risk premium is systematically correlated with several firm and industry characteristics, suggesting an alternative approach to estimating the cost-of-capital. In this section, we clarify some implementation issues, discuss the implications of our findings, and highlight several important caveats.

5.1 Implementation issues

For purposes of firm valuation and stock selection, it would be tautological to estimate the implied cost-of-capital based on current stock prices. Similarly, in capital budgeting decisions, estimating an implied cost-of-capital for the parent firm based on its current stock prices is of very little use, unless the project (or the division) in question has the same systematic risk profile as the parent firm. However, the explanatory power of our regression model in predicting the implied risk premium suggests that it is not necessary to rely on current market prices to compute a cost-of-capital estimate.

Instead of using daily stock prices, a financial analyst (or CFO) can use our regression results to estimate the cost-of-capital. First, the analyst can add the mean excess industry risk premium (in excess of the market risk premium) to the analyst's estimate of the market risk premium to estimate a risk premium for the industry in question. If the analyst wishes to use industry-level estimates, that is all that is required. However, the analyst can alternatively use the regression-based approach to make firm-specific adjustments. Relevant characteristics of a given firm can be combined with an industry mean estimate to derive a firm-specific estimate of the implied cost-of-capital. The coefficients reported in our regressions offer a starting point for making these estimates.

Notice that the estimation approach we recommend does not depend on either a firm's average realized returns, or its current market price. Rather, our approach exploits the long-term cross-sectional relation between the implied risk premium and a small set of explanatory variables. Specifically, we recommend estimating a firm's expected cost-of-capital based on the mean implied risk premium of its industry from the prior year (Indus), its current B/M ratio, its forecasted growth rate (Ltg), and the dispersion in its analyst forecasts (Disp). Our results show that these four variables capture most of the cross-sectional variation in the implied cost-of-capital.

The cost-of-capital estimates derived from this procedure reflect the market's assessment of a firm's risk. Our reasoning is that if the market has consistently ascribed a higher (or lower) discount rate to certain firms or industries, chances are it will continue to do so in the future. Therefore, it is sensible to use this information in discounting a firm's current cash flows. It is possible that some of the predictive power of our regression comes from measurement errors, or idiosyncrasies, of our valuation model. Even so, if we continue to use the same RIM valuation model in the future, it is sensible to adjust today's cost-of-capital to reflect the market's long-term assessment of a firm's risk level.[30]

5.2 Caveats and potential concerns

One concern some readers may have is that some of our explanatory variables are associated with market pricing anomalies. These variables are not nominated by risk theory, per se, but prior empirical studies have found them to be correlated with average realized returns. For example, the B/M ratio (Fama and French [1992]) and the long-term analyst forecasted growth rate (Ltg) (La Porta [1996]) have both been shown to predict average realized returns. It is reasonable to question our rational for using variables in cost-of-capital estimations that may be indicators of market mispricings.

As argued by Stein [1996], these variables can be relevant in cost-of-capital analyses even if they represent market *mispricing* rather than *risk factors*, provided that the eventual market correction takes place over relatively long horizons. In other words, even if market prices are not fully rational, rational capital budgeting may call for inclusion of these variables in estimating the cost-of-capital, because the mispricing may not correct over finite horizons (see Section 3.5 for more discussion).

It is important to highlight some of the limitations of our approach. Most of these arise from the valuation model assumptions we have made. Any finite horizon implementation of the discounted cash flow model involves simplifying assumptions.

First, the risk premia of growth (mature) firms may be biased downwards (upwards). Second, the procedure we have followed for estimating the dividend payout ratio may understate the actual payout rate of firms with persistent share repurchase plans. Third, our (17-year) study period may not be long enough for us to conclude with confidence that the correlations detailed in the paper will continue to hold in the future. Finally, as discussed above, some of the variables used in our study have a joint risk/mispricing interpretation.

In sum, it is important for the reader to recognize the possibility that our cost-of-capital estimates contain significant measurement errors. These potential measurement errors, and our efforts to contain them, are discussed in Section 4.3. We also expect, and encourage, future research to improve on our valuation methodology and further reduce the remaining errors.

5.3 Implications

The current procedures for cost-of-capital estimation advocated in standard finance textbooks have yielded few useful guidelines for finance professionals. Despite the caveats and limitations discussed above, we believe the approach outlined here holds much more promise. In this concluding section, we discuss implications of these results for corporate managers, investment professionals, and capital market researchers.

For capital budgeting applications, a manager can compute the implied cost-of-capital for one or more *pure-play* firms that are comparable to the project or division being evaluated, and use the mean/median implied cost-of-capital of these firms for that project or division. In these applications, we leave the decision on the level of market risk premium to the manager (or corporate headquarters). The approaches detailed above can also, of course, be used to estimate cost-of-capital for non-traded firms.

For quantitative investors, our results suggest that the simple value-to-price (V/P) stock selection strategy (e.g., see Frankel and Lee [1998], or Dechow et al. [1999]) can be improved on by incorporating the four variables in our regression model. These prior studies show that cross-sectional adjustments for beta and the three Fama-French [1993] risk factors do not improve the predictive power of V/P. However, our results suggest firms in higher risk industries (Table II), as well as firms with higher leverage (or B/M ratio), higher growth rates, and lower dispersion in forecasted earnings, should be accorded higher discount rates in RIM valuation.

Our results suggest that these firm characteristics are useful in isolating stocks whose P/V ratios will not revert over the next two years. Using these variables, an investor can compute an "expected" cost-of-capital for each firm and compare it to the “actual” implied cost-of-capital based on current stock prices. A trading strategy based on the “spread” between the expected and actual measures should have superior predictive power for future returns, because it is better at isolating short-term mispricings that corrects over the next two years. Our research plans include testing such a strategy.

Finally, our results have implications for at least two other branches of academic research. First, researchers interested in the relation between disclosure policies and cost-of-capital may find our procedures useful in their research design. Specifically, our results suggest several cross-sectional determinants of a firm’s implied cost-of-capital that should be considered in future studies that call for a cost-of-capital estimate. Second, our results are relevant for researchers who examine the correlation between market prices (or returns), and accounting numbers. Specifically, our findings suggest several cost-of-capital proxies that should be included in the right-hand-side of price level regressions. If these variables are omitted, the price level regression model may be misspecified.

In conclusion, we regard this study as a first step toward estimating an implied cost-of-capital. Our goal is to demonstrate the feasibility of an alternate technique that does not depend on average realized returns, or even a firm’s current stock price. We recognize the limitations of our current effort. Our hope, and expectation, is that future researchers will build on the work we have done, and produce even more useful estimates of the cost-of-capital.

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Appendix A: General Motors

This appendix provides an example of the implicit rate calculation for General Motors (GM) as of November 30th, 1995. Key parameters of the model are the analysts' mean EPS forecasts for the next two years ($6.75 and $7.73), the mean expected long-term growth rate (Ltg=7.3%), the dividend payout ratio (19.6%), and the target ROE for the industry (16%). To compute the implied discount rate, we adjust this parameter until the implied price is equal to the current market price ($48.50). The process yields a current cost-of-equity for GM of 13.94%.

GM	**PARAMETERS**	**FY1**	**FY2**	**Ltg**	
as of	**EPS Forecasts**	6.75	7.73	7.30%	**(using the mean analyst forecast)**
Nov. 30, 1995	**Book value/share (last fye)**	17.01			
	Discount Rate	13.94%			
	Dividend Payout Ratio	0.196			
	Target ROE (industry avg.)	0.1600			

	Year	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
	Long-term EPS Growth Rate (Ltg)			0.0730									
	Forecasted EPS	6.75	7.73	8.29									
	Beg. of year BV/Shr	17.01	22.437	28.652									
	Implied ROE		0.34452	0.2895									
ROE	(Beg. ROE, from the DCF model)	0.397	0.345	0.289	0.275	0.261	0.246	0.232	0.218	0.203	0.189	0.174	0.160
Abnormal ROE	(ROE-r)	0.257	0.205	0.150	0.136	0.121	0.107	0.093	0.078	0.064	0.049	0.035	0.021
growth rate for B	(1-k)*(ROEt-1)	0.000	0.319	0.277	0.233	0.221	0.210	0.198	0.186	0.175	0.163	0.152	0.140
Compounded growth		1.000	1.319	1.684	2.076	2.536	3.067	3.675	4.360	5.123	5.959	6.864	7.826
growth*AROE		0.257	0.271	0.253	0.282	0.308	0.328	0.340	0.341	0.327	0.294	0.240	0.161
discount rate		1.139	1.298	1.479	1.685	1.920	2.188	2.493	2.841	3.237	3.688	4.202	4.788
Add to P/B	PV(growth*AROE)	0.23	0.21	0.17	0.17	0.16	0.15	0.14	0.12	0.10	0.08	0.06	0.03
Cum P/B		1.23	1.43	1.61	1.77	1.93	2.08	2.22	2.34	2.44	2.52	2.58	2.61
Add: Perpetuity beyond current year (assume this yr's AROE forever)		1.62	1.49	1.23	1.20	1.15	1.07	0.98	0.86	0.72	0.57	0.41	0.24
Total P/B	(P/B if we stop est. this period)	2.85	2.93	2.83	2.97	3.08	3.16	3.20	3.20	3.16	3.09	2.99	2.85
Implied price													**48.50**

Appendix B: Johnson and Johnson

This appendix provides an example of the implicit rate calculation for Johnson and Johnson (JNJ) as of November 30th, 1995. Key parameters of the model are the analysts' mean EPS forecasts for the next two years ($3.68 and $4.18), the mean expected long-term growth rate (Ltg=12.53%), the dividend payout ratio (36.2%), and the target ROE for the industry (18%). To compute the implied discount rate, we adjust this parameter until the implied price is equal to the current market price ($86.63). The process yields a current cost-of-equity of 7.12%.

JNJ	**PARAMETERS**	**FY1**	**FY2**	**Ltg**	
as of	**EPS Forecasts**	3.68	4.18	12.53%	**(using the mean analyst forecast)**
Nov. 30, 1995	**Book value/share (last fye)**	11.08			
	Discount Rate	7.12%			
	Dividend Payout Ratio	0.362			
	Target ROE (industry avg.)	0.1800			

	Year	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
	Long-term EPS Growth Rate (Ltg)			0.1253									
	Forecasted EPS	3.68	4.18	4.70									
	Beg. of year BV/Shr	11.08	13.42637	16.092									
	Implied ROE		0.311328	0.2923									
ROE	(Beg. ROE, from the DCF model)	0.332	0.311	0.292	0.280	0.267	0.255	0.242	0.230	0.217	0.205	0.192	0.180
Abnormal ROE	(ROE-r)	0.261	0.240	0.221	0.209	0.196	0.184	0.171	0.159	0.146	0.134	0.121	0.109
growth rate for B	(1-k)*(ROEt-1)	0.000	0.212	0.199	0.186	0.178	0.170	0.163	0.155	0.147	0.139	0.131	0.123
Compounded growth		1.000	1.212	1.452	1.723	2.030	2.377	2.763	3.190	3.657	4.164	4.709	5.286
growth*AROE		0.261	0.291	0.321	0.360	0.398	0.437	0.473	0.506	0.535	0.557	0.571	0.575
discount rate		1.071	1.147	1.229	1.317	1.410	1.511	1.618	1.733	1.857	1.989	2.130	2.282
Add to P/B	PV(growth*AROE)	0.24	0.25	0.26	0.27	0.28	0.29	0.29	0.29	0.29	0.28	0.27	0.25
Cum P/B		1.24	1.50	1.76	2.03	2.31	2.60	2.90	3.19	3.48	3.76	4.02	4.28
Add: Perpetuity beyond current year (assume this yr's AROE forever)		3.42	3.56	3.67	3.84	3.97	4.06	4.11	4.10	4.05	3.94	3.77	3.54
Total P/B	(P/B if we stop est. this period)	4.67	5.06	5.43	5.87	6.28	6.66	7.00	7.29	7.52	7.69	7.79	7.82
Implied price													**86.63**

[1] We include in this literature the extensive work done on testing the CAPM and APT models (see Fama [1991]), as well as recent work by Fama and French [1992] using an "empirically inspired" three-factor model.

[2] However, ex post mean returns need not necessarily reflect ex ante expected returns even in an efficient market. As Miller [1977] argues, in a market with heterogeneous expectations and short-selling constraints, ex post mean returns tend to reflect the expectations of a minority of investors who are most optimistic about a stock rather than the ex ante expectations of the average investor.

[3] The residual income or economic profit model is algebraically equivalent to the dividend discount model in infinite horizons. As discussed later, we employ this model because it suggests a new method for estimating long-term earnings, using a return-on-equity (ROE) mean-reversion toward the industry median.

[4] To be exact, we compute an implied risk premium, which is the difference between the implied cost-of-capital and the nominal risk-free rate. Our tests are based on the implied risk premium rather than on the total cost-of-capital.

[5] A survey of practitioner-oriented publications reveal a number of references to implied cost-of-capital estimates. For example, Madden [1998], Damodaran [1994], Ibbotson [1996], Gordon and Gordon [1997], Pratt [1998]. Most of these sources use a either a Gordon constant-growth model or a multi-stage dividend discount model. Madden (1998) uses a CFROI-based model, which is closest in spirit to our valuation model.

[6] Two exceptions are Botosan [1997] and Claus and Thomas [1998]. Botosan investigates the relationship between corporate disclosure and the implied cost-of-capital. Claus and Thomas examine the aggregate market risk premium implied by the valuation model. We discuss how our work relates to theirs in more detail later.

[7] In his presidential address to the American Finance Association, Elton [1999] offers a concise summary of the problems associated with using average realized returns as a proxy for expected returns. He concludes his address with a call for alternative approaches to measuring expected returns.

[8] Similar to Claus and Thomas, we find an implied market risk premium of around 2 to 3%. Much controversy in the finance literature focuses on what the appropriate aggregate market risk premium should be (see Siegel [1999]). However, the purpose of this study is not to explain the level of aggregate market risk premium, and we do not take a view on this debate. Rather, we focus on explaining cross-sectional variations in risk premia. Our goal is to offer guidance on how much more (or less) the risk premium on a stock should be, given a market risk premium.

[9] Botosan includes beta as a control variable in her study of the effect of accounting disclosure policies on the cost-of-capital. She reports a positive relation between beta and the implied risk premium. However, her sample is limited to 122 firms in a single year (1990). Our most restricted sample includes more than 10,000 firm-years.

[10] Specifically, we estimate the multivariate regression using data up to year ‘ t’ and then use the regression coefficients along with firm characteristics from year ‘t’ to forecast the implied risk premium for year ‘t+1’. Then, we examine the cross-sectional relationship between the forecasted implied risk premium and the actual implied risk premium for year ‘t+1’ using regression tests.

[11] This is the unconditional version of APT. The conditional version is similar except that all the expectations, factor loadings and risk premia are conditional on current period’s information set. If there is a risk-free asset in the economy then λ_0 is the return on this asset, i.e., $\lambda_0=r_f$.

[12] Fama and French [1992] use this approach to investigate the ability of firm characteristics (such as size, book-to-market, leverage, and beta) to explain cross-sectional differences in subsequent realized returns. They find that a two-characteristic model involving firm size and book-to-market ratio is sufficient to explain the cross-section of U.S. stock returns.

[13] The model is sometimes referred to as the Edwards-Bell-Ohlson (EBO) valuation equation. Recent implementations of this formula are most often associated with the theoretical work of Ohlson [1991, 1992, 1995] and Feltham and Ohlson [1995]. Earlier theoretical treatments can be found in Preinreich [1938], Edwards and Bell [1961], and Peasnell [1982]. Recent papers that empirically implement the residual income model include Bernard [1994], Abarbanell and Bernard [1995], Penman and Sougiannis [1997], Frankel and Lee [1998, 1999], Lee, Myers and Swaminathan [1999] and Dechow et al. [1999]. See Lee [1999] for a recent survey of this literature.

[14] Clean surplus accounting requires that all gains and losses affecting book value be included in earnings; that is, the change in book value from period to period is equal to earnings minus net dividends ($b_t = b_{t-1} + NI_t - D_t$).

[15] Rates of mean reversion are likely to be industry specific. However, we are aware of no empirically implementable approaches to estimating rates of mean reversion across industries. Attempts to do so are likely to introduce measurement errors in the process. On the other hand, imposing constant mean reversion rates is also likely to introduce measurement errors in the computation of implied cost-of-capital. We address the measurement errors that are likely to arise from this assumption in detail in Section 5.3.

[16] As a result, the overall ROE for the entire firm (not the ROE on new investments) declines slowly over time to the cost of equity.

[17] The equation for *T*=3 can be re-expressed as the sum of the discounted dividends for two years and a discounted perpetuity of period-3 earnings, thus eliminating the need for the current book value in the formulation.

[18] We use the median to control for the influence of outliers. However, using means instead of medians does not change the results appreciably. The file of industry median ROEs we used is available upon request.

[19]Prior to 1981, I/B/E/S does not report *Ltg*. When this variable is missing, we use the composite growth rate implicit in FY1 and FY2 to forecast FY3.

[20] The long-run return-on-total assets in the United States is approximately six percent. Hence we use six percent of total assets as a proxy for normal earnings levels when current earnings are negative.

[21] Another motivation for using firm size is presented by Berk [1995], who suggests that firm size is likely to be a catchall risk proxy.

[22] We have empirical measures of relative spread available for 1980-89. We find that there is a positive relationship between relative bid-ask spread and cost-of-capital. Not surprisingly we find this spread variable is highly (negatively) correlated with firm size. In multivariate regressions, bid-ask spread does not do as well in the presence of firm size.

[23] We use the ratio of FY2 to FY1 if Ltg is not available. In that case, we eliminate firms where FY1 or FY2 is negative.

[24]Later, we appeal to Stein [1996] in arguing that this distinction may not be necessary to justify including this variable in our analysis.

[25] These authors compute a value-to-price (V/P) ratio using the residual income model, and show that high (low) V/P firms earn higher (lower) subsequent returns. Their V/P signal corresponds to our implied cost-of-capital (our valuation model is very similar to theirs, so high V/P firms are firms with high implied cost-of-capital in our context).

[26] We thank one of the referees for suggesting this test.

[27] The mean and median differences are time-series averages of the differences in cross-sectional means and medians.

[28] Replacing this variable with either the mean absolute error variable (MAE Ern) or the earnings variability variable (Var Ern) yields similar results.

[29] The negative relationship between dispersion in analyst forecast and cost of capital is consistent with Miller [1977] who predicts such a relationship in a capital market with short-sale constraints and heterogeneous expectations.

[30] In effect, our approach generates an “expected” yield on forecasted earnings, which can be compared to the “actual” yield based on current prices. The argument is analogous to the use of relative market multiples (such as P/E ratios). If certain types of firms have consistently been accorded higher (or lower) P/E multiples over time, it stands to reason that their current earnings should also be accorded a higher valuation multiple, even if we do not fully understand the market’s rationale for assigning the higher multiple.

Table 1
Summary Statistics

Year-by-year average implied risk premia are shown below for our sample of NYSE/AMEX stocks contained in the I/B/E/S database on June 30th of each year from 1979 to 1995. Implied risk premia are calculated by first solving for the discount rate required to equate the fundamental value derived from the Edwards-Bell-Ohlson (EBO) valuation model with the current stock price and then subtracting the current yield on the 10-year government bond. A twelve-year version of the EBO model is used which incorporates consensus earnings forecasts from the I/B/E/S database and allows long-term growth estimates to revert to the historical industry ROEs. Historical returns are from the CRSP database, accounting data comes from Compustat, and earnings forecasts come from I/B/E/S.

		Excess	Implicit Risk Pr.	
Year	N	Returns	Median	Mean
79	1044	18.7%	4.9%	5.2%
80	1040	53.2%	4.1%	4.1%
81	1044	-25.9%	-0.2%	0.2%
82	1054	57.0%	1.5%	1.9%
83	1056	-3.2%	0.3%	0.6%
84	1060	-16.3%	-0.7%	-0.2%
85	1038	-4.5%	1.1%	1.6%
86	1018	17.7%	2.2%	2.6%
87	1025	-11.5%	1.1%	1.7%
88	1019	-1.9%	2.0%	2.8%
89	1049	1.1%	2.8%	3.8%
90	1092	-4.8%	2.4%	3.3%
91	1091	-2.4%	2.0%	3.1%
92	1150	3.3%	2.4%	3.4%
93	1230	9.8%	3.0%	4.4%
94	1269	-3.0%	2.4%	3.6%
95	1333	18.8%	3.4%	4.6%
Average		6.2%	2.0%	2.7%

Table 2
Industry Risk Premia

The table below shows time series mean implied and historical risk premia firms in various industries. Firms are sorted into 48 industries following the groupings of Fama and French (1997). Industry portfolios are formed each year and include all exchange-listed stocks in the I/B/E/S database on June 30th for each of the years 1979 to 1995. The number of firms per year ranges from 1018 in 1986 to 1333 in 1995. Implied risk premia are calculated by first solving for the discount rate required to equate the fundamental value derived from the Edwards-Bell-Ohlson (EBO) valuation model with the current stock price and then subtracting the current yield on the 10-year government bond. A twelve-year version of the EBO model is used which incorporates consensus earnings forecasts from the I/B/E/S database and allows long-term growth estimates to revert to the historical industry ROEs. Historical risk premia are based on the average realized returns over the next year. The table reports both the risk premium in excess of yields/returns on ten-year government bonds (Excess Premium), and the risk premium in excess of the average risk premium for all firms in a given year (Relative Premium). Both the time-series mean and the time-series standard error for the mean are reported. Also reported is the average number of firms in each industry for each year in the sample (N). The last row reports the equal-weighted mean for each variable across all industries.

		Excess Premium				Relative Premium			
		Implied Risk Premium		Historical Risk Premium		Implied Risk Premium		Historical Risk Premium	
Industry	N	Mean	Std Err	Mean	Std Err	Mean	Std Err	Mean	Std Err
Toys	12	8.38%	0.67%	6.47%	6.53%	5.58%	0.58%	3.82%	4.23%
Smoke	2	7.90%	2.03%	26.87%	9.45%	5.69%	2.13%	16.90%	8.17%
Banks	58	6.27%	0.74%	7.28%	6.02%	3.52%	0.50%	1.48%	3.83%
Comps	25	5.70%	0.68%	5.65%	8.81%	2.95%	0.63%	-0.72%	3.85%
Autos	29	4.31%	0.58%	8.81%	8.91%	1.57%	0.30%	1.44%	4.82%
ElcEq	18	4.15%	0.56%	2.95%	6.23%	1.37%	0.26%	-2.68%	2.17%
Insur	45	4.02%	0.48%	7.11%	3.98%	1.32%	0.21%	0.69%	2.94%
Steel	34	3.81%	0.48%	-0.22%	6.23%	1.00%	0.27%	-6.56%	3.22%
Clths	20	3.56%	0.57%	8.36%	8.89%	0.83%	0.29%	2.18%	4.87%
Beer	7	3.54%	1.41%	12.08%	3.91%	0.81%	1.21%	6.22%	4.49%
Cnstr	17	3.53%	0.50%	1.12%	7.01%	0.78%	0.19%	-5.15%	2.77%
Coal	1	3.26%	0.51%	2.50%	9.39%	0.32%	0.58%	-8.00%	6.42%
BusSv	40	3.22%	0.52%	9.92%	6.47%	0.41%	0.19%	2.64%	1.58%
Aero	12	3.22%	0.45%	5.17%	7.22%	0.48%	0.33%	-1.03%	3.34%
Food	30	3.20%	0.38%	9.77%	3.85%	0.48%	0.33%	3.83%	4.05%
Chips	31	3.07%	0.62%	8.27%	8.82%	0.29%	0.43%	1.95%	5.14%
Guns	2	3.04%	0.97%	12.57%	5.66%	0.47%	0.78%	5.80%	2.72%
Chems	42	2.91%	0.54%	6.76%	5.32%	0.20%	0.27%	0.96%	2.73%
Trans	25	2.85%	0.39%	4.77%	7.15%	0.12%	0.14%	-1.21%	2.76%
Soda	3	2.57%	0.56%	3.76%	5.05%	0.13%	0.69%	-0.41%	5.51%
Rtail	63	2.48%	0.53%	9.94%	7.16%	-0.22%	0.21%	3.85%	3.31%
Telcm	18	2.48%	0.74%	13.09%	4.49%	-0.28%	0.46%	7.24%	3.19%
Ships	3	2.38%	0.49%	5.35%	8.72%	-0.36%	0.37%	-1.08%	6.25%
Paper	35	2.35%	0.37%	4.99%	5.51%	-0.39%	0.18%	-1.17%	2.40%
Util	103	2.33%	0.22%	4.35%	2.39%	-0.40%	0.29%	-1.78%	4.27%
Hlth	8	2.14%	0.82%	15.34%	10.54%	-0.66%	0.53%	7.00%	7.48%
Boxes	8	2.08%	0.56%	7.17%	5.26%	-0.66%	0.43%	1.83%	3.72%
Hshld	30	2.08%	0.41%	8.20%	5.66%	-0.66%	0.20%	1.57%	2.45%
Mines	6	2.06%	0.80%	5.90%	10.49%	-0.70%	0.59%	-0.62%	7.86%
BldMt	35	1.94%	0.38%	5.48%	6.00%	-0.82%	0.20%	-0.48%	1.63%
Txtls	17	1.76%	0.50%	9.45%	8.54%	-1.00%	0.19%	2.98%	5.31%
Drugs	25	1.75%	0.48%	12.55%	5.50%	-1.01%	0.18%	7.67%	3.99%
Rubbe	14	1.70%	0.42%	5.97%	5.38%	-1.03%	0.14%	0.05%	2.47%
PerSv	7	1.60%	0.72%	13.17%	12.26%	-1.16%	0.45%	6.26%	7.11%
Meals	13	1.60%	0.49%	4.24%	5.88%	-0.83%	0.36%	-3.25%	2.92%
FabPr	5	1.49%	0.54%	1.85%	8.30%	-1.25%	0.27%	-4.23%	4.63%
Fun	14	1.36%	0.40%	6.55%	6.53%	-1.40%	0.19%	-0.48%	3.26%
Books	19	1.35%	0.50%	10.21%	6.57%	-1.37%	0.19%	3.70%	3.17%
Mach	57	1.32%	0.36%	2.76%	6.11%	-1.43%	0.23%	-3.35%	2.45%
Enrgy	57	1.25%	0.33%	0.76%	8.28%	-1.44%	0.50%	-5.75%	6.36%
Whlsl	35	1.20%	0.46%	6.98%	6.42%	-1.55%	0.13%	0.93%	1.83%
LabEq	22	1.08%	0.31%	2.82%	6.54%	-1.66%	0.23%	-1.75%	3.18%
MedEq	9	0.82%	0.39%	11.96%	5.67%	-1.95%	0.20%	6.15%	5.98%
Fin	33	0.31%	0.53%	10.88%	7.32%	-2.39%	0.24%	2.36%	1.91%
Agric	1	0.08%	0.76%	8.17%	7.20%	-2.65%	0.48%	2.00%	6.86%
Misc	1	-0.06%	0.50%	5.66%	19.66%	-2.87%	0.41%	2.12%	17.52%
Gold	6	-0.73%	0.59%	4.46%	11.00%	-3.47%	0.74%	-1.72%	7.41%
RlEst	5	-2.79%	0.54%	-4.46%	7.23%	-5.24%	0.51%	-11.44%	5.86%
ALL		2.50%	0.58%	7.16%	7.20%	-0.22%	0.40%	0.85%	4.47%

Table 3
Relation Between Historical and Implied Risk Premia

In Panel A, firms are sorted into quintiles on June 30th of each year from 1979 to 1995 based on their implied risk premia. Implied risk premia are calculated by first solving for the discount rate required to equate the fundamental value derived from an Edwards-Bell-Ohlson (EBO) valuation model with the current stock price, then subtracting the current yield on the 10-year government bond. A twelve-year version of the EBO model is used. For each quintile historical risk premia are calculated as the time-series equal-weighted return in years one through three after the ranking period minus the realized returns on the 10-year government bond. In Panel B, the industry level mean implied risk premia given in Table II are regressed against mean historical risk premia with the resulting coefficients are shown below with t-statistics in parenthesis. Data on returns, volume, and shares outstanding come from the CRSP stock files. Book values, earnings, dividends and long-term debt come from Compustat annual files. The number of analysts making earnings forecasts, the standard deviation of those forecasts, and the consensus forecasts themselves come from I/B/E/S. The number of firms per year ranges from 1018 in 1986 to 1333 in 1995.

Panel A - Firm Level Quintile Sort

	Smallest				Largest		
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-Stat
Mean Implied Risk Premium	-1.72%	0.69%	2.05%	3.41%	9.26%	10.98%	22.76
Median Implied Risk Premium	-1.26%	0.70%	2.04%	3.38%	5.81%	7.07%	40.42
Historical Risk Premium (Yr 1)	5.68%	5.88%	6.38%	5.75%	7.54%	1.86%	0.69
Historical Risk Premium (Yr 2)	2.84%	5.30%	5.47%	6.82%	7.75%	4.90%	1.53
Historical Risk Premium (Yr 3)	0.14%	1.00%	2.39%	4.90%	5.16%	5.02%	2.18

Panel B - Industry Level Regression

Intercept	Slope	R^2
0.05	0.87	0.12
(4.54)	(2.50)	

Table 4
Implied Risk Premia and Firm Characteristics

On June 30th of each year, stocks are sorted into quintiles based on each of fourteen firm characteristics. This table reports the time-series average historical and implied risk premia for each quintile. The firm characteristics are: five year rolling market beta (Beta); standard deviation of the previous years daily returns (Std. Dev); long-term debt-to-book ratio (D/B); long-term debt-to-market value of equity ratio (D/M); number of analysts making annual forecasts (#Ann); average daily transaction dollar volume over the previous year in millions ($Vol); firm size in millions (Size); mean absolute error of last five annual earnings forecasts divided by the average actual earnings over the same period (MAE Ern); coefficient of variation of annual earnings per share over previous five years (Var Ern); dispersion of one-year-ahead analyst earnings forecasts (Disp Fcst); long-term growth earnings estimate (Ltg); book-to-market ratio (B/M); prior six month price momentum (Mtm); average daily turnover calculated over the previous year (Trnovr). Implied risk premia are calculated by first solving for the discount rate required to equate the fundamental value derived from an Edwards-Bell-Ohlson (EBO) valuation model with the current stock price, then subtracting the current yield on the 10-year government bond. A twelve-year version of the EBO model is used. Historical risk premia are defined as the annual equal-weighted returns for each portfolio in the year after the ranking, minus the realized returns on the 10-year government bond, and averaged across all years. Data on returns, volume, and shares outstanding come from the CRSP stock files. Book values, earnings, dividends and long-term debt come from Compustat annual files. The number of analysts making earnings forecasts, the standard deviation of those forecasts, and the consensus forecasts themselves come from I/B/E/S. The period covered is 1979 to 1995 with one exception. Both the MAE of earnings forecasts and the coefficient of variation of actual earnings require five years of prior data for the calculation, so figures are only available from 1984 to 1995. The number of firms per year ranges from 1018 in 1986 to 1333 in 1995. Risk premium differences for quintile 5 minus quintile 1 are reported (Q5-Q1), along with Newey-West autocorrelation corrected t-statistics. ***, **, * indicate 1%, 5%, and 10% significance in the direction predicted.

	Smallest				Largest			
Ranked by:	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-Stat	
Panel A. Market Volatility								
Beta (Rolling 5 Year)	0.51	0.86	1.10	1.33	1.71			
Mean Implied Risk Premium	3.21%	2.36%	2.07%	1.89%	2.14%	-1.07%	-3.26	
Median Implied Risk Premium	1.78%	1.64%	1.66%	1.73%	1.99%	0.21%	0.55	
Historical Risk Premium	6.74%	6.67%	8.33%	5.79%	4.63%	-2.10%	-0.40	
Std. Dev. Of Daily Returns	1.28%	1.66%	1.99%	2.41%	3.23%			
Mean Implied Risk Premium	2.36%	2.40%	2.60%	2.48%	2.58%	0.21%	0.63	
Median Implied Risk Premium	1.73%	1.56%	1.72%	1.91%	2.31%	0.58%	1.60	
Historical Risk Premium	6.68%	7.44%	6.37%	7.24%	3.78%	-2.90%	-0.54	
Panel B. Leverage								
Debt/Book	3.10%	21.97%	44.33%	75.88%	151.55%			
Mean Implied Risk Premium	2.03%	2.42%	3.11%	2.42%	2.44%	0.41%	2.94	***
Median Implied Risk Premium	1.30%	1.55%	1.93%	1.86%	2.48%	1.18%	5.85	***
Historical Risk Premium	6.37%	6.61%	6.21%	7.06%	5.04%	-1.33%	-0.88	
Debt/Mkt. Val. Equity	1.62%	12.81%	29.81%	59.04%	146.71%			
Mean Implied Risk Premium	0.88%	1.30%	1.78%	2.30%	6.38%	5.50%	13.04	***
Median Implied Risk Premium	0.75%	1.11%	1.69%	2.22%	3.41%	2.66%	13.10	***
Historical Risk Premium	5.85%	6.29%	6.87%	6.07%	6.22%	0.37%	0.17	
Panel C. Liquidity and Information Environment								
Number of Analysts	1.12	3.71	7.47	13.35	23.06			
Mean Implied Risk Premium	3.81%	3.61%	2.16%	1.60%	1.71%	-2.10%	-3.89	***
Median Implied Risk Premium	2.25%	2.36%	1.71%	1.39%	1.54%	-0.71%	-2.68	***
Historical Risk Premium	6.70%	6.77%	6.76%	5.93%	4.91%	-1.79%	-0.52	
Average $ Volume Previous Year (millions)	0.08	0.29	0.83	2.58	9.57			
Mean Implied Risk Premium	3.83%	2.64%	2.14%	2.10%	2.03%	-1.80%	-3.76	***
Median Implied Risk Premium	2.37%	1.93%	1.63%	1.60%	1.68%	-0.70%	-3.01	***
Historical Risk Premium	8.36%	6.97%	5.59%	5.60%	4.59%	-3.77%	-0.97	
Size (millions)	55.2	166.7	414.0	1,034.4	3,686.9			
Mean Implied Risk Premium	4.98%	2.78%	1.95%	1.76%	1.62%	-3.36%	-4.95	***
Median Implied Risk Premium	2.74%	2.05%	1.70%	1.51%	1.43%	-1.31%	-3.81	***
Historical Risk Premium	7.12%	6.58%	6.72%	5.50%	5.15%	-1.96%	-0.41	

Table 4 Continued

Ranked by:	Smallest Q1	Q2	Q3	Q4	Largest Q5	Q5-Q1	t-Stat	
Panel D. Variability of Earnings								
MAE of Forcast Earnings	0.12	0.22	0.34	0.62	2.13			
Mean Implied Risk Premium	1.93%	1.77%	1.69%	3.96%	3.72%	1.79%	6.72	***
Median Implied Risk Premium	1.85%	1.67%	1.64%	2.36%	2.67%	0.82%	5.94	***
Historical Risk Premium	2.13%	2.19%	2.21%	0.76%	-1.66%	-3.80%	-0.91	
Coef. Of Variation Of EPS (5 Years)	0.14	0.25	0.40	0.76	2.94			
Mean Implied Risk Premium	2.13%	2.18%	2.81%	3.20%	2.98%	0.85%	5.50	***
Median Implied Risk Premium	1.77%	1.51%	1.89%	2.35%	2.65%	0.88%	6.49	***
Historical Risk Premium	1.97%	2.79%	2.10%	-0.58%	-1.52%	-3.50%	-0.83	
Dispersion of Analyst Forcasts	0.018	0.035	0.059	0.107	0.321			
Mean Implied Risk Premium	1.64%	2.16%	2.66%	3.07%	2.53%	0.89%	4.21	***
Median Implied Risk Premium	1.15%	1.64%	1.97%	2.36%	1.94%	0.79%	4.64	***
Historical Risk Premium	8.37%	6.55%	6.48%	4.47%	4.40%	-3.98%	-1.07	
Panel E. Other Pricing Anomalies								
Long Term Growth	3.38%	8.39%	10.79%	13.20%	18.26%			
Mean Implied Risk Premium	3.95%	2.83%	2.37%	1.73%	1.76%	-2.20%	-5.19	
Median Implied Risk Premium	2.29%	2.31%	1.78%	1.30%	1.42%	-0.87%	-2.58	
Historical Risk Premium	5.43%	6.57%	6.20%	6.61%	6.05%	0.62%	0.22	
Book/Price	0.293	0.500	0.699	0.915	1.433			
Mean Implied Risk Premium	0.05%	1.01%	1.89%	2.68%	7.43%	7.38%	14.30	
Median Implied Risk Premium	-0.07%	0.97%	1.85%	2.55%	4.26%	4.32%	19.08	
Historical Risk Premium	5.45%	5.91%	5.09%	6.78%	7.85%	2.40%	0.70	
Momentum (6 Month)	-14.95%	-0.06%	9.82%	20.16%	39.84%			
Mean Implied Risk Premium	2.98%	2.64%	2.19%	2.39%	2.37%	-0.61%	-2.48	
Median Implied Risk Premium	2.06%	1.92%	1.73%	1.74%	1.68%	-0.38%	-2.10	
Historical Risk Premium	2.07%	5.43%	7.29%	6.42%	9.83%	7.76%	2.99	
Avg. Daily Turnover Previous Year (x1000)	0.765	1.370	1.949	2.769	4.609			
Mean Implied Risk Premium	2.57%	1.84%	2.07%	2.39%	3.62%	1.06%	1.62	
Median Implied Risk Premium	1.72%	1.51%	1.67%	1.93%	2.30%	0.58%	1.94	
Historical Risk Premium	7.85%	6.77%	6.33%	6.06%	4.09%	-3.77%	-1.57	

Table 5

Risk Premia for Firm Characteristics Conditional on Long-term Growth Forecasts

On June 30th of each year, stocks are sorted into quintiles based on analysts' long-term growth forecasts. In each growth quintile, firms are again sorted into quintiles by one of thirteen firm characteristics. The firm characteristics are: five year rolling market beta (Beta); standard deviation of the previous years daily returns (Std. Dev); long-term debt-to-book ratio (D/B); long-term debt-to-market value of equity ratio (D/M); number of analysts making annual forecasts (#Ann); average daily transaction dollar volume over the previous year in millions ($Vol); firm size in millions (Size); mean absolute error of last five annual earnings forecasts divided by the average actual earnings over the same period (MAE Ern); coefficient of variation of annual earnings per share over previous five years (Var Ern); dispersion of one-year-ahead analyst earnings forecasts (Disp Fcst); book-to-market ratio (B/M); prior six month price momentum (Mtm); average daily turnover calculated over the previous year (Trnovr). Implied risk premia are calculated by first solving for the discount rate required to equate the fundamental value derived from an Edwards-Bell-Ohlson (EBO) valuation model with the current stock price, then subtracting the current yield on the 10-year government bond. A twelve-year version of the EBO model is used. Historical risk premia are defined as the annual equal-weighted returns for each portfolio in the year after the ranking, minus the realized returns on the 10-year government bond, and averaged across all years. Data on returns, volume, and shares outstanding come from the CRSP stock files. Book values, earnings, dividends and long-term debt come from Compustat annual files. The number of analysts making earnings forecasts, the standard deviation of those forecasts, and the consensus forecasts themselves come from I/B/E/S. The period covered is 1979 to 1995 with one exception. Both the MAE of earnings forecasts and the coefficient of variation of actual earnings require five years of prior data for the calculation, so figures are only available from 1984 to 1995. The number of firms per year ranges from 1018 in 1986 to 1333 in 1995. Risk premium differences for quintile 5 minus quintile 1 are reported (Q5-Q1), along with Newey-West autocorrelation corrected t-statistics. ***, **, * indicate 1%, 5%, and 10% significance in the direction predicted.

	Quintiles based on long-term growth									
Characteristics	**Low Ltg (1)**		**2**		**3**		**4**		**High Ltg (5)**	
	Q5-Q1	**t-Stat**	**Q5-Q1**	**t-Stat**	**Q5-Q1**	**t-Stat**	**Q5-Q1**	**t-Stat**	**Q5-Q1**	**t-Stat**
Beta										
Mean Implied Risk Premium	-0.97%	-1.11	-0.51%	-1.26	-0.64%	-1.79	0.64%	2.23	0.02%	0.07
Median Implied Risk Premium	-0.25%	-0.37	1.16%	3.36	1.10%	4.47	1.59%	8.47	0.54%	1.45
Std. Dev. Of Daily Returns										
Mean Implied Risk Premium	-0.20%	-0.23	0.29%	0.93	0.71%	2.01	1.59%	5.89	1.94%	4.95
Median Implied Risk Premium	-0.24%	-0.37	0.83%	2.49	1.17%	4.97	1.75%	7.40	1.80%	4.65
Debt/Book										
Mean Implied Risk Premium	-1.87%	-3.28	-0.08%	-0.25	0.85%	3.79	0.43%	1.11	0.97%	2.99
Median Implied Risk Premium	0.19%	0.73	0.86%	5.25	1.43%	9.69	1.17%	4.95	1.19%	4.75
Debt/Equity										
Mean Implied Risk Premium	8.72%	6.38	5.29%	7.83	5.39%	9.53	3.23%	9.23	2.96%	10.84
Median Implied Risk Premium	2.23%	10.65	2.47%	12.74	2.82%	16.47	2.32%	9.06	2.14%	8.96
Number of Analysts										
Mean Implied Risk Premium	-1.53%	-1.54	-0.92%	-1.30	-2.72%	-5.15	-2.27%	-6.34	-2.10%	-6.93
Median Implied Risk Premium	0.17%	0.32	0.26%	0.91	-1.02%	-3.35	-1.68%	-6.96	-1.81%	-6.89
Dollar Volume										
Mean Implied Risk Premium	-2.51%	-2.58	-0.76%	-1.56	-1.77%	-5.31	-1.27%	-4.67	-1.47%	-6.17
Median Implied Risk Premium	0.19%	0.43	-0.10%	-0.38	-0.97%	-4.15	-1.15%	-5.34	-1.37%	-5.47
Size										
Mean Implied Risk Premium	-4.72%	-2.79	-1.93%	-3.14	-3.81%	-6.69	-2.53%	-5.93	-2.52%	-7.67
Median Implied Risk Premium	-0.41%	-0.51	-0.54%	-1.85	-1.59%	-6.17	-1.91%	-8.19	-2.03%	-6.65

Table 5 Contd. on the next page.

Table 5 Contd.

Characteristics	Quintiles based on long-term growth: Low Ltg (1)		2		3		4		High Ltg (5)	
	Q5-Q1	t-Stat	Q5-Q1	t-Stat	Q5-Q1	t-Stat	Q5-Q1	t-Stat	Q5-Q1	t-Stat
MAE of Forecast Earnings										
Mean Implied Risk Premium	0.99%	1.35	1.83%	4.22	2.78%	7.12	2.18%	3.49	1.74%	4.05
Median Implied Risk Premium	0.27%	0.69	1.08%	5.14	0.91%	3.62	0.92%	3.16	1.20%	3.03
Coef. Of Variation of EPS										
Mean Implied Risk Premium	0.78%	1.79	0.67%	2.40	0.85%	2.65	1.28%	3.71	1.55%	2.83
Median Implied Risk Premium	0.65%	2.31	0.88%	4.06	0.92%	3.41	0.97%	4.20	1.31%	2.91
Dispersion of Analyst Forecasts										
Mean Implied Risk Premium	-0.94%	-1.06	0.23%	0.73	1.07%	5.33	1.16%	3.15	1.83%	5.83
Median Implied Risk Premium	-0.54%	-1.31	0.39%	2.76	1.07%	4.32	0.77%	2.21	1.17%	3.44
Book/Price										
Mean Implied Risk Premium	11.64%	7.50	7.32%	11.47	6.93%	13.15	4.90%	12.37	4.01%	21.08
Median Implied Risk Premium	4.89%	9.64	4.32%	25.80	4.27%	22.22	3.71%	16.66	3.17%	11.16
Momentum										
Mean Implied Risk Premium	0.38%	0.50	-0.47%	-1.62	-0.56%	-1.88	-0.36%	-1.23	-0.96%	-3.31
Median Implied Risk Premium	0.35%	1.02	-0.33%	-1.31	-0.03%	-0.13	-0.25%	-0.93	-0.69%	-2.26
Turnover (x1000)										
Mean Implied Risk Premium	1.36%	0.83	2.49%	3.60	1.73%	2.42	1.31%	3.24	1.08%	3.23
Median Implied Risk Premium	0.66%	1.02	1.15%	4.83	0.76%	5.58	1.04%	4.57	1.10%	5.58

Table 6
Correlations of Firm Characteristics

This table shows the time series average of the cross-sectional Spearman correlations for our fourteen ex-ante firm characteristics: five year rolling market beta (Beta); standard deviation of the previous years daily returns (Std. Dev); long-term debt-to-book ratio (D/B); long-term debt-to-market value of equity ratio (D/M); number of analysts making annual forecasts (#Ann); average daily transaction dollar volume over the previous year in millions ($Vol); firm size in millions (Size); mean absolute error of last five annual earnings forecasts divided by the average actual earnings over the same period (MAE Ern); coefficient of variation of annual earnings per share over previous five years (Var Ern); dispersion of one-year-ahead analyst earnings forecasts (Disp Fcst); long-term growth earnings estimate (Ltg); book-to-market ratio (B/M); prior six month price momentum (Mtm); average daily turnover calculated over the previous year (Trnovr). Data on returns, volume, and shares outstanding comes from the CRSP stock files. Book values, earnings, dividends and long-term debt come from Compustat annual files. The number of analysts making forecasts, the standard deviation of those forecasts, and the consensus forecasts themselves come from I/B/E/S. The period covered is 1979 to 1995 with one exception. Both mean absolute error of earnings forecasts and dispersion of actual earnings require five years of prior data for calculation so figures are only available from 1984 to 1995. The number of firms per year ranges from 1018 in 1986 to 1333 in 1995. T-statistics are also given below the corresponding correlations.

	Beta	Std. Dev	D/B	D/M	# Ann.	$ Vol	Size	MAE Ern	VarErn	DispFcst	Ltg	B/P	Mtm	Trnovr
Beta	100.0%	54.2%	-4.8%	-10.1%	-3.3%	6.9%	-9.6%	16.1%	24.9%	18.6%	37.1%	-10.8%	-1.8%	39.9%
		20.47	-5.00	-9.08	-1.15	3.06	-3.30	10.01	13.98	6.46	42.34	-4.47	-0.30	19.90
Std. Dev		100.0%	3.6%	3.0%	-26.4%	-17.9%	-37.0%	30.8%	46.6%	33.9%	20.8%	1.5%	-2.1%	36.8%
			3.27	2.34	-10.73	-11.67	-15.73	24.18	42.56	21.99	20.22	0.62	-0.50	11.90
D/B			100.0%	87.4%	-0.8%	0.7%	-2.3%	13.7%	15.5%	17.4%	-17.7%	15.9%	1.6%	6.7%
				194.40	-0.40	0.47	-1.41	15.01	20.96	19.39	-18.71	10.49	0.88	7.61
D/E				100.0%	-9.5%	-9.7%	-15.6%	21.5%	21.3%	27.5%	-33.8%	53.9%	-7.3%	4.9%
					-5.55	-5.99	-13.13	19.90	20.96	30.57	-17.68	40.67	-3.07	3.02
# Ann.					100.0%	84.1%	84.5%	-3.8%	-16.7%	-11.0%	12.6%	-21.3%	-0.5%	24.7%
						113.21	301.46	-2.18	-9.70	-11.48	9.56	-12.44	-0.16	7.37
$ Vol						100.0%	90.1%	4.0%	-13.0%	-11.5%	16.1%	-25.6%	-1.3%	48.6%
							245.64	2.12	-6.97	-7.12	9.96	-11.81	-0.40	23.13
Size							100.0%	-5.9%	-25.5%	-23.8%	9.4%	-31.9%	8.2%	12.6%
								-3.53	-14.05	-17.73	5.69	-15.53	2.24	4.10
MSE Ern								100.0%	74.4%	34.0%	-1.5%	17.4%	2.8%	23.7%
									93.29	27.37	-1.22	12.51	0.90	11.75
CoV Ern									100.0%	48.8%	2.3%	22.6%	0.4%	25.2%
										37.38	1.74	10.63	0.08	12.98
CoV Fcst										100.0%	-9.5%	34.1%	-10.8%	19.2%
											-4.61	20.20	-2.49	18.95
Ltg											100.0%	-46.1%	2.6%	22.7%
												-15.50	0.78	18.20
B/P												100.0%	-20.3%	-3.2%
													-6.16	-1.40
Mtm													100.0%	-0.2%
														-0.06
Trnovr														100.0%

Table 7
Cross-Sectional Regression of Implied Risk Premium

The following cross-sectional regression is estimated on June 30th of each year and the resulting time series average coefficients are reported below.

$$r_{i,t} - rf_t = a_t + \sum_{j=1}^{k} d_{j,t} C_{j,i,t} + m_{i,t}$$

Where $r_{i,t} - rf_t$ is the year t implied risk premium for firm i derived from a twelve year version of the EBO valuation model, measured in percent. The eight ex-ante firm characteristics, $C_{j,i,t}$, are: five year rolling market beta (Beta); log long-term debt-to-book ratio (D/B); log long-term debt-to-market value of equity ratio (D/M); log firm size in millions (Size); log dispersion of one-year-ahead analyst earnings forecasts (Disp); long-term growth earnings estimate (Ltg); log book-to-market ratio (B/M); average industry implied risk premium (Indus). All NYSE and AMEX stocks with available data are included in the sample from 1979 to 1995. In Panel B all the independent variables except beta and industry risk premium are standardized each month to have a mean of zero and a standard deviation of one. Book values, earnings, dividends and long-term debt come from Compustat quarterly files. The standard deviation of analyst forecasts, one- and two-year-ahead consensus forecasts and the long-term growth forecast come from IBES. The number of firms per year ranges from 1018 in 1986 to 1333 in 1995. The last column shows the average adjusted R^2 for each model over the sample period. Newey-West autocorrelation corrected t-statistics are also given.

a	Beta	ln (D/M)	ln (Size)	ln (Disp)	Ltg	ln (B/P)	Indus	Adj-R^2
Panel A - Cross-Sectional Regression								
6.64	-0.26	1.27	-0.53	-0.39	1.67			0.18
(7.05)	(-1.41)	(12.49)	(-4.05)	(-4.09)	(0.76)			
-0.37	0.42	-0.02	0.13	-0.79	19.66	6.05		0.58
(-0.73)	(2.35)	(-0.32)	(2.43)	(-7.44)	(7.34)	(19.04)		
-0.43	0.19	-0.02	0.08	-0.75	19.13	5.84	0.27	0.60
(-0.83)	(1.11)	(-0.30)	(1.29)	(-7.51)	(7.22)	(19.95)	(5.89)	
0.28				-0.73	20.08	5.76	0.29	0.58
(0.73)				(-10.51)	(5.60)	(24.80)	(5.36)	
Panel B - Standardized Cross-Sectional Regression								
2.97	-0.26	2.09	-0.88	-0.48	0.53			0.18
(10.49)	(-1.41)	(9.88)	(-4.08)	(-4.15)	(1.89)			
1.99	0.42	-0.02	0.20	-0.94	2.74	5.18		0.58
(4.92)	(2.35)	(-0.25)	(2.43)	(-6.99)	(2.63)	(13.48)		
1.54	0.19	-0.02	0.11	-0.90	2.66	5.00	0.27	0.60
(4.10)	(1.11)	(-0.22)	(1.23)	(-7.03)	(2.62)	(13.80)	(5.89)	
1.89				-0.86	2.49	4.94	0.29	0.58
(6.68)				(-9.09)	(2.96)	(14.60)	(5.36)	

Table 8
Forecast Regressions

In Panel A, the following cross-sectional regression is estimated on June 30th of each year:

$$r_{i,t} - rf_t = a_t + \sum_{j=1}^{7} d_{j,t} C_{j,i,t} + m_{i,t}$$

Where $r_{i,t} - rf_t$ is the year t implied risk premium for firm i derived from a twelve year version of the EBO valuation model, measured in percent. The seven firm characteristics, $C_{j,i,t}$, are: five year rolling market beta (Beta); log firm size in millions (Size); log dispersion of one-year-ahead analyst earnings forecasts (Disp); long-term growth earnings estimate (Ltg); log book-to-price ratio (B/P); average industry implied risk premium (Indus). Size, Disp, Ltg, and B/P are standardized each month to have a mean of zero and a standard deviation of one. The resulting coefficients from the above regression are then used to forecast an implied risk premium for each firm the following year. Three methods are used for forecasting: coefficients from the prior year only; rolling five-year average coefficients; average coefficients from all prior years. In Panel B the following forecast regression is estimated:

$$r_{i,t} - r^*_{i,t} = a_t + b_t r^*_{i,t} + e_{i,t}$$

Where * indicates the forecasted implied risk premium. The last row reports the time-series average coefficients along with Newey-West autocorrelation corrected t-statistics. The number of firms per year ranges from 1018 in 1986 to 1333 in 1995.

Panel - A Estimation Regression

Year	a	ln (Disp)	Ltg	ln (B/P)	Indus	Adj-R^2
79	4.17	-0.38	1.43	4.26	0.04	0.64
	(6.79)	(-2.46)	(4.15)	(6.07)	(0.41)	
80	1.31	-0.47	1.27	4.17	-0.20	0.47
	(2.32)	(-2.05)	(2.95)	(4.90)	(-1.78)	
81	2.28	-0.35	2.07	4.83	0.02	0.41
	(13.08)	(-1.66)	(3.90)	(5.03)	(0.28)	
82	0.23	-0.88	0.08	2.73	0.26	0.50
	(1.54)	(-7.31)	(0.48)	(9.78)	(4.02)	
83	-0.09	-0.74	1.19	3.13	0.21	0.38
	(-0.41)	(-2.67)	(1.65)	(3.79)	(1.52)	
84	1.48	-0.72	2.14	4.88	0.22	0.60
	(12.93)	(-3.52)	(4.16)	(5.85)	(2.54)	
85	2.29	-0.75	8.35	4.15	0.38	0.63
	(16.97)	(-3.79)	(4.54)	(6.16)	(5.40)	
86	0.24	-1.28	2.35	4.13	0.49	0.53
	(0.95)	(-4.85)	(4.84)	(5.45)	(4.59)	
87	1.89	-0.71	1.43	4.31	0.46	0.53
	(11.23)	(-3.64)	(2.64)	(5.46)	(5.32)	
88	2.37	-1.20	0.78	5.56	0.45	0.60
	(8.04)	(-4.63)	(1.72)	(9.12)	(4.94)	
89	1.57	-0.71	0.90	5.01	0.43	0.66
	(7.86)	(-4.08)	(5.11)	(10.70)	(8.33)	
90	2.08	-0.70	1.06	5.14	0.28	0.62
	(8.67)	(-3.36)	(5.26)	(10.22)	(3.71)	
91	2.70	-1.48	1.41	6.29	0.23	0.62
	(11.16)	(-6.32)	(6.42)	(9.30)	(3.31)	
92	2.58	-1.50	1.40	6.83	0.45	0.66
	(8.58)	(-6.53)	(7.76)	(10.51)	(5.25)	
93	1.84	-1.18	0.90	6.69	0.40	0.67
	(7.41)	(-7.35)	(4.99)	(11.91)	(6.23)	
94	3.24	-0.71	13.09	6.87	0.48	0.70
	(13.32)	(-4.16)	(5.13)	(13.52)	(8.42)	
	(6.68)	(-9.09)	(2.96)	(14.60)	(5.36)	
All	1.89	-0.86	2.49	4.94	0.29	0.58

Table 8 - Continued

Panel B - Forcast Regressions												
	One Year				Rolling 5 Year				All Prior Years			
Year	a	b	b-1	R^2	a	b	b-1	R^2	a	b	b-1	R^2
80	-3.69	0.95	-0.05	0.47					-3.69	0.95	-0.05	0.47
	(-5.94)	(5.84)	(-0.34)						(-5.94)	(5.84)	(-0.34)	
81	1.78	1.12	0.12	0.40					-0.36	1.10	0.10	0.40
	(14.28)	(5.24)	(0.57)						(-0.86)	(5.24)	(0.49)	
82	-0.54	0.50	-0.50	0.36					-0.82	0.56	-0.44	0.36
	(-4.36)	(9.44)	(-9.33)						(-5.63)	(9.51)	(-7.44)	
83	-0.72	1.07	0.07	0.37					-1.65	0.83	-0.17	0.40
	(-5.64)	(4.44)	(0.29)						(-5.62)	(4.60)	(-0.92)	
84	1.39	1.53	0.53	0.59	-0.60	1.29	0.29	0.60	-0.60	1.29	0.29	0.60
	(12.11)	(5.92)	(2.05)		(-1.85)	(6.01)	(1.36)		(-1.85)	(6.01)	(1.36)	
85	1.58	0.82	-0.18	0.59	1.70	1.03	0.03	0.59	1.19	1.01	0.01	0.59
	(10.59)	(5.95)	(-1.31)		(12.66)	(5.96)	(0.15)		(5.82)	(5.96)	(0.08)	
86	-0.23	0.56	-0.44	0.30	-0.03	0.99	-0.01	0.46	-0.39	1.04	0.04	0.51
	(-0.65)	(3.84)	(-3.04)		(-0.11)	(5.20)	(-0.07)		(-1.30)	(5.47)	(0.22)	
87	1.09	0.98	-0.02	0.49	0.83	1.05	0.05	0.51	0.54	1.06	0.06	0.51
	(4.26)	(5.11)	(-0.10)		(2.56)	(4.85)	(0.25)		(1.54)	(5.14)	(0.30)	
88	0.20	1.26	0.26	0.58	1.04	1.33	0.33	0.65	0.85	1.39	0.39	0.61
	(0.60)	(8.92)	(1.81)		(3.83)	(7.53)	(1.89)		(3.04)	(8.19)	(2.31)	
89	-0.12	0.90	-0.10	0.65	-0.13	1.15	0.15	0.81	0.22	1.27	0.27	0.73
	(-0.48)	(11.28)	(-1.23)		(-0.50)	(10.79)	(1.38)		(0.97)	(11.04)	(2.34)	
90	-0.19	1.00	0.00	0.62	-1.02	1.14	0.14	0.73	-0.35	1.25	0.25	0.67
	(-0.77)	(10.86)	(0.01)		(-3.06)	(10.64)	(1.27)		(-1.29)	(10.80)	(2.16)	
91	-0.10	1.18	0.18	0.61	-0.34	1.25	0.25	0.62	-0.25	1.45	0.45	0.65
	(-0.36)	(9.31)	(1.42)		(-1.12)	(9.23)	(1.82)		(-0.83)	(9.17)	(2.83)	
92	0.35	1.11	0.11	0.65	-0.08	1.29	0.29	0.66	0.12	1.56	0.56	0.69
	(1.30)	(10.64)	(1.04)		(-0.27)	(10.65)	(2.37)		(0.42)	(10.39)	(3.73)	
93	-0.56	0.99	-0.01	0.66	-0.60	1.17	0.17	0.67	-0.58	1.49	0.49	0.69
	(-2.12)	(11.87)	(-0.13)		(-2.27)	(11.93)	(1.76)		(-2.14)	(11.55)	(3.80)	
94	1.03	1.01	0.01	0.69	0.46	1.13	0.13	0.69	0.46	1.42	0.42	0.69
	(4.84)	(13.86)	(0.18)		(1.88)	(13.84)	(1.61)		(1.84)	(13.87)	(4.09)	
Average	0.08	1.00	0.00	0.54	0.11	1.16	0.16	0.64	-0.35	1.18	0.18	0.57
	(0.25)	(15.43)	(-0.02)		(0.46)	(33.55)	(4.75)		(-1.16)	(15.63)	(2.37)	