Firm Specific Information and the Cost of Equity Capital

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Abstract

We develop a comprehensive and large-sample measure of a firm's information quality. The measure is the ratio of firm-specific return variation to firm-specific cash-flow variation. Empirical evidence supports the validity of our measure. Using this measure, we find that cost of equity capital decreases by about -0.4% on an annual basis if a firm's information quality increases by one standard deviation. This is consistent with the joint hypotheses that (1) firm-specific stock returns contain economic information as argued by Morck, Yeung, and Yu (2000) and (2) better information quality can lower the cost of equity.

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1 Introduction

When there is uncertainty or information asymmetry, information quality may affect the cost of equity capital. Higher quality information could, for example, reduce parameter uncertainty (Barry and Brown (1985)) or the extent of adverse-selection problems between traders (Diamond and Verrecchia (1991)).

Empirical investigations of the relation between information quality and the cost of equity capital have attracted research interest for some time. Such investigations have, however, typically been based on small samples and short time periods. Botosan (1997) finds that greater disclosure is associated with a lower cost of equity capital for firms with low analyst following. She uses a sample of 122 manufacturing firms, and measures disclosure as the amount of voluntary disclosure provided in the firms' 1990 annual reports. Botosan and Plumlee (2003) find a negative correlation between cost of capital and the Association for Investment and Management Research (AIMR) analyst rankings of corporate disclosure. The rankings are available for about 200 to 300 firms per year from 1979 to 1996. Leuz and Verrecchia (2000) show that German firms that switch from German Generally Accepted Accounting Principles (GAAP) to International Accounting Standards (IAS) or U.S. GAAP have a lower information asymmetry component of their equity cost-of-capital. Baber and Gore (2005) find that municipal bond yields are 15 basis points lower in states that have mandated the adoption of GAAP disclosure for municipal bond issuers and that the extent of the yield reduction is increasing in proxies for information asymmetry.

The lack of large sample evidence is probably due to the difficulty in constructing a good empirical measure of overall information quality. We attempt to address this issue by developing a measure of information quality based on firm-specific information. In our model, investors value a firm using a weighted average of the firm's reported profitability and industry-level profitability. The higher the information quality, the more weight is put on the firm-specific information. In the extreme case of no firm-specific informativeness, a firm will be valued at the industry mean level of profitability. We show that information quality can be measured as the ratio of the idiosyncratic volatility of returns to the idiosyncratic volatility of reported cash flows.

This measure is related to recent arguments in the finance literature about the meaning of firm-specific stock returns. Traditionally, firm-specific returns have generally been regarded as "noise." Roll (1988) argues that the low R-squared of popular asset pricing models could be consistent with noise in prices. West (1988) argues theoretically that more firm-specific volatility is associated with less information.

Several recent papers, however, attempt to empirically link firm-specific returns to economic efficiency. Morck, Yeung, and Yu (2000) find greater firm-specific price variation (i.e., less synchronicity of returns across firms) in economies where the government better protects outside investors' private property rights. The results are consistent with the hypothesis that strong property rights promote informed arbitrage, leading to the impounding of more firm-specific information and thus less comovement in stock returns across firms. Durnev, Morck, Yeung, and Zarowin (2003) find that firms and industries with lower market model R^2 statistics exhibit higher association between current returns and future earnings, indicating more information about future earnings in current stock returns. Durnev, Morck, and Yeung (2004) find a positive relation between firm-specific variation in stock returns and a measure of corporate investment efficiency. Consistent with the firm-specific information argument, Fox, Morck, Yeung, and Durnev (2003) find that the Management Discussion and Analysis (MD&A) disclosure requirements adopted in 1981 increase the firm-specific stock returns for bad-news firms.

We contribute to this literature by decomposing firm-specific stock returns into firm-specific cash flow news and information quality. We show that a firm can have high firm-specific return variation because it has high firm-specific cash flow variation or high quality of information. Hence, we can measure the quality of information about the firm with firm-specific returns by controlling for the underlying fundamentals.

Our empirical approach and results are as follows. We first construct the information quality measure using firm-specific stock returns and cash flows. We then assess the measure by correlating it with some mandatory disclosure variables. Consistent with our measure capturing information quality, we find that it increased for pension-intensive firms after the mandatory disclosure requirement for pension information in the 1980s. Firms in the oil and gas industry also experienced an increase in our measure of firm-specific information after they began making mandated disclosures of their reserves. Our measure is positively correlated with the ranking of disclosure policies by AIMR analysts, and firms with higher information quality based on our measure have higher analyst coverage and lower dispersion in analyst forecasts.

We find that the cost of equity is negatively related to information quality. We measure cost of equity in two ways: using the implied cost of equity approach based on both Gebhardt, Lee, and Swaminathan (2001) and Easton (2004) and using the Fama and French (1993) three-factor model. We find that for a one standard deviation increase in information quality, the cost of equity decreases by about 0.4%. The results are consistent across the two approaches to estimating the of cost of equity.

Our findings are consistent with the joint hypotheses that firm-specific stock returns contain meaningful information and that firms' information quality affects the cost of equity. Our contributions are thus two-fold. First, our results lend support to the argument originated by Morck, Yeung, and Yu (2000) that idiosyncratic stock returns contain useful economic information. Our results indicate that more firm-specific information in stock returns is related to a lower cost of equity and hence potentially improves the capital allocation efficiency of the economy. Second, we provide large sample evidence on the effect of information quality on the cost of equity. This corroborates the findings from many previous studies based on small samples, short time periods and partial measures of information quality.

The paper proceeds as follows. In the next section, we develop a measure of information quality using firm-specific returns and discuss the empirical estimation of this measure. Section 3 assesses the measure by correlating it with changes in mandatory disclosure requirements, AIMR analyst rankings, and analyst forecast properties. Section 4 links our information quality measure with the cost of equity and Section 5 discusses a future refinement of our measure. The last section concludes.

2 Measure of Information Quality

In this section, we develop a simple measure of corporate information quality. The idea is that when information quality is high, investors trust the numbers that are reported by the firm. When information quality is poor, investors treat the firm like an average firm in its industry. It turns out that our measure is the ratio of idiosyncratic return volatility to the idiosyncratic (reported) cash-flow volatility. The rest of this section tries to establish the link between our measure and information quality.

Assume that investors perceive a firm's permanent earnings as a geometrically weighted average of reported earnings and industry average earnings. If the firm has good disclosure, investors put more weight on firm's reported earnings. If investors don't trust the disclosure, they put more weight on industry earnings. We denote $\tilde{E}_{j,t}$ as investors' perception of the firm j's permanent earnings in year t; $E_{j,t}$ as the firm's reported earnings; and $E_{I,t}$ as the industry average earnings. We scale the earnings by firm assets $A_{j,t}$ and industry total assets $A_{I,t}$. Formally, the permanent earnings perceived by investors is

$$\frac{\tilde{E}_{j,t}}{A_{j,t-1}} = \left(\frac{E_{j,t}}{A_{j,t-1}}\right)^{\delta} \left(\frac{E_{I,t}}{A_{I,t-1}}\right)^{1-\delta} \tag{1}$$

Here, δ is between 0 and 1 and is the weight put on firm-specific information.

Taking logarithms and then the first-order difference, we have

$$\tilde{e}_{j,t} = \delta e_{j,t} + (1-\delta)e_{I,t} + (1-\delta)\left(log\left(\frac{A_{j,t-1}}{A_{I,t-1}}\right) - log\left(\frac{A_{j,t-2}}{A_{I,t-2}}\right)\right) \tag{2}$$

Here the lower case variables denote the log-growth rate of the variable. That is, $\tilde{e}_{j,t}=log\left(\frac{\tilde{E}_{j,t}}{\tilde{E}_{j,t-1}}\right)$, $e_{j,t}=log\left(\frac{E_{j,t}}{E_{j,t-1}}\right)$, $e_{I,t}=log\left(\frac{E_{I,t}}{E_{I,t-1}}\right)$. $\frac{A_{j,t}}{A_{I,t}}$ represents the firm's share of the industry's assets. Assuming that the firm's share of the industry's assets does not change much from year $t-2$ to year $t-1$, then we have approximately

$$\tilde{e}_{j,t} = \delta e_{j,t} + (1-\delta)e_{I,t} \tag{3}$$

Prices are determined by investors' perceived permanent earnings. Further assuming firms have a constant cost of equity capital and a constant expected growth rate, we have

$$P_{j,t} = \frac{\tilde{E}_{j,t}}{\mu_j - g_j} \tag{4}$$

where μ_j is the constant discount rate, and g_j is the constant growth rate.

In this setup, $r_{j,t}$=$\tilde{e}_{j,t}$, i.e., a firm's stock return is the same as its permanent earnings growth rate. This implies that the idiosyncratic variance of the return must be equal to the idiosyncratic variance of the perceived permanent earnings.

Defining idiosyncratic as relative to the industry, we assume the following relation between firm returns and industry returns and between firm earnings and industry earnings:

$$r_{j,t} = \tilde{e}_{j,t} = \alpha + \beta r_{I,t} + \epsilon^r_{j,t} \tag{5}$$

$$e_{j,t} = a + b e_{I,t} + \epsilon^e_{j,t} \tag{6}$$

It's easy to see that the idiosyncratic variance of the perceived earnings is equal to δ^2 times the idiosyncratic variance of the reported earnings growth. That is,

$$var(\epsilon^r_j) = \delta^2 var(\epsilon^e_j) \tag{7}$$

Thus, δ, which measures information quality, can be calculated as the idiosyncratic volatility of the stock return divided by the idiosyncratic volatility of earnings:

$$\delta = \frac{vol(\epsilon^r_j)}{vol(\epsilon^e_j)} \tag{8}$$

2.1 Empirically Measuring Information Quality

2.1.1 Measuring Idiosyncratic Return Volatility

For stocks in year t (t between 1972 and 2004), we use monthly return data from year t-5 to t-1 to calculate idiosyncratic volatility in the following regression.

$$r^j_t = a_j + b^M_j r^M_t + b^I_j r^I_t + \epsilon^j_t \tag{9}$$

where r_t^j is the firm's monthly stock return, r_t^M is the CRSP value-weighted return, and r_t^I is the Fama and French (1997) industry return. We label the annualized idiosyncratic volatility ($\sqrt{1}2 * std(\epsilon_t^j)$) as $IVOL_{ret}$.

To ensure the accuracy of the regression, we require the firm to have at least 50 valid monthly returns.

2.1.2 Measuring Idiosyncratic Earnings Volatility

For stocks in year t (t between 1972 and 2004), we use quarterly Compustat data from year t-5 to t-1 to calculate idiosyncratic earnings volatility with the following regression.

$$EG_t^j = a_j + b_j^M EG_t^M + b_j^I EG_t^I + \epsilon_t^j \tag{10}$$

where EG_t^j is the growth rate of operating earnings constructed as $\frac{\text{Operating Earnings}_t}{\text{Operating Earnings}_{t-4}} - 1$. Operating earnings is data item #8 in the quarterly Compustat dataset. To avoid complications that arise from seasonality, the denominator is lagged one year, so that it is measured for the same quarter of the year as the numerator. If lagged earnings are negative, the growth rate is not meaningful and we drop the observation.[1] EG_t^I is the industry's weighted-average earnings growth rate, where industry is defined as in Fama and French (1997). EG_t^M is the market's weighted-average earnings growth rate. We require at least 15 quarters of data. We label the idiosyncratic volatility as $IVOL_{cf}$.

2.1.3 Measure of Information Quality

We construct the information quality score as $\frac{IVOL_{ret}}{IVOL_{cf}}$. The intuition of this measure is that, controlling for cash flow idiosyncratic volatility, the better a firm's information quality, the higher its firm-specific return volatility. Compared with other empirical measures of information quality, our measure captures the overall quality of information from the perspective of the equity investors.

[1] Because we use operating earnings rather than net income, the percentage of loss firms is small and there is no impact on our estimation.

Because the number of firms that have enough quarterly earnings from Compustat before 1980 is relatively small (typically less than 100 per quarter), we limit our sample to the post-1980 intersection of Compustat and CRSP. In later tests where the implied cost of equity is used, we further limit our sample to post-1984 in order to have I/B/E/S analyst forecast data available.

The mean of our information quality measure is 0.72, while the median is 0.36 (Table I). There is huge variation across firms in information quality: the standard deviation is about one and the inter-quartile range is about 0.7. About 10% of the sample firm-years have information quality scores greater than the theoretical upper bound of one in our framework. This indicates that our measure may be biased upward because of time-varying expected returns. We will address this issue in our future work. To reduce the impact of extreme observations, we winsorize all continuous regression variables at the 1st and 99th percentiles of their distribuions.

3 Relating Information Quality to Measures of Disclosure

In this section, we empirically assess our measure of information quality by examining its association with some measures of disclosure. Specifically, we find that our information quality measure increased, as expected, after two new regulations that increased mandatory disclosures. We also find that our measure is positively correlated with some components of the AIMR analyst rankings of disclosure. Furthermore, we find that firms that are followed by more analysts have somewhat higher information quality, and that analyst forecast dispersion is much smaller for firms with higher information quality. These findings support the notion that our measure indeed captures the quality of firm-specific information.

3.1 Pension Disclosure Regulation Event

We first check whether the mandatory disclosure requirement for pension data affects our measure of information quality. The event we use is the introduction of Statement of Financial Accounting Standard 35 (SFAS35). SFAS35 (Accounting and Reporting by Defined Benefit Pension Plans) was issued in March 1980 and became effective for fiscal years after 1980.

Prior to this statement, firms were not required to report their pension obligations. This Statement established standards of financial accounting and reporting for the annual financial statements of a defined benefit pension plan. It requires that the financial statements include information regarding (a) the net assets available for benefits as of the end of the plan year, (b) the changes in net assets during the plan year, (c) the actuarial present value of accumulated plan benefits as of either the beginning or end of the plan year, and (d) the effects, if significant, of certain factors affecting the year-to-year change in the actuarial present value of accumulated plan benefits. Either or both of those categories of information may be presented on the face of one or more financial statements or in accompanying notes.

We examine the change of information quality for public firms around the issuance of SFAS35. More specifically, we look at the disclosure quality change from 1977-1979 to 1985-1987 and see whether firms that had greater pension liabilities experienced larger increases in our information quality measure.[2]

Panel A of Table II shows the results from the regression of information quality on POST, PENSION, and the interaction term of POST and PENSION. POST is a year indicator that equals 1 if the year is post-SFAS35 and 0 otherwise. PENSION is a measure of pension intensity, calculated as the amount of Projected Benefit Obligation from the firm's defined benefit pension plans scaled by total assets. As can be seen from Table II, the interaction term of POST and PENSION produces a significantly positive coefficient estimate. The result is consistent with the joint hypothesis that

[2]Years from 1980 to 1984 are dropped because our estimates of information quality for year t use the data from year $t-5$ to $t-1$. Hence, the information quality estimates for 1980 to 1984 will be contaminated by pre-SFAS35 data. However, including 1980-1984 does not change our results.

SFAS35 improves pension-intensive firms' information quality and that our measure captures firm-specific information quality.

3.2 Oil and Gas Disclosure Regulation Event

Statement of Financial Accounting Standard 69 (SFAS69) significantly improves the disclosure required of oil and gas companies. SFAS69 (Disclosures about Oil and Gas Producing Activities), became effective for fiscal years beginning on or after December 15, 1982. In this section, we check the change in our information quality measure for oil and gas companies from before versus after SFAS69.

SFAS69 establishes a comprehensive set of disclosures for oil and gas producing activities and replaces requirements of several earlier statements. Publicly traded enterprises with significant oil and gas activities, when presenting a complete set of annual financial statements, are required to disclose the following as supplementary information: proved oil and gas reserve quantities; costs relating to oil and gas producing activities; costs incurred in oil and gas property acquisition, exploration, and development activities; results of operations for oil and gas producing activities; and a standardized measure of discounted future net cash flows relating to proved oil and gas reserve quantities.

To the extent our information quality measure is effective, we expect an increase in our measure for oil and gas companies following the implementation of SFAS69. This is indeed the case. Table II Panel B shows the results of a regression of information quality on the indicator variable POST (equal to 1 for years after 1986 and 0 otherwise), an oil & gas industry indicator OIL (equal to 1 for firms with SIC codes equal to 1389 or in the ranges 1300 to 1339, 1370 to 1382, 2900 to 2912, or 2990 to 2999, and equal to 0 otherwise), and the interaction of OIL and POST. We find that the coefficient estimate for the interaction term is significantly positive − firms from oil & gas industries experience a 0.29 increase in information quality relative to non-oil & gas firms following enactment of SFAS69. The result is consistent with SFAS69 improving the information quality of oil & gas firms.[3]

[3] Years from 1982 to 1986 are dropped because our estimates of information quality for year t use the data

3.3 AIMR Analyst Ranking of Corporate Disclosure

Next, we check whether our measure of information quality is correlated with the annual ranking of corporate disclosure practices published by the Association for Investment and Management Research (AIMR). Prior studies have used AIMR scores as a proxy for disclosure quality (Lang and Lundholm (1993) and Lang and Lundholm (1996)). It is a direct and overall measure of disclosure quality, but it has a relatively small sample size. The data are only available for about 200 to 300 firms per year from 1979 to 1996.

In Table III, we examine the relation between our measure of information quality and AIMR scores. AR, QR, IR, and TS are disclosure scores by AIMR calculated as in Bushee and Noe (2001) and are defined as follows: AR is the ranking by analysts of the quality of firms' annual report/10-K disclosure; QR is the ranking by analysts of the quality of firms' quarterly report/10-Q disclosure; IR is the ranking by analysts of the disclosure quality of firms' investor relations activities; and TS is the total score for disclosure quality as rated by AIMR analysts. From Panel A, we find that our information quality measure is strongly positively correlated with the investor relations ranking, marginally postively correlated with the annual report and total disclosure score rankings, and not significantly associated with the quarterly report rankings. In Panel B, where information quality is demeaned using the AIMR industries defined in Bushee and Noe (2001), the results are similar. The Table III results indicate that our measure is strongly associated with the AIMR rankings of investor relations and is not strongly associated with the financial statement rankings nor with the total disclosure score rankings.

Past studies document a positive relation between total stock return volatility and AIMR scores (Lang and Lundholm (1993)). To ensure that our measure of information quality does not correlate with AIMR disclosure rankings through total stock return volatility, we also control for total volatility in the test above. Untabulated results show that our inferences are not sensitive to the inclusion of this control variable.

from year $t-5$ to $t-1$. Hence, the information quality estimates for 1982 to 1986 will be contaminated by pre-SFAS69 data. However, including 1982-1986 does not change our results.

3.4 Analyst Coverage and Forecast Dispersion

We now examine how our measure of information quality is related to two analyst coverage characteristics. We examine the association with the level of analyst coverage in order to assess whether our measure is distinct from size-based measures of information quality such as the amount of analyst coverage. We also investigate the association of our measure with the dispersion of analyst forecasts to assess whether our measure appears to be driven more by public disclosure quality or by private information acquisition.

In Table IV, we regress our disclosure measure on the number of analysts that are covering a firm and the dispersion of the forecasts (the logarithm of standard deviation of forecasts divided by mean forecasts of EPS). We include observations with no coverage when calculating the Analyst Coverage variable and therefore measure it as (1 + # of analysts). We require a minimum of three analysts in order to calculate a value for the Forecast Dispersion variable. We find that our information quality measure is, at most, weakly postively associated with the level of analyst coverage. Thus, our measure appears to capture aspects of information quality distinct from size-based information environment proxies (we will also examine the relation of our measure with firm size).

The Table IV results also reveal a strongly negative association between the information quality measure and analysts' forecast dispersion. This preliminary association must be interpreted with extreme caution because part or all of the association may be induced. Recall that our information quality measure is calculated with idiosyncratic earnings volatility in the denominator. Thus, ceteris paribus, our information quality measure is smaller when idiosyncratic earnings volatility is larger. Forecast dispersion is also likely to be larger when idiosyncratic earnings volatility is higher. The stong negative association between information quality and forecast dispersion is therefore likely to reflect something other than the economic relation we are interested in to the extent that large values of idiosyncratic earnings volatility occur for reasons unassociated with large amounts of cash flow news. It is plausible that large values of idiosyncratic earnings volatility do capture noise, and not just news, given the large right skewness in the distribution of this variable. We will investigate this issue further. If the negative association is not entirely induced, the following implication arises. To the extent that forecast dispersion is decreasing in the amount (or quality) of public disclosure and increasing in the amount (or quality) of private information acquisition, this result indicates that our measure is more strongly influenced by public disclosure than by private information acquisition.

4 The Effects of Information Quality on the Cost of Equity

There are at least two theoretical reasons why increased disclosure can, by improving information quality, reduce the cost of capital. In Barry and Brown (1985) disclosure reduces the cost of capital by reducing parameter uncertainty. In Diamond and Verrecchia (1991), disclosure reduces the cost of capital by reducing the adverse-selection problems between traders. However, the empirical evidence linking information quality and the cost of capital is typically based on small samples and short time periods. In this section, we establish large-sample evidence of this theoretical prediction.

Specifically, we construct three measures of the cost of equity. The first is the implied cost of equity as calculated in Gebhardt, Lee, and Swaminathan (2001). The second is an alternative approach for estimating the implied cost of equity capital developed in Easton (2004). The third is based on the Fama and French (1993) three-factor model. We find that our measure of information quality is negatively correlated with all three measures of the cost of equity.

4.1 Measuring the Cost of Equity

4.1.1 Implied Cost of Equity

The first approach we use to estimate cost of equity is the implied cost of equity method. This approach assumes a valuation model and infers the cost of equity needed to arrive at the current equity price given the other parameters of the assumed valuation model.

We first follow Gebhardt, Lee, and Swaminathan (2001) in calculating the implied cost of equity capital using the residual income model.

Assuming the dividend discount model,

$$P_t = \sum_{i=1}^{\infty} \frac{E_t(D_{t+i})}{(1+r_e)^i} \tag{11}$$

and clean surplus accounting, we get the residual income equity valuation model

$$P_t = B_t + \sum_{i=1}^{\infty} \frac{E_t[(ROE_{t+i} - r_e)B_{t+i-1}]}{(1+r_e)^i} \tag{12}$$

where P is the stock price, D is the dividend, r_e is the discount rate, ROE is the return on equity, B is the book value of equity, and $E(.)$ is the expectation operator.

We can thus solve for the cost of equity from the equation above using current stock price, current book value of equity, and forecasts of future ROE and book value of equity. Following Gebhardt, Lee, and Swaminathan (2001), we perform the forecasts in the following way.

First, we forecast earnings in two steps: 1) we forecast earnings explicitly for the next three years using I/B/E/S EPS and EPS growth forecasts, 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. The mean reversion is achieved through simple linear interpolation between period t+3 ROE and the industry median ROE. The industry median ROE is a moving median of ROEs from all firms in the same Fama-French industry during the past ten years.

Second, by assuming a clean-surplus accounting system and assuming a constant dividend payout ratio, we forecast future book value of equity using the forecasted future earnings.

With future earnings and book value of equity, we can then calculate future ROE ($FROE$) and stock price at year t will be:

$$\begin{aligned} P_t &= B_t + \frac{FROE_{t+1} - r_e}{(1+r_e)} B_t + \frac{FROE_{t+2} - r_e}{(1+r_e)^2} B_{t+1} + TV \\ &= B_t + \frac{FROE_{t+1} - r_e}{(1+r_e)} B_t + \frac{FROE_{t+2} - r_e}{(1+r_e)^2} B_{t+1} \\ &\quad + \sum_{i=3}^{T-1} \frac{FROE_{t+i} - r_e}{(1+r_e)^i} B_{t+i-1} + \frac{FROE_{t+T} - r_e}{r_e(1+r_e)^{T-1}} B_{t+T-1} \end{aligned} \tag{13}$$

where $FROE_{t+1}$ and $FROE_{t+2}$ are earnings forecasts for the next two years, and TV is the terminal value estimate.

We estimate the implied cost of equity by numerically solving the above equation. Since I/B/E/S only has large sample data on EPS forecasts after 1984, we constrain our sample to 1984-2004. From Table I, the mean and median cost of equity for our sample are both 12% with a standard deviation of 5% and an inter-quartile range of 6%.

The Gebhardt et al. method (and all other valuation methods based on the residual income model) assumes clean-surplus accounting, which may not hold for many reasons (Ohlson (2001) and Easton (2004)). In addition, the terminal growth rate is often arbitrary in the empirical models and this brings further estimation errors. We hence also use the approach proposed by Easton (2004) to estimate the implied cost of equity and redo our tests.

Easton (2004) models equity price as a function of earnings and earnings growth and provides an empirical means of simultaneously estimating the expected rate of return and the rate of change in abnormal growth in earnings beyond the (short) forecast horizon.

Starting with a no-arbitrage assumption and assuming a perpetual rate of change in abnormal growth in earnings, Easton (2004) derives the following equation for equity price:

$$P_t = eps_{t+1}/r + agr_{t+1}/(r(r - \Delta agr)) \tag{14}$$

where $agr_{t+1} = eps_{t+2} + r * dps_{t+1} - (1 + r)eps_{t+1}$ is the expected abnormal growth in accounting earnings, eps_{t+1} is the EPS forecast in year $t + 1$, dps_{t+1} are the expected dividends per share, r is the expected return, and Δagr is the perpetual rate of change in agr.

Rearranging terms, we have

$$ceps_{t+2}/P_t = \gamma_0 + \gamma_1 eps_{t+1}/P_t + e_t \tag{15}$$

where $\gamma_0 = r(r - \Delta agr)$ and $\gamma_1 = (1 + \Delta agr)$ and $ceps_{t+2}$ is the cum-dividend EPS forecast in year $t + 2$.

Hence, the following regression can be used to estimate the parameters.

$$ceps_{i,t+2}/P_{it} = \gamma_0 + \gamma_1 eps_{i,t+1}/P_{it} + e_{it} \tag{16}$$

In the regression, $\gamma_0 = r(r - \Delta agr)$ and $\gamma_1 = (1 + \Delta agr)$, and we can solve for r and Δagr with the estimates of γ_0 and γ_1.

Following the suggestions in Easton (2004), we first sort firms into 40 equally sized portfolios every year based on our information quality measure. For each portfolio, we run the above regression to estimate γ_0 and γ_1 and solve for the portfolio-specific cost of equity. We then check whether the cost of equity is systematically different across the portfolios.

The cost of equity using the Easton method is slightly higher than that from the Gebhardt et al. approach. Mean and median of cost of equity estimates are both 15% and the standard deviation is about 3%. The fact that somewhat lower estimates are obtained using the Gebhardt et al. approach is not surprising. Easton, Taylor, Shroff, and Sougiannis (2002) show that the estimate of growth in residual income implicit in the Gebhardt et al. method is too low, resulting in an implied cost of equity that may also be too low.

4.1.2 Fama-French 3-Factor Model Cost of Equity

As an alternative approach to measuring the cost of equity, we use the Fama-French three factor model. For stocks in year t (t between 1980 and 2000), we estimate the following regression using monthly data for year t through year t+4:

$$r_t^j - r_t^f = \alpha_j + \beta_j(r_t^M - r_t^f) + \beta_h HML_t + \beta_s SMB_t + \epsilon_t^j \tag{17}$$

We then construct the Fama-French cost of equity capital as follows:

$$FFCOC = r_t^f + \beta_j(r^M - r^f) + \beta_h HML + \beta_s SMB \tag{18}$$

where the market premium $(r^M - r^f)$, HML, and SMB are the averages for these factors from 1925 to 2004.

The mean and median of *FFCOC* figures (both about 14%) are, like the Easton (2004) estimates, slightly bigger than the estimates using the Gebhardt et al. implied cost of equity approach. The standard deviation is about 7% and the inter-quartile range is 9%.

4.2 The Relation Between Information Quality and Cost of Equity

In Tables V through VII, we regress our measures of cost of equity on our measure of information quality and control variables. In Tables V and VI, we use implied cost of equity measures. In Table VII, we use the Fama-French 3-factor model based cost of equity. Because cost of equity tends to be autocorrelated, we use two techniques to address this autocorrelation. In Panel A of the three tables, we use pooled regressions, but we calculate the Newey-West robust standard errors with three lags. In Panel B of the three tables, we estimate the regression year by year, and then report the average coefficient from the time series. The standard errors are also calculated with the Newey-West procedure.

4.2.1 Univariate Regressions

As can be seen from Panel A of Table V, there is a negative and significant relation between our measure of information quality and the Gebhardt et al. implied cost of capital. The coefficient estimate on information quality in a simple regression of cost of capital on information quality is -0.4% with a Newey-West t-statistic of -13.26. The coefficient estimates are almost the same if Fama and MacBeth (1973) regressions are used, although the t-statistics become considerably smaller (Panel B). These results are consistent with the hypothesis that better information quality lowers the cost of equity. The economic magnitude of the coefficient is reasonable. For a one standard deviation increase in information quality, the cost of equity is reduced by -0.4% on an annual basis.

We get similar results using cost of equity calculated using the approach of Easton

(2004) and using the Fama-French three-factor model (Table VI and Table VII). The economic magnitude of the association is stable across the tables. For a one standard deviation increase in information quality, the Fama-French cost of capital goes down by about 0.4% to 0.5% on an annual basis.

4.2.2 Controlling for Other Determinants of Cost of Equity

We also include the following control variables and find that our results are quite robust.

- Herfindahl Index. By construction our measure of information quality, δ, captures the weight investors put on firm's reported earnings versus industry earnings. Here we have attributed δ to information quality. But δ may be proxying for other things. In particular, it might proxy for industry competitiveness. For instance, if a firm has some sort of monopoly power, then its earnings can be expected to persist for a long time before they revert to the industry level. This kind of firm will have a high δ. So our findings are also consistent with the hypothesis that monopolistic firms (or firms in highly concentrated industries) have a lower equity cost of capital. Indeed, Hou and Robinson (2005) find that firms in concentrated industries have lower realized returns.

  To address this issue, we control for industry concentration measured using the Herfindahl index. Following Hou and Robinson (2005), we construct the Herfindahl index for an industry as

  $$Herfindahl_j = \sum_{i=1}^{I} s_{i,j}^2 \tag{19}$$

  where $s_{i,j}$ is firm i's market share of sales in industry j. We define industries by three-digit SIC codes. We perform the Herfindahl index calculations each year for each industry, and then average the values over the past three years. This ensures that potential data errors do not have undue influence.

- CAPM β. In Barry and Brown (1985), information quality affects cost of equity incrementally to the impact of the conventionally estimated CAPM β. A somewhat similar idea is found in the model of Lambert, Leuz, and Verrecchia (2005), in which information quality is associated with the equity cost of capital in a manner that is fully captured by a fully specified, forward-looking β. Because a β derived from historical returns generally will not capture forward-looking β, including both historical β and an information quality variable is justified when regressing the cost of capital on explanatory variables. Hence, we include β as a control variable to see whether our information quality measure has incremental power in explaining variation in the cost of equity. We measure the CAPM β in year t using monthly returns from year t-5 to year t-1.

- Firm Age. Pástor and Veronesi (2003) argue that firm age affects equity price because uncertainty decreases as the firm matures. Therefore, we control for firm age (logarithm of one plus the number of years since the firm first appears in the CRSP database) in our regressions.
- Analyst Coverage and Forecast Dispersion. In a previous section, we showed that analyst coverage and especially analyst forecast dispersion are correlated with our measure of information quality. Diether, Malloy, and Scherbina (2002) document that stocks with high analyst forecast dispersion have lower realized returns. To mitigate the concern that our information quality measure merely captures analyst forecast properties, we also include them as control variables. Interestingly, we find that in most of our specifications, analyst forecast dispersion is positively correlated with the cost of capital.
- Growth. Finally, we also control for firm growth as measured by the natural logarithm of the three-year sales growth rate. Prior literature has shown that some growth variables can predict returns even after controlling for typical determinants of returns.

Tables V through VII show that our results are generally robust to the inclusion of the control variables. Both the statistical significance and economic magnitude of the coefficient estimate on information quality generally remain the same or become stronger, suggesting that our results are not likely to be driven by omitted variables.

To mitigate the concern that there are common industry components in our measures of cost of equity and information quality, we further check the association between them by exploiting within-industry variation. In most columns in Panel A of Tables V and VII, we use industry fixed effects. The results indicate that the relation between our measure of information quality and measures of the cost of equity is still statistically significant and the economic magnitude remains the same. This suggests that our empirical results are not merely capturing across-industry effects.

Overall we conclude that information quality is significantly negatively correlated with cost of capital, both statistically and economically.

5 Future Refinement of the Measure

In developing our measure, we make the assumption that expected returns are constant. There has been substantial evidence that expected returns for the market are not constant (e.g., see Campbell (1991) and Campbell and Ammer (1993)). Although Vuolteenaho (2002) show that for individual stocks, cash flow variation is much more important than expected return variation, we wish to consider the effect of time-varying expected returns on our measure of information quality.

5.1 Alternative Interpretation: Time-Varying Expected Returns

In our current model, we assume that expected return is constant for a firm. Therefore, we argue that our measure captures information quality. In reality, expected returns are time-varying. For a traditional asset pricer, our measure may be capturing the relative importance of the idiosyncratic expected return news to the idiosyncratic cash-flow news.

To see this, assume a traditional asset pricing framework. Assume that disclosure is perfect and expected returns are time-varying. The first assumption means that a firm's reported earnings are its true earnings. From $P_{j,t}=\frac{E_{j,t}}{R_{j,t}}$, define $r_{j,t}=log(\frac{P_{j,t}}{P_{j,t-1}})$,

$e_{j,t}$=$log(\frac{E_{j,t}}{E_{j,t-1}})$, and $\mu_{j,t}$=$log(\frac{R_{j,t}}{R_{j,t-1}})$. Then

$$r_{j,t} = e_{j,t} + \mu_{j,t} \tag{20}$$

This also holds for the industry return,

$$r_{I,t} = e_{I,t} + \mu_{I,t} \tag{21}$$

Now assume that firm cash flow news is related to the cash flow news of the firm's industry, but not related to the industry's expected return news:

$$e_{j,t} = a + b * e_{I,t} + \epsilon^e_{j,t} \tag{22}$$

and that firm expected return news is related to the expected return news of the firm's industry, but not related to the industry's cash flow news:

$$\mu_{j,t} = c + d * \mu_{I,t} + \epsilon^\mu_{j,t} \tag{23}$$

Then

$$r_{j,t} = a + c + be_{I,t} + d\mu_{I,t} + \epsilon^e_{j,t} + \epsilon^\mu_{j,t} \tag{24}$$

Now assume that b=d, then

$$r_{j,t} = a + c + b * r_{I,t} + \epsilon^e_{j,t} + \epsilon^\mu_{j,t} \tag{25}$$

Therefore, idiosyncratic return ϵ^r_j=ϵ^e_j+ϵ^μ_j, and:

$$\frac{var(\epsilon^r_j)}{var(\epsilon^e_j)} = 1 + \frac{var(\epsilon^\mu_j)}{var(\epsilon^e_j)} \tag{26}$$

Therefore, our information quality variable may be measuring the relative importance of idiosyncratic cash flow news versus idiosyncratic discount rate news.

5.2 Refinement: Model of Three Way Decomposition

In the future, we plan to refine our measure by considering a three-way decomposition of return variance. That is, we consider return variance being determined by the expected return news component, firm cash flow component and information quality. Now let's assume that

$$r_{j,t} = \delta e_{j,t} + (1-\delta)e_{I,t} + \mu_{j,t} \tag{27}$$

Intuitively,

$$var(\epsilon_j^r) = \delta^2 var(\epsilon_j^e) + var(\epsilon_j^\mu) \tag{28}$$

Thus we can refine our measure as

$$\delta^2 = \frac{var(\epsilon_j^r) - var(\epsilon_j^\mu)}{var(\epsilon_j^e)} \tag{29}$$

6 Conclusions

We propose a new way of measuring corporate information quality. We assume that when pricing stocks, investors use a weighted average of firms' reported earnings and industry earnings. Investors put more weight on firms' reported earnings when the information quality is high. It turns out that we can use the ratio of idiosyncratic volatility of returns to that of cash flow to measure information quality.

Several tests assess the relation between our information quality measure and various measures of disclosure quality. Following passage of regulations that mandate disclosure of pension obligations and oil reserves in the 1980's, our measure increases for the firms most affected by the new regulations (those that have high pension obligations and those in oil-related industries). Our measure of information quality is strongly correlated with the investor relations component of the AIMR analyst rankings of corporate disclosure, but is only weakly correlated with the financial reporting components and with the AIMR's total disclosure score. Finally, our measure of information quality is weakly positively correlated with analyst coverage and strongly negatively correlated with forecast dispersion.

Because our measure can be readily calculated for almost all firms, we are able to provide large-sample evidence that information quality is negatively related to the cost of equity capital. We use two approaches to estimate cost of capital: implied cost of capital (Gebhardt, Lee, and Swaminathan (2001) and Easton (2004)) and Fama-French cost of capital. Our results remain robust after controlling for a number of variables. This confirms the findings from previous studies based on small samples, short time periods and partial measures of information quality.

Our empirical evidence also lends additional support for the argument that idiosyncratic stock returns are informative and more firm-specific information in stock returns can potentially improve the capital allocation efficiency of the economy (Durnev, Morck, and Yeung (2004)).

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Table I: Descriptive Statistics

This table shows the descriptive statistics for the main variables. The sample consists of the intersection of COMPUSTAT-CRSP firm-years from 1980 to 2004. For GLS COC (implied cost of equity measure using the approach in Gebhardt, Lee, and Swaminathan (2001) and Easton COC (implied cost of equity measure using the approach in Easton (2004)), the sample is from 1984 to 2004. IVOL(return) is the idiosyncratic volatility for firm i in year t. It is the standard deviation of the residuals in the regressions of firm i's monthly stock returns on value-weighted market returns and industry returns using data from the last five years($t-5$ to $t-1$). Industries are defined as in Fama and French (1997). Return R^2 is the R-squared from the regression. IVOL(earnings) for firm i in year t is the standard deviation of the residuals in the regressions of firm i's quarterly growth in operating earnings over the same quarter of last year on value-weighted market earnings growth and Fama and French (1997) industry earnings growth, using data from the last five years ($t-5$ to $t-1$). Earnings R^2 is the R-squared from the regression. Information is calculated as IVOL(return)/IVOL(earnings). FF COC is the cost of equity implied by Fama and French (1993) three-factor model.

Variable	N	Mean	Std Dev	Min	25th Pctl	Median	75th Pctl	Max
Year	41615	-	-	1980	1987	1992	1996	2000
IVOL(return)	41615	0.35	0.21	0.00	0.21	0.30	0.44	4.11
Return R^2	41615	0.27	0.19	0.00	0.11	0.23	0.39	1.00
IVOL(earnings)	41615	4.44	30.73	0.00	0.30	0.83	2.50	2309.87
Earnings R^2	41554	0.29	0.25	0.00	0.09	0.22	0.42	1.00
Information	41615	0.72	1.00	0.00	0.14	0.36	0.83	5.00
GLS COC	25365	0.12	0.05	0.00	0.09	0.12	0.15	0.29
Easton COC	29349	0.15	0.03	0.10	0.13	0.15	0.16	0.54
FF COC	41615	0.14	0.07	-0.07	0.09	0.14	0.18	0.36

Table II: The Effect of Mandatory Disclosure Events on Information Quality

This table shows the results from the regressions of information quality on mandatory disclosure event variables. In both Panel A and Panel B, the dependent variable is Information, as defined in Table I. In Panel A, POST is an indicator variable that equals one if the year is greater than 1980 and zero otherwise. PENSION is the amount of Projected Benefit Obligation of a firm's defined benefit pension plan divided by its assets. In Panel B, POST is an indicator variable that equals one if the year is greater than 1983 and zero otherwise. OIL is an indicator variable that equals one if a firm is in the Oil & Gas industry and zero otherwise. All standard errors are Newey-West adjusted with three lags.

Panel A

	Constant	Post	Pension	Pension*Post	Observations	R^2
(1)	0.89	-0.14			6350	0.14%
	(19.44)***	(-3.02)***				
(2)	1.08	-0.34	-4.20	4.44	6350	0.59%
	(18.26)***	(-5.66)***	(-5.02)***	(5.24)***		

Panel B

	Constant	Post	Oil	Oil*post	Observations	R^2
(1)	0.81	-0.12			14401	0.31%
	(57.31)***	(-6.69)***				
(2)	0.82	-0.13	-0.13	0.29	14401	0.41%
	(56.38)***	(-7.29)***	(-1.95)*	(3.48)***		

t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table III: Regressions of Information Quality on AIMR Scores

This table shows the average coefficients and t-statistics from the annual regressions of Information on AIMR analyst rankings of corporate disclosure. In Panel A, the dependent variable is Information, as defined in Table I. In Panel B, the dependent variable is Information demeaned by industry using the industry definitions used for AIMR ranking as in Bushee and Noe (2001). AR, QR, IR, and TS are disclosure scores by AIMR calculated as in Bushee and Noe (2001). AR is the ranking by analysts of the information quality of firms' annual report/10-K disclosure. QR is the ranking by analysts of the information quality of firms' interim (quarterly) report/10-Q disclosure. IR is the ranking by analysts of the information quality of firms' investor relations activities. TS is the overall information quality as rated by AIMR analysts. All standard errors are Newey-West adjusted with three lags.

Panel A: Information Quality on AIMR rankings

	Constant	AR	QR	IR	TS	Observations	R^2
(1)	0.74	0.0012				152	0.46%
	(13.76)***	(1.79)*					
(2)	0.78		0.0004			153	0.86%
	(12.91)***		(0.42)				
(3)	0.69			0.0021		148	1.04%
	(27.01)***			(2.96)***			
(4)	0.79				0.0014	219	0.62%
	(16.54)***				(1.80)*		

Panel B: Demeaned Information Quality on AIMR rankings

	Constant	AR	QR	IR	TS	Observations	R^2
(1)	-0.05	0.0013				152	0.69%
	(-1.02)	(1.68)*					
(2)	-0.0058		0.0005			153	1.26%
	(-0.09)		(0.44)				
(3)	-0.08			0.0019		148	1.22%
	(-2.35)***			(2.79)***			
(4)	-0.03				0.0009	219	0.59%
	(-0.99)				(1.43)		

t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table IV: Regressions of Information Quality on Analyst Coverage and Forecast Dispersion

This table shows the average coefficients and t-statistics from the annual regressions of information quality on analyst coverage and EPS forecast dispersion. The dependent variable is Information, defined as in Table I. Analyst coverage is the natural logarithm of (1+ # of analysts) for a given firm-year, where # of analysts is the number of analysts who are covering the company in that year. Forecast dispersion is the natural logarithm of the standard deviation of the EPS forecasts divided by the mean forecasts at the end of the fiscal year end. All standard errors are Newey-West adjusted with three lags.

	Constant	Analyst Coverage	Forecast Dispersion	Observations	R^2
(1)	0.72	0.04		3121	0.86%
	(28.73)***	(1.90)*			
(2)	0.16		-0.21	1161	7.07%
	(7.17)***		(-11.09)***		
(3)	0.06	0.05	-0.20	1161	7.77%
	(0.64)	(1.33)	(-12.92)***		

t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table V: Regressions of Gebhardt et al. Implied Cost of Capital on Information Quality

This table shows the results from the regressions of implied cost of equity on information quality and control variables. The dependent variable is the cost of equity calculated following Gebhardt, Lee, and Swaminathan (2001). Information is defined as in Table I. Herfindahl is the Herfindahl index for the three-digit SIC industry that the firm belongs to. CAPM β is estimated using monthly data from year t-5 to year t-1. Age is the logarithm of one plus the number of years a firm has been on CRSP. Analyst coverage is the logarithm of one plus the number of analysts following the firm. Dispersion is the logarithm of the standard deviation of analyst EPS forecasts divided by the mean forecast. Sales growth is the logarithm of firm's three-year sales growth. Panel A shows pooled regression results and Panel B shows Fama-MacBeth regression results. All standard errors are Newey-West adjusted with three lags.

Panel A: Pooled regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.13	0.173	0.132	0.13	0.142	0.131	0.196
	(28.18)***	(97.13)***	(24.99)***	(27.81)***	(33.18)***	(28.53)***	(57.29)***
Information	-0.004	-0.003	-0.005	-0.004	-0.003	-0.004	-0.004
	(-13.26)***	(-5.85)***	(-11.86)***	(-13.18)***	(-10.37)***	(-12.84)***	(-5.83)***
Herfindahl		0.002					-0.03
		(0.39)					(-5.26)***
CAPM β			-0.005				-0.01
			(-5.69)***				(-8.81)***
Age				0.001			0.001
				(1.36)			(0.16)
Analyst Coverage					-0.001		-0.001
					(-15.43)***		(-9.07)***
Dispersion					0.001		-0.003
					(4.79)***		(-5.33)***
Sales Growth						-0.004	-0.011
						(-5.53)***	(-6.35)***
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummy	Yes	No	Yes	Yes	Yes	Yes	No
Observations	25365	25365	14767	25365	21248	25146	12992

Panel B: Fama-Macbeth regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.13	0.13	0.14	0.12	0.14	0.13	0.16
	(17.60)***	(13.55)***	(28.13)***	(9.40)***	(30.62)***	(20.14)***	(26.54)***
Information	-0.0031	-0.0031	-0.0041	-0.0031	-0.0040	-0.0029	-0.0043
	(-4.02)***	(-4.22)***	(-6.12)***	(-3.90)***	(-4.27)***	(-4.23)***	(-6.32)***
Herfindahl		-0.011					-0.032
		(-0.66)					(-3.61)***
CAPM β			-0.007				-0.0047
			(-1.47)				(-1.16)
Age				0.0031			-0.0002
				(1.67)*			(-0.13)
Analyst Coverage					-0.009		-0.0083
					(-2.90)***		(-2.91)***
Dispersion					-0.004		-0.0035
					(-8.74)***		(-7.72)***
Sales Growth						-0.0062	-0.01
						(-1.54)	(-2.10)**
Observations	1208	1208	869	1208	1012	1197	764
R^2	0.56%	2.05%	3.21%	1.22%	3.89%	1.75%	8.64%

t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table VI: Regressions of Easton (2004) Implied Cost of Capital on Information Quality

This table shows the results from the regressions of implied cost of equity on information quality and control variables. The dependent variable is the cost of equity calculated following Easton (2004). Each year all firms are sorted into 40 portfolios based on their information quality score and the cost of equity is estimated at portfolio level using the method in Easton (2004). Information is defined as in Table I. Herfindahl is the Herfindahl index for the three-digit SIC industry that the firm belongs to. CAPM β is estimated using monthly data from year t-5 to year t-1. Age is the logarithm of one plus the number of years a firm has been on CRSP. Analyst coverage is the logarithm of one plus the number of analysts following the firm. Dispersion is the logarithm of the standard deviation of analyst EPS forecasts divided by the mean forecast. Sales growth is the logarithm of firm's three-year sales growth. Panel A shows pooled regressions results and Panel B shows Fama-MacBeth regression results. All standard errors are Newey-West adjusted with three lags.

Panel A: Pooled regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.155	0.150	0.165	0.166	0.156	0.149	0.148
	(71.77)***	(29.44)***	(20.49)***	(8.96)***	(12.84)***	(50.63)***	(5.51)***
Information	-0.007	-0.007	-0.009	-0.007	-0.006	-0.009	-0.018
	(-2.13)**	(-2.28)***	(-2.43)**	(-2.23)**	(-1.20)	(-2.90)***	(-2.40)**
Herfindahl		0.032					0.051
		(1.21)					(1.74)*
CAPM β			-0.008				-0.003
			(-1.31)				(-0.50)
Age				-0.004			-0.005
				(-0.61)			(-0.61)
Analyst Coverage					-0.001		0.002
					(-0.12)		(0.32)
Dispersion					-0.000		-0.005
					(-0.09)		(-1.08)
Sales Growth						0.022	0.008
						(3.31)***	(0.74)
Observations	959	959	799	959	959	959	799

Panel B: Fama-Macbeth regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.155	0.144	0.155	0.211	0.185	0.151	0.223
	(41.79)***	(23.24)***	(11.80)***	(12.30)***	(14.22)***	(22.85)***	(6.19)***
Information	-0.007	-0.008	-0.008	-0.009	-0.003	-0.007	-0.009
	(-2.11)**	(-3.16)***	(-2.18)**	(-3.10)***	(-0.41)	(-2.86)**	(-1.73)*
Herfindahl		0.064					0.067
		(2.66)**					(1.84)*
CAPM β			0.001				-0.011
			(0.15)				(-1.04)
Age				-0.019			-0.020
				(-3.14)***			(-1.86)*
Analyst Coverage					-0.012		-0.004
					(-2.70)**		(-1.15)
Dispersion					0.003		0.002
					(0.67)		(0.46)
Sales Growth						0.014	0.006
						(0.99)	(0.39)
Observations	40	40	40	40	40	40	40
R^2	3.85%	7.66%	7.35%	6.48%	9.37%	7.45%	21.69%

t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table VII: Regressions of Fama-French Three-factor Cost of Capital on Information Quality

This table shows the results from the regressions of Fama-French three-factor cost of equity on information quality and control variables. The dependent variable is the cost of equity calculated using the three-factor model in Fama and French (1993). Information is defined as in Table I. Herfindahl is the Herfindahl index for the three-digit SIC industry that the firm belongs to. CAPM β is estimated using monthly data from year t-5 to year t-1. Age is the logarithm of one plus the number of years a firm has been on CRSP. Analyst coverage is the logarithm of one plus the number of analysts following the firm. Dispersion is the logarithm of the standard deviation of analyst EPS forecasts divided by the mean forecast. Sales growth is the logarithm of firm's three-year sales growth. Panel A shows pooled regressions results and Panel B shows Fama-MacBeth regression results. All standard errors are Newey-West adjusted with three lags.

Panel A: Pooled regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.134	0.138	0.095	0.135	0.136	0.128	0.124
	(11.32)***	(85.02)***	(8.65)***	(11.44)***	(13.69)***	(12.36)***	(39.10)***
Information	-0.004	-0.004	-0.004	-0.004	-0.005	-0.005	-0.004
	(-9.71)***	(-9.50)***	(-9.40)***	(-9.78)***	(-7.71)***	(-10.37)***	(-6.40)***
Herfindahl		0.021					-0.001
		(5.85)***					(-0.32)
CAPM β			0.046				0.043
			(50.11)***				(29.56)***
Age				0.001			0.001
				(2.96)***			(3.27)***
Analyst Coverage					-0.001		-0.001
					(-9.84)***		(-12.89)***
Dispersion					0.006		0.006
					(11.71)***		(11.97)***
Sales Growth						0.004	-0.006
						(3.69)***	(-3.28)***
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummy	Yes	No	Yes	Yes	Yes	Yes	No
Observations	41615	41598	41615	41607	17828	41359	17809

Panel B: Fama-Macbeth regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.144	0.140	0.100	0.164	0.188	0.143	0.144
	(92.65)***	(141.39)***	(17.89)***	(33.70)***	(52.10)***	(126.06)***	(22.67)***
Information	-0.0054	-0.0054	-0.0053	-0.0056	-0.0053	-0.0057	-0.0043
	(-3.93)***	(-3.91)***	(-3.63)***	(-3.90)***	(-7.01)***	(-4.56)***	(-5.67)***
Herfindahl		0.023					-0.0044
		(3.50)***					(-0.26)
CAPM β			0.045				0.046
			(11.80)***				(7.93)***
Age				-0.0068			0.0010
				(-3.59)***			(0.56)
Analyst Coverage					-0.0076		-0.011
					(-8.96)***		(-15.20)***
Dispersion					0.0081		0.0065
					(8.48)***		(7.63)***
Sales Growth						0.0025	-0.0088
						(1.27)	(-1.97)**
Observations	1982	1981	1982	1981	849	1969	848
R^2	1.02%	1.36%	17.29%	1.75%	6.40%	1.42%	22.59%

t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%