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Management Forecast Accuracy and Cost of Equity Capital

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Abstract

This study examines the accuracy of earnings forecasts announced by firms (hereafter, management earnings forecasts) and a firm's cost of capital. The purpose of this paper is to confirm whether management earnings forecast accuracy is appropriately priced in the Japanese stock market. The paper shows that firms with lower management earnings forecast accuracy have a higher cost of capital than firms with higher management earnings forecast accuracy. This result suggests that management earnings forecast accuracy is closely related to cost of capital, and plays an important role in asset pricing. Previous research shows that the quantity of information communicated to investors is associated with cost of capital. However, the result of this paper implies that not only quantity of information, but also quality of information, such as management earnings forecast accuracy, influences cost of capital. The implication of this study is that reporting management earnings forecasts with greater accuracy to investors leads to lower cost of capital.

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1. Introduction

This paper investigates the association between management earnings forecast accuracy and cost of capital. The study is motivated by theoretical study that shows a strong relationship between the precision of information held by investors and asset pricing.

Easley and O'Hara (2004) showed that firms with lower precise information about future returns (future performance) have a higher cost of capital in equilibrium. This study empirically evaluates whether cost of capital in the Japanese stock market is negatively associated with information precision described in previous theoretical studies.

To evaluate the relationship between information precision and cost of capital, information precision must be quantified. Some quantifiable proxy must be used because information precision cannot be quantified. In Japan, managers of listed companies report earnings forecasts for the following year in accordance with stock exchange requirements. In this environment, management earnings forecast accuracy significantly influences information precision. Management earnings forecast accuracy is thus a proxy for information precision. By using this proxy, this study examines the proposition established by theoretical study.

In Japan, as required by stock exchanges, most managers announce forecasts for the following year's sales, ordinary income, net income, and dividends. Since a stock is priced based on a firm's future performance, the management forecast plays an important role in investor decision making. This role is evidenced by prior empirical research which showed that management earnings forecasts for the following year explain the cross-sectional variation in stock return, even after controlling for net income for the current year (e.g., Sakurai and Goto, 1993).

Earnings forecasts reported by managers, who are the most familiar with future prospects of the firm, greatly influence market expectations, but even management earnings forecasts sometimes diverge from actual earnings that are reported the following year. This divergence is caused by mistakes made by management in reading prospects, rapid changes in the business environment, and so on. Even if managers, who are the most familiar with future prospects for the firm, cannot give higher accuracy to management earnings forecasts, the uncertainty of market expectations based on management earnings forecasts is high. Therefore, the precision of information held by investors depends on management earnings forecast accuracy.

This paper finds that firms with lower management earnings forecast accuracy have a higher cost of capital. Using traditional asset pricing models such as CAPM, we are unable to examine the relationship between management earnings forecast accuracy and cost of capital because information factors are not explicitly included in the traditional asset-pricing world. This paper thus computes the cost of capital (equity) for each firm as the implicit discount rate that equates book value and forecasted future earnings to the current stock price using a residual income valuation model. Prior research found that cost of capital estimated by this method is related with some risk proxies and mispricing variables. The paper shows that management earnings forecast accuracy is negatively associated with cost of capital, even after controlling for risk factors and mispricing variables known to affect cost of capital.

This finding suggests that management earnings forecast accuracy plays a meaningful role in asset pricing in the Japanese stock market. This paper makes two contributions to the emerging literature in accounting and finance. First, consistent with theoretical studies that demonstrate the association between information precision and cost of capital, it empirically confirms that firms with lower information precision have a higher cost of capital by assuming that information precision is positively correlated with management earnings forecast accuracy. This result is consistent with the proposition developed by Easley and O’Hara (2004).

Second, this paper presents evidence to identify management motivation to make a soft landing on the earnings forecasts they release. Suda and Shuto (2001) indicate that many managers of listed companies manage earnings to be able to make a soft landing on earnings forecasts released by them. However, the motive for this has not yet been pinpointed. To resolve this puzzle, this paper provides evidence that cost of capital is forced up if reported actual earnings diverge from forecasted earnings released by a manager. It would appear that managers in Japan may manage earnings to avoid increasing cost of capital.

The remainder of this paper is organized as follows. Section 2 reviews prior research and develops a research hypothesis. In section 3, I describe research design. Section 4 contains a discussion of the sample and data. Section 5 reports empirical results. Conclusions and a discussion of future research are presented in section 6.

2. Prior Research and Development of a Hypothesis

As cost of capital has been taken up in prior accounting research, many have focused on the relationship between cost of capital and level of disclosure. For example, from the aspect of theoretical research, Diamond and Verrecchia (1991) claim that disclosing information to reduce information asymmetry can reduce cost of capital by attracting increased demand from large investors in response to greater liquidity for the securities concerned. On the other hand, from the aspect of empirical research, Botosan (1997) shows that among firms with a small analyst following, greater disclosure reduces cost of capital.

As remarked above, prior research explains that the level of disclosure, especially the quantity of information, affects cost of capital. Theoretical research in recent years, however, demonstrates that not only quantity of information but also quality of information affects cost of capital. In this context, Easley and O'Hara (2004) present the proposition that firms with lower information precision about future returns (future performance) have a higher cost of capital.

Following Easley and O'Hara (2004), there have been some studies that explain the association between information precision and cost of capital using accounting information as a proxy for information precision. Francis *et al.* (2005) employ the quality of 'accruals' as a proxy for information precision. 'Accruals' indicate revenues and expenses which are accrued or deferred under accrual accounting. The accrued/deferred revenues/expenses are estimated by managers. It is easier for investors to predict a firm's future earnings if the estimated management error is smaller. Based on this philosophy, Francis *et al*. (2005) treat the quality of 'accruals' as a proxy for information precision, and show that such quality is negatively associated with cost of capital.

Francis *et al*. (2004) investigate relations among level of disclosure, information precision, and cost of capital using the quality of accruals as a proxy for information precision. They found that firms with good accruals quality (i.e., high information precision) have greater disclosure, but that level of disclosure has no pricing effect even after controlling for accruals quality. They conclude that it is not the quantity of information, but the quality of information that affects cost of capital.

Botosan and Plumlee (2003) show that firms with higher information precision have a lower cost of capital. They quantify information precision using analyst forecast dispersion and mean squared analyst forecast error based on the theoretical model of Barron *et al*. (1998).

Likewise, in a number of studies, the proxy of information precision estimated using accounting information is negatively related to cost of capital, consistent with Easley and O'Hara (2004). However, Easley and O'Hara (2004) do not show sources of cross-sectional difference and variables of information precision. Therefore, it is necessary to quantify information precision to investigate the relationship between information precision and cost of capital. In this study, I focus on management earnings forecasts that are equally available to all investors, and regard management earnings forecast accuracy as a proxy for information precision.

In Japan, most firms give forecasts for the following year's sales, ordinary income, net income, and dividends in their press releases as required by stock exchanges. In consequence, forecast error, defined as the difference between management forecast and actual result functions well as a proxy for explaining the cross-sectional difference of a firm's information precision since most firms provide earnings forecasts for the following year. It is argued that market expectations with respect to earnings greatly depend on the earnings forecasts reported by managers who are insiders. Therefore, if a manager gives an earnings forecast of low accuracy, the precision of investor expectations about the firm's future prospects based on the management earnings forecast is also low. Hence, investors require high compensation for such information risk attaching to a firm with low management earnings forecast accuracy. This suggests that, all else being equal, firms with low management earnings forecast accuracy have a higher cost of capital than firms with high accuracy. This gives rise to my hypothesis (in alternative form), stated below.

H: Firms with lower management earnings forecast accuracy have a higher cost of capital.

3. Research Design

3.1 Management Earnings Forecast Accuracy

In this paper, I regard management earnings forecast accuracy as information precision held by investors about a firm's future return (future performance). In Japan, most listed companies report financial information for the following year as required by stock exchanges. The difference between such earnings forecasts and reported earnings is management forecast error. Management earnings forecast accuracy is negatively correlated with management forecast error; firms with a higher management forecast error have lower management earnings forecast accuracy, and the precision of information held by investors is lower as a result.

In theory, expectations pertaining to management forecast error in the future should normally be used as information precision. However, in actuality, management forecast error cannot be predicted, and therefore the expectation cannot be estimated. This paper thus regards actual management forecast error in the past as a proxy for information precision.

I define forecasted earnings for year *t* released by a firm in year $t-1$ as $Feps_t^{t-1}$, and actual earnings for year *t* as eps_t, then management forecast error, MFE_t, is computed as follows (it is deflated by the stock price at the beginning of year *t* for standardization):

$$MFE_t = \frac{eps_t - Feps_t^{t-1}}{P_{t-1}} \tag{1}$$

Not MFE_t, but the absolute value of MFE_t is used in this paper, since management forecast error should be measured in terms of how much the management earnings forecast diverges from actual earnings, regardless of whether up or down. It is unrealistic to consider management earnings forecast accuracy is low if once greatly diverging from actual earnings for just one period. Hence, this paper defines the variable indicating management earnings forecast accuracy, $abs(MFE)_t$, as the sum of the absolute value of MFE_t over the past three years. Firms with higher $abs(MFE)_t$ tend to have lower management earnings forecast accuracy.

3.2 Estimate of Cost of Capital

In finance research, the capital asset pricing model (CAPM) and the three-factor model of Fama and French (1993, 1997) are mainly used to estimate a firm's appropriate cost of capital. These theoretical models call for measures of expected returns in estimating cost of capital. However, expected returns are not observable in fact. Therefore, realized returns are used to estimate cost of capital because the realized return should be an unbiased estimator for unobservable expected return in an efficient market where risk is appropriately priced (Gebhardt *et al.*, 2001).

A method using realized returns to estimate cost of capital is not necessarily appropriate. Elton (1999) indicates that estimating cost of capital based on realized returns is problematic since the correlation between expected returns and realized returns is low. Fama and French (1997) conclude that cost of capital estimates computed from realized returns are imprecise because of difficulties in identifying the right asset pricing model. In addition, the association between management earnings forecast accuracy and cost of capital cannot be clarified, as Easley and O'Hara (2004) argue, since asset pricing models, such as CAPM, do not include any information factors.

This paper estimates cost of capital by using a method that does not depend on realized returns. I estimate the cost of capital for each firm as the internal rate of return (IRR) that equates the present value of expected cash flow to the current stock price. Cost of capital estimated by this approach is called *ex ante* cost of capital or *implied* cost of capital. In this paper, I investigate the relationship between management earnings forecast accuracy and cost of capital using the method based on a residual income valuation model proposed by Gebhardt *et al.* (2001).

(a) The residual income valuation model

Gebhardt *et al.* (2001) computed the cost of capital for each firm using a residual income valuation model derived from the discounted dividend valuation model and the assumption of clean surplus accounting:

$$P_t = bps_t + \sum_{\tau=1}^{\infty} \frac{E_t[(Froe_{t+\tau} - r_e)bps_{t+\tau-1}]}{(1+r_e)^{\tau}} \tag{2}$$

where:

P_t = stock price at time t;

bps_t = book value per share at time t;

$Feps_{t+\tau}$ = forecasted earnings per share for period $t+\tau$;

$Froe_{t+\tau}$ = forecasted return on equity for period $t+\tau$ computed as $Feps_{t+\tau}/bps_{t+\tau-1}$; and

r_e = cost of equity capital.

The second identity on the right-hand side is a measure of the present value of future residual income. Cost of capital for each firm is computed by substituting stock price, book value per share, and expected future residual income into equation (2).

(b) Forecasting horizons and terminal values

As described in Equation (2), the residual income valuation model shows that stock price can be expressed as the sum of book value plus the present value of expected future residual income. However, we cannot implement equation (2) for practical purposes since expected future residual income in an infinite series cannot be predicted. Therefore, a terminal value must be specified in implementing equation (2). It is necessary for residual income after year three to consider some sort of assumption, because forecasted ROEs for the following two years is only available from public information sources.

Based on Gebhardt *et al*. (2001), this paper implements the residual income valuation model assuming that forecasted ROEs after year three mean revert toward the median ROE of the industry over time. This assumes that firms' ROEs mean revert toward the median ROE over time, as Nissim and Penman (2001) demonstrated, at an industrial level.

Suppose that it is possible to predict firms' future ROE by period $t+T$, forecasted ROE for period $t+T$ is the median ROE in the industry. In this paper, I forecast ROEs explicitly for the following two years from publicly available information sources, and I forecast ROEs after year three implicitly, by mean reverting period $t+2$ ROE to the industry median ROE by period $t+T$. Mean reversion is achieved through simple linear interpolation between period $t+2$ ROE to the industry median ROE by period $t+T$; that is, if forecasted ROE for period $t+2$ is higher (lower) than forecasted ROE for period $t+T$ (i.e., industry median ROE), forecasted ROEs after year three decreases (increases) at a constant rate every year, reverting to the forecasted ROE for period $t+T$. Assuming that forecasted ROEs after year three reverts to the industry median ROE, then equation (2) is rewritten below:

$$P_t = bps_t + \frac{Froe_{t+1} - r_e}{(1+r_e)} bps_t + \frac{Froe_{t+2} - r_e}{(1+r_e)^2} bps_{t+1} + TV\ , \tag{3}$$

where TV is terminal value. It makes no sense that residual income after $t+T$ is zero. Hence, this paper assumes that firms perpetually earn residual income for period $t+T$ after period $t+T+1$. For any horizon *T*, the terminal value calculation is given below:

$$TV = \sum_{\tau=3}^{T-1} \frac{Froe_{t+\tau} - r_e}{(1+r_e)^{\tau}} bps_{t+\tau-1} + \frac{Froe_{t+T} - r_e}{r_e(1+r_e)^{T-1}} bps_{t+T-1}\ . \tag{4}$$

I estimate the cost of capital based on equations (3) and (4) assuming that firms' ROEs mean revert to the industry median in year twelve[1]. To compute an industry median ROE, I group all stocks into the same industry classifications based on the *Nikkei's* 36 classifications. Loss is temporary for a going concern, so I exclude loss-making firms on the basis that the population of profit-making firms better reflects long-term industry equilibrium ROE, consistent with Gebhardt *et al*. (2001)[2]. Eight years (i.e., from period $t-7$ to period *t*) of past ROE data is used for computing this median.

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[1] *The validity of estimating cost of capital based on this assumption depends on whether firms' ROEs actually mean revert. Using consolidated financial data for 1986 to 2003, I found that Japanese firms' ROEs actually mean revert for ten years therefore this assumption is realistic. I will discuss this topic in another paper.*

[2] *My results were unchanged when I estimated implied cost of capital based on the industry median ROE including loss-making firms.*

(c) Future book value

For implementing the residual income valuation model it is necessary to compute future book value. Firms' book values at the end of the period, dividend payout ratios, and forecasted ROEs allow me to generate future book values, using clean surplus accounting. Suppose that the dividend payout ratio is *k*, future book value can be written as follows:

$$\begin{aligned} bps_{t+1} &= [1+(1-k)Froe_{t+1}]bps_t \\ bps_{t+2} &= [1+(1-k)Froe_{t+1}][1+(1-k)Froe_{t+2}]bps_t \\ bps_{t+3} &= \qquad \vdots . \end{aligned} \tag{5}$$

(d) Dividend payout ratio

To compute future book value, equation (5) calls for an estimate of the dividend payout ratio. I assume that the current payout ratio will be sustained in the future. I obtain a firm-specific estimate of *k* by dividing actual dividends from the most recent fiscal year by earnings over the same time period, i.e., dps_t / eps_t, where dps_t is dividend per share for year *t*. The dividend payout ratio cannot be derived for firms experiencing negative earnings. For firms with negative earnings, I divide dividends by 1.35% of total assets to derive an estimated payout ratio, reflecting that the average long-run return on the assets of Tokyo Stock Exchange firms is 1.35%[3].

I assign a payout ratio greater than one a value of one, since it makes no sense for such a high payout ratio to persist in the future.

(e) Risk premium

In the following analysis, not the implied cost of capital, but the implied risk premium defined as the difference between estimated cost of capital and risk-free rate is used. In doing so, the time-series difference of the risk-free rate is adjusted. The implied cost of capital is estimated based on the latest data available prior to September 30 of each year. I estimate the implied cost of capital for each firm by solving resulting equations (3) and (4). Then, the end-of-month yield on 20-year government bonds is subtracted from the implied cost of capital measure to obtain an implied risk premium for each firm.

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[3] *Because earnings from continuing operations is a concept that is consistent with total assets, return on assets is technically computed by dividing earnings from continuing operations by total assets (e.g., Sakura, 2003). However, since I just compute the normal level of net income for total assets, return on assets in this paper is simply computed by dividing net income by total assets. The average long-term return on assets is computed using financial data from 1985 to 2003. The sample includes listed Tokyo Stock Exchange firms providing ROA data. The mean value (standard deviation) of ROA is 1.15% (6.95%) for 19,424 firm-year observations.*

3.3 Control Variables

The purpose of this study is to analyze the relationship between management earnings forecast accuracy and cost of capital. In theory, the cost of capital should be closely related to risk proxies. According to previous research, estimated cost of capital based on the residual income valuation model is also related to mispricing variables. Therefore, several variables known to affect cost of capital should be controlled to investigate whether management earnings forecasts accuracy relate to cost of capital. Section 5 gives a multivariate analysis considering these variables.

The control variables used in this paper are as follows: (a) market beta ($\hat{\beta}$), (b) firm size ($\ln(ME)$), (c) book-to-market ratio ($\ln(BM)$), (d) standard deviation of ROEs over the past five years (SD_roe), (e) average sales growth over the past five years (SG), (f) annual stock return (Ret), and (g) the previous year's median industry implied risk premium ($Indus$).

Market beta, firm size, and book-to-market ratio are proxies for the market risk factor (e.g., Fama and French, 1993; 1997), standard deviation of ROEs is a proxy for accounting risk, average sales growth and annual stock return are typical mispricing variables, and the previous year's median industry implied risk premium is a control variable for the industry effect[4].

The definition of each variable is as follows. (a) $\hat{\beta}$ is the market beta of each stock by running a five-year rolling regression using monthly data; (b) $\ln(ME)$ is the natural log of equity market value at end-September of year *t*; (c) $\ln(BM)$ is the natural log of book value at end-fiscal year *t* divided by market value of equity at end-March of year *t*; (d) SD_roe is standard deviation of ROEs in the previous five years, $t-4$ to *t*; (e) SG is average sales growth over the previous five years, $t-4$ to *t*; (f) Ret is annual stock return, from the beginning of October of year $t-1$ to end-September of year *t*; and (g) $Indus$ is median of industry *ex ante* risk premium in the previous year. Industry classifications are based on the *Nikkei* 36 classifications.

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[4] *For further details of the mispricing effect of sales growth, see Lakonishok et al. (1994), and for annual stock return, Jagadeesh and Titman (1993) and Lee and Swaminathan (2000). Annual stock return is a control variable for the momentum or reversal effect. And there is another important reason for using annual stock return as a control variable. That is to reduce measurement error in cost of capital estimates resulting from the fact that analyst earnings forecasts are a poor proxy for market expectations of earnings. Consider a large stock price increase (decline) prior to estimating cost of capital, where the change in stock price reflects the market revision of earnings expectations. If analysts' forecasts do not fully reflect the new information contained in the current stock price, the estimated implied cost of capital will be abnormally low (high). Therefore, I expect that the estimated cost of capital is negatively correlated with recent return performance. This point is argued by Guay et al. (2003).*

I expect market beta, book-to-market ratio, standard deviation of ROEs, and industry effect to be positively correlated with implied risk premium, and the other variables to be negatively correlated with it.

4. Sample and Data

I include observations that fulfill the following requirements in my sample:

(1) firms whose fiscal year-end is March and listed on the 1st Section of the Tokyo Stock Exchange (excluding financial firms),
(2) MFE_t s over the past three years are computable,
(3) forecasted earnings for both one year and two years ahead by analysts are available,
(4) all of the control variables are computable,
(5) book value per share at the end of fiscal year $t-1$ is greater than 10 yen.

I sample only firms whose fiscal year-end is March to estimate the cost of capital for each firm on a like-for-like basis. If firms with different fiscal year-ends are sampled, the cost of capital based on the stock price is formed under different market conditions. As a result, even firms with actually the same level of cost of capital result in having different cost of capital. I require greater than 10 yen for a firm's book value to avoid sampling abnormally high ROE firms because of a low denominator. The final sample is 2,582 firm-year observations, fulfilling the above five requirements, from 2001 to 2003[5].

Management earnings forecast data reported in annual press releases is obtained from the pocket edition of the *Nihon Keizai Shimbun*. Financial data is acquired from NEEDS-FinancialQUEST, and price data from Daily Stock Return in Japan, Nikkei Media Marketing, Inc. Analysts' earnings forecast data come from Toyo Keizai's Autumn Quarterly Corporate Report released about half a month before the end of September which estimates cost of capital. Financial data is based on consolidated financial statements.

This paper winsorizes all variables except for $\hat{\beta}$ at 0.5% and 99.5% of their distributions,

[5] *The reason the sample period is limited to these three years is that analysts' two-year ahead earnings forecasts are not obtained from publicly-available sources. Analysts' two-year ahead earnings forecasts are available from Toyo Keizai's Quarterly Corporate Report from 2000, thus the sample period normally includes 2000. However, I use the previous year's median industry implied risk premium as a control variable, therefore the sample period does not include 2000.*

and $\hat{\beta}$ at 0.2 and 4.0 each year[6].

5. Empirical Results

5.1 Setting the Regression Model

A regression model which considers several control variables known to affect implied cost of capital is developed to investigate the relationship between management earnings forecast accuracy and cost of capital. I then estimate the following regression model:

$$r_{i,t} - rf_t = \alpha_0 + \sum_{\tau=2002}^{2003} \alpha_{\tau-2001} YD_{\tau,i,t} + \sum_{j=1}^{k} \delta_j C_{j,i,t(t-1)} + \gamma_1 abs(MFE)_{i,t} + \mu_{i,t} \quad (6)$$

where:

$r_{i,t}$ = estimated implied cost of capital for firm *i* at time *t*;

rf_t = yield on 20-year government bonds at time *t*;

$YD_{\tau,i,t}$ = annual indicator variable for year τ ;

C_j = control variable *j*;

$abs(MFE)_{i,t} = \sum_{\tau=0}^{2} | MFE_{t-\tau} |$;

$\mu_{i,t}$ = disturbance term; and

$C_{j,t(t-1)} \in [\hat{\beta}_t, \ln(ME)_t, \ln(BM)_t, SD\_roe_t, SG_t, Ret_t, Indus_{t-1}]$.

The dependent variable is the implied risk premium defined as the difference between the estimated cost of capital for each firm and the risk-free rate. I set the annual indicator variable to control for year effect. In addition, several control variables described above and the proxy for management earnings forecast accuracy are set as independent variables. By estimating this regression model, I analyze whether management earnings forecast accuracy is related to risk premium, even after controlling the several variables which are recognized in previous studies as determinants of implied risk premium.

If the hypothesis in this paper is accepted, that is, management earnings forecast accuracy affects cost of capital, I expect $abs(MFE)$ to have a positive relationship with implied risk premium, given the several control variables.

5.2 Descriptive Statistics and Regression Results

Panel A of **Table 1** provides descriptive statistics. RP is implied risk computed as estimated implied cost of capital less the risk-free rate (i.e., $r_e - rf$). Compared with Otogawa (2000) and

[6] *My results are unchanged when I use raw estimated beta for all firms.*

Suda *et al*. (2002) which estimated implied cost of capital for firms listed on the Japanese stock market using a residual income valuation model, the mean value of implied cost of capital (r_e) in this paper is higher than the mean value reported in their researches. Otogawa (2000) and Suda *et al*. (2002) estimate a mean (median) value for r_e of 2.81% (2.36%) and 3.01% (2.63%), respectively. On the other hand, the mean (median) value in this paper is 5.08% (5.00%)[7].

According to the descriptive statistics, the skewness of SD_roe and $abs(MFE)$ is much higher than for the other variables. Therefore, these variables may provide a serious bias in estimating the regression model. Hence, I show regression results transforming these variables into percentile ranks, scaled to a [0, 1] range each year.

TABLE 1
Descriptive Statistics and Correlation Matrix

Panel A: Descriptive Statistics

	Mean	Std.	Min	1Q	Median	3Q	Max
r_e (%)	5.080	1.770	0.617	3.837	4.995	6.129	11.771
RP (%)	3.154	1.763	-1.432	1.938	3.073	4.204	9.722
$\hat{\beta}$	0.980	0.526	0.200	0.604	0.927	1.302	4.000
$\ln(ME)$	24.640	1.543	21.372	23.468	24.378	25.645	29.095
$\ln(BM)$	0.023	0.652	-2.008	-0.380	0.073	0.483	1.500
SD_roe	0.119	0.443	0.004	0.021	0.042	0.095	7.050
SG	0.012	0.068	-0.184	-0.026	0.001	0.036	0.404
Ret	0.078	0.419	-0.773	-0.150	0.021	0.217	2.847
$abs(MFE)$	0.203	0.350	0.003	0.040	0.088	0.218	4.062

Panel B: Correlation Matrix

	RP	$\hat{\beta}$	$\ln(ME)$	$\ln(BM)$	SD_roe	SG	Ret	$abs(MFE)$
RP	100.0%	3.8%*	-50.7%***	67.5%***	-6.0%***	-17.3%***	-9.6%***	26.3%***
$\hat{\beta}$	3.7%*	100.0%	-21.7%***	-1.0%	38.6%***	-8.8%***	-12.8%***	29.4%***
$\ln(ME)$	-48.5%***	-18.1%***	100.0%	-53.3%***	-20.6%***	37.3%***	2.9%	-49.1%***
$\ln(BM)$	64.0%***	-5.1%***	-50.9%***	100.0%	-12.1%***	-32.7%***	18.8%***	33.2%***
SD_roe	2.8%	17.5%***	-7.0%***	-17.4%***	100.0%	-24.6%***	2.1%	66.2%***
SG	-14.6%***	4.7%**	30.4%***	-29.4%***	-14.7%***	100.0%	-13.9%***	-45.5%***
Ret	-6.4%***	-2.2%	-2.4%	17.2%***	14.9%***	-16.2%***	100.0%	11.0%***
$abs(MFE)$	23.9%***	20.6%***	-32.2%***	15.7%***	42.5%***	-28.0%***	27.1%***	100.0%

Notes: 1. $N = 2,582$. 2. *, **, *** Statistical significance at the 10, 5, and 1 percent levels, respectively (two-tailed).

[7] *There are three possibilities which can be mentioned for this: (1) it may reflect a different sample period; (2) most of the samples in previous studies may consist of large firms, because both studies select firms evaluated by analysts for level of disclosure; and (3) it may derive from the fact that both studies compute cost of capital based on the residual income valuation model assuming that firms perpetually earn residual income for period* $t+2$ *after period* $t+3$.

Panel B of **Table 1** presents a correlation matrix for the primary variables of interest, with Pearson (Spearman) correlations below (above) the diagonal. With regard to control variables, the correlations of all variables, except for SD_roe and implied cost of capital, are statistically significant in the predicted directions (both Pearson and Spearman); firms with higher market beta, small firms, firms with higher book-to market ratios, lower long-term growth, and lower stock return all have a higher implied risk premium. This result where most control variables correlate with risk premium in the predicted directions suggests that the estimation of implied risk premium in this paper is valid.

As to the relationship between $abs(MFE)$ and control variables, the matrix shows that $abs(MFE)$ is positively correlated with market beta and earnings volatility and negatively correlated with firm size and long-term growth. This suggests that firms with higher market beta and higher earnings volatility, small firms, and firms with lower long-term growth have higher absolute management forecast error.

The correlation between $abs(MFE)$ and RP is positive (Pearson = 23.9%, Spearman = 26.3%) and significant at the 1% level. This result suggests that firms with higher management forecast error, that is lower management earnings forecast accuracy, tend to have higher implied risk premium, and supports the hypothesis in a univariate analysis[8].

Table 2 reports regression results of equation (6). I use t-Statistics based on White's (1980) heteroscedasticity-consistent standard errors in the significance tests. $inc.adj.R^2$s indicate incremental explanatory power, equal to the difference in adjusted R^2s' from estimations of Models 2, 3, 4, and 5 versus Model 1.

[8] *The high correlations between some variables (e.g., SD_roe and $abs(MFE)$; $\ln(ME)$ and $\ln(BM)$) in the correlation matrix are such that multicollinearity may be a problem in my regression analyses. Thus, I compute VIF (variance inflation factor) for each variable to confirm degree of multicollinearity. All computed VIFs are less than 10, so multicollinearity is no problem in estimating regression models.*

TABLE 2
Cross-Sectional Regression of Implied Risk Premium

		Model 1		Model 2		Model 3		Model 4		Model 5	
	Pred. sign	*Coef.*	*t-Stat.*	*Coef.*	*t-Stat.*	*Coef.*	*t-Stat.*	*Coef.*	*t-Stat.*	*Coef.*	*t-Stat.*
Intercept	?	8.61	13.80	7.70	12.78	7.32	12.49	6.70	11.82	7.35	12.82
YD_{2002}	?	0.09	1.47	0.08	1.32	0.18	3.15	0.02	0.26	-0.00	-0.05
YD_{2003}	?	-0.43	-6.42	-0.47	-7.20	-0.16	-2.49	-0.36	-5.41	-0.36	-5.24
$\hat{\beta}$	(+)	0.07	1.24	0.01	0.21	-0.07	-1.42	-0.08	-1.51	0.03	0.55
$\ln(ME)$	(−)	-0.22	-8.84	-0.18	-7.74	-0.17	-7.55	-0.17	-7.63	-0.20	-8.99
$\ln(BM)$	(+)	1.51	19.99	1.51	20.68	1.72	21.97	1.61	20.05	1.42	15.20
SD_roe	(+)					0.50	3.06	0.47	2.85	-0.30	-2.35
SG	(−)					2.93	6.17	3.13	6.72	2.46	5.23
Ret	(−)					-0.77	-7.64	-0.84	-8.29	-0.66	-5.31
$Indus$	(+)							0.25	8.34	0.27	9.22
$abs(MFE)$	(+)			0.54	3.63	0.63	3.30	0.62	3.20	0.61	3.98
$adj.R^2$		46.12%		46.98%		51.31%		52.70%		49.86%	
$inc.adj.R^2$		—		0.86%		5.19%		6.58%		3.74%	

Notes: 1. $N = 2{,}582$. 2. $inc.adj.R^2$ s indicate incremental explanatory power, equal to the difference in adjusted R^2 s' from estimations of Models 2, 3, 4, and 5 versus Model 1. 3. SD_roe and $abs(MFE)$ in Model 5 are transformed into percentile ranks.

I regress implied risk premium on Fama and French's (1993, 1997) three factors, i.e., market beta, firm size, and book-to-market ratio, in Model 1. As expected, the coefficients on $\ln(ME)$ and $\ln(BM)$ are statistically significant at the 1% level in predicted directions. On the other hand, $\hat{\beta}$ is positive as expected, but not significant. This result reflects the reliability degradation of market beta in recent years. These three variables can explain about 46% of the cross-sectional variation in implied cost of capital.

Model 2 involves three factors and a variable indicating management earnings forecast accuracy. The coefficient on $abs(MFE)$ is positive and significant at the 1% level, and the explanatory power of Model 2 increases from that of Model 1. This result suggests that firms with lower management earnings forecast accuracy have higher implied risk premium, even after controlling for the three factors which are recognized in previous studies as determinants in the explanation of risk premium, and supports the hypothesis in this paper.

Model 3 includes the variables described above and other control variables, except for $Indus$, and Model 4 consists of all variables. The coefficient for SD_roe is statistically significant in the anticipated positive direction in Model 3 and Model 4; that is, firms with higher earnings volatility have higher implied risk premium. Not surprisingly, Ret is also statistically significant and negative in both models. $Indus$ is positive and significant, which suggests that the median industry implied risk premium from the previous year plays an important role in explaining implied cost of capital for the year. Contrary to my expectation, SG is positive and statistically significant, but consistent with Gebhardt *et al*. (2001). This result indicates that firms with higher sales growth have higher implied risk premium. By adding the control variables, explanatory power of all models steadily increases. Therefore, all of the control variables have incremental explanatory power for implied risk premium.

Considering all of the control variables as given, the coefficient on $abs(MFE)$ is positive and statistically significant at the 1% level, although the t-Statistic of this variable slightly decreases. This result is robust in an alternative regression model. SD_roe and $abs(MFE)$ in Model 5 are transformed into percentile ranks. In Model 5, the coefficient on SD_roe is negative and statistically significant, contrary to my expectation. On the other hand, the coefficient on $abs(MFE)$ is 0.61, statistically significant at 1%, as expected. This result suggests that firms with the highest management earnings forecast accuracy enjoy 61 basis points lower implied risk premium relative to firms with the lowest management earnings forecast accuracy, ceteris paribus.

This results show that firms with higher management forecast error over the past three years, i.e., lower management earnings forecast accuracy, have higher implied risk premium, even after controlling for several determinants, recognized in previous studies, of implied risk premium. Therefore, I conclude that management earnings forecast accuracy is appropriately priced, and the empirical results strongly support the hypothesis in this paper.

5.3 Asset-Pricing Test

This paper recognizes that estimating cost of capital based on realized returns is problematic, and I thus estimate it using a method that does not depend on realized returns. However, the estimation method used in this paper includes some assumptions, so these assumptions may introduce measurement errors in computation of implied cost of capital. I conducted asset-pricing tests, and examined the robustness of the results in this paper. Based on Fama and MacBeth (1973), I estimate the following cross-sectional regression equation for each month of the sample period:

$$R_{i,l,t} - rf_{l,t} = \gamma_0 + \gamma_1 \hat{\beta}_{i,t} + \gamma_2 \, ln(ME)_{i,t} + \gamma_3 \, ln(BM)_{i,t} + \gamma_4 SD\_roe_{i,t} + \gamma_5 SG_{i,t} + \gamma_6 \, Ret_{i,t} + \gamma_7 abs(MFE)_{i,t} + \mu_{i,t} \,, \qquad (7)$$

where $R_{i,l,t}$ is monthly return on stock *i* in month *l* of year *t* and $rf_{l,t}$ is the yield on government bonds in month *l* of year *t*. The measurement period for monthly return is from October of year t to September of year $t+1$. I use the same variables used in previous subsections. For example, monthly returns from October 2001 to September 2002 correspond with the control variables based on the latest data available prior to September 30, 2001. The sample period of the estimates for this regression is October 2001 to September 2004, 36 months.

Table 3 presents the estimation results of monthly cross-sectional regressions. The coefficients and adjusted R^2s are means of 36 monthly regressions over the sample period, and t-Statistics in parentheses are computed using the Fama and MacBeth (1973) algorithm.

TABLE 3
Asset-Pricing Test

	Intercept	$\hat{\beta}$	$\ln(ME)$	$\ln(BM)$	SD_roe	SG	Ret	$abs(MFE)$	$adj.R^2$
Model 1	2.466	0.092	-0.066	0.658	0.432	1.268	-0.006	1.045	11.43%
	(0.575)	(0.174)	(-0.415)	(3.363)	(1.027)	(0.791)	(-1.050)	(1.952)	
Model 2	2.270	-0.057	-0.079	0.694	0.837	1.515	-0.008	1.055	11.21%
	(0.524)	(-0.118)	(-0.474)	(3.225)	(1.389)	(0.909)	(-1.173)	(2.254)	

Notes: 1. The sample includes 791, 832, and 959 observations for September 2001, 2002, 2003, respectively (the sample sometimes becomes smaller with each passing moment because of delisting). 2. The coefficients and adjusted R^2s are means of 36 monthly regressions over the sample period. 3. The t-Statistics in parentheses are computed using the Fama and MacBeth (1973) algorithm. 4. The degree of freedom $DF = 36 - 1 = 35$, and the critical value of t_{35} is 1.690, 2.030, and 2.724 at 10, 5, and 1 percent levels, respectively (two-tailed). 5. SD_roe and $abs(MFE)$ in Model 2 are transformed into percentile ranks.

All variables in Model 1 are raw data. Almost none of the variables are statistically significant, but $\ln(BM)$ and $abs(MFE)$ are significant in predicted directions. SD_roe and $abs(MFE)$ in Model 2 are transformed into percentile ranks. Like Model 1, the time-series average coefficient on $abs(MFE)$ is 1.055 and statistically significant at the 5% level. This result suggests that firms with the highest management earnings forecast accuracy enjoy 105 basis points lower realized return relative to firms with the lowest management earnings forecast accuracy, ceteris paribus.

Consistent with the results of implied risk premium, the results of asset-pricing tests based on realized return also support the hypothesis. Therefore, the results of the prior subsection are robust.

6. Conclusion and Future Research

This study explored the relationship between management earnings forecast accuracy and cost of capital. According to the empirical results of this paper, firms with lower management earnings forecast accuracy have higher implied cost of capital that equates the current stock price to book value and the present value of expected future residual income. However, this result may be caused by the correlation between the proxy for management earnings forecast accuracy and risk factors such as earnings volatility. Thus, this paper took into account earnings volatility, other risk factors, and mispricing variables known to affect cost of capital and analyzed the relations. In the result, this paper found that management earnings forecast accuracy is negatively associated with cost of capital. This result leads to the conclusion that management earnings forecast accuracy explains cross-sectional variation in the cost of capital and is therefore a different factor from determinants which previous studies suggest are associated with cost of capital. In addition, the negative association between management earnings forecast accuracy and cost of capital is robust in an asset-pricing test using realized returns.

This result has two implications. First, in the Japanese stock market, management earnings forecast accuracy is closely related to cost of capital, and plays an important role in asset pricing. Second, while several previous studies on accounting concluded that the quantity of information affects cost of capital, this study concluded that the quality of information affects cost of capital. From this viewpoint one may say that managers in Japan can enjoy the benefit of taking into consideration not only the quantity but also the quality of information like management earnings forecasts accuracy in the stock market.

In this regard, however, this paper focuses only on management earnings forecasts that are public information. Easley and O'Hara (2004) consistently developed the proposition that the overall precision of information, both public and private, affects cost of capital, although management earnings forecast accuracy must have an important part to play in determining information precision. This paper implies that management earnings forecast accuracy is positively correlated with overall information precision, and indirectly tests the proposition developed by Easley and O'Hara (2004). Future research could construct research design that directly quantifies information precision and explores the relationship between it and asset pricing.

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