The Usefulness of Management Forecast Information

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Abstract: This paper investigates the usefulness of management earnings forecasts from the perspective of their value-relevance, their impact on analysts' forecasts, and their usefulness as an investment indicator. The value-relevance of management forecasts of earnings is investigated based on the Ohlson [2001] framework that expresses firm value as a function of the book value of equity, current earnings, and expected earnings. The results show that management forecasts of earnings are more value-relevant than book values and current earnings. When the value-relevance of analysts' forecasts and management forecasts is compared, little difference is found between these two forecasts. Deviation of analysts' forecasts from management forecasts is then examined. The results show more than 80% of analysts' forecasts are identical to management forecasts. Further analysis suggests that the relatively high accuracy of management forecasts may explain their high value-relevance and their large impact on analysts' forecasts. Finally, the predictive ability of P/E, P/B, and P/MF ratios with respect to future returns is examined. The P/MF ratio based strategy generates the highest abnormal returns. Thus, the findings of this paper indicate that management earnings forecasts provide the market and analysts with valuable information and are also useful as a predictor of future abnormal returns.

Key Words: Other information *v*, Management forecasts, Analysts' forecasts.

Data Availability: Data are publicly available from sources identified in the paper.

1. *Introduction*

There are a number of studies that investigate cross-national differences in the value-relevance of accounting data (see Holthausen and Watts [2001]). They often attribute the difference found in their studies to country-specific factors that are related to financial reporting. Jacobson and Aaker [1993] report higher correlation between current stock returns and future earnings in Japan than in the U.S., that is the Japanese stock prices incorporate accounting information about future performance earlier than the U.S. stock prices. They argue that Japanese firms' cross-ownership of stock, particularly in the same *keiretsu* (industrial group), and their close ties with banks allow investors to have access to inside information. Similarly, Ali and Hwang [2001] find that the value-relevance of financial reports is lower for countries such as Japan where the financial systems are bank-oriented rather than market-oriented and the extent to which earnings information is reflected in leading-period returns as compared to current returns is greater for bank-oriented than for market-oriented countries. Although the findings of these papers certainly capture important characteristics of the Japanese financial reporting system and explain the difference in value-relevance between Japan and other countries, a crucial feature of the Japanese financial system appears to be overlooked.

A major disclosure difference between Japan and other countries is that the stock exchanges in Japan request firms to provide forecasts of next period's earnings. Although the forecasts are technically voluntary, almost all Japanese companies provide them. As a consequence, management forecasts of earnings are announced simultaneously with current earnings. Darrough and Harris [1991], Conroy *et al*. [1998], and Conroy *et al*. [2000] find that stock price reactions around the announcement date are much more pronounced to management forecasts of future earnings than to current earnings. Their evidence suggests management forecasts of earnings have more information content than current earnings. This also provides a motivation to explore whether the early incorporation of future accounting information by the Japanese stock market and the weak (strong) relation between current return and current (future) earnings that are reported in Jacobson and Aaker [1993], Alford *et al*. [1993], and Ali and Hwang [2001] are due to the availability of management forecasts.

The first objective of this paper is to investigate the value-relevance of management forecasts of earnings. The most commonly used regression models in the recent value-relevance research are price and return based models whose theoretical foundations are derived from the Ohlson [1995] linear information dynamics (e.g., Collins *et al*. [1997], Francis and Schipper [1999], Lev and Zarowin [1999], and Ely and Waymire [1999]). However, other information, v, in the Ohlson's model is ignored in application of both types of model. Ohlson [2001] shows that v can be given concrete empirical content if next-period's expected earnings are observable. In this case, firm value can be expressed as a linear function of the book value of equity, earnings, and expected earnings. This study examines the value-relevance of book values, current earnings, and management forecasts of earnings based on the Ohlson [2001] analysis using management forecasts as a proxy for expected earnings. The results indicate that management forecasts of earnings (changes) have the highest correlation and incremental explanatory power with stock prices (returns) of the three accounting variables. The weak return-earnings relation is substantially improved by the inclusion of management forecasts of earnings.

The second objective of this paper is to investigate the relative usefulness of management forecast information in comparison with other available forecasts such as analysts' forecasts. When analysts' forecasts are used in lieu of management forecasts as a proxy variable for expected earnings, little difference in value-relevance is observed. Following this finding, deviation of analysts' forecasts from management forecasts is examined. The results show that more than 80% of analysts' forecasts are the same as management forecasts. This seems to imply that analysts consider management forecasts as credible information. To assess the credibility of management forecasts, ex post management forecast errors are examined. The results reveal that, although management forecasts are somewhat optimistic and sometimes far from actual earnings, the majority of forecast errors are clustered around zero. Overall, the accuracy of management forecasts appears to be high. This may explain the high value-relevance of management forecasts in the stock market and their large impact on analysts' forecasts.

Finally, the usefulness of management forecasts as a predictor of future returns is investigated. In addition to the conventional P/E and P/B ratios, the P/MF (price-to-management forecast of earnings) ratio is calculated and the future profitability of an investment strategy based on these ratios is examined. The highest abnormal returns are produced by the strategy based on the P/MF ratio.

Thus, the findings of this paper indicate that management earnings forecasts provide the market and analysts with valuable information and appear to present supportive evidence for the usefulness of management forecast information.

The remainder of this paper proceeds as follows. Section 2 discusses the models used in this study. Section 3 describes the sample and Section 4 presents evidence on the value-relevance of management forecasts. Section 5 examines the impact of management forecasts on analysts' forecasts. Section 6 reports the results of ratio-based tests and Section 7 concludes the paper.

2. Model Development

2.1 BACKGROUND

Given the clean surplus relation: $b_t = b_{t-1} + x_t - d_t$ where b_t is the book value of equity at time t, x_t is earnings for the period t, and d_t is dividends paid at time t; and assuming the long-term growth rate of b_t is less than the discount rate r: $(1+r)^{-\tau}E_t[b_{t+\tau}] \rightarrow 0$, the dividend discount model can be restated as

$$V_t = b_t + \sum_{\tau=1}^{\infty} E_t\left[\frac{x^a_{t+\tau}}{(1+r)^\tau}\right], \tag{1}$$

where V_t is the value of a firm at time t, $E_t[\ ]$ is the expected value operator conditioned on time t information, and x^a_t is abnormal earnings defined as $x^a_t \equiv x_t - rb_{t-1}$. This valuation model is called the residual income valuation model (RIV).

Next, the Ohlson [1995] assumes that the time-series behavior of abnormal earnings follows

$$x^a_{t+1} = \omega x^a_t + v_t + \varepsilon_{1t+1}, \tag{2a}$$

$$v_{t+1} = \gamma v_t + \varepsilon_{2t+1}, \tag{2b}$$

where v_t is information other than abnormal earnings, ω is the persistence parameter of abnormal earnings and predicted to lie in the range $0 \leq \omega < 1$, γ is the persistence parameter of other information and predicted to lie in the range $0 \leq \gamma < 1$, and ε_{1t} and ε_{2t} are error terms. Equations (2a) and (2b) are called the Ohlson [1995] linear information model (LIM).

Combining the RIV with the Ohlson [1995] LIM and rewriting the equation using the clean surplus relation yields the following valuation function termed the Ohlson/RIV:

$$V_t = (1\text{-}k)b_t + k(\varphi x_t - d_t) + \alpha v_t, \tag{3}$$

where $k = \frac{r\omega}{1+r-\omega}$, $\varphi = \frac{1+r}{r}$, and $\alpha = \frac{1+r}{(1+r-\omega)(1+r-\gamma)}$.

This Ohlson/RIV model is probably the most pervasive valuation model today (see Barth [2000, p. 13] and Barth *et al*. [2001, p. 91]). Equation (3) indicates that firm value can be viewed as a weighted average of the book value of equity and earnings. Therefore it is often cited as the theoretical foundation for many studies of the relation between stock price, book value of equity, and earnings (see Easton [1999, p. 402], Easton and Sommers [2000, p. 34], and Holthausen and Watts [2001, p. 53]). These studies use the following price and return models:

$$V_t = \theta_0 + \theta_1 b_t + \theta_2 x_t + \varepsilon_t, \tag{4}$$

$$Ret_t = \theta_0 + \theta_1 x_t/V_{t\text{-}1} + \theta_2 \Delta x_t/V_{t\text{-}1} + \varepsilon_t, \tag{5}$$

where $Ret_t = (V_t - V_{t\text{-}1} + d_t)/V_{t\text{-}1}$ and $\Delta x_t = x_t - x_{t\text{-}1}$.

However, both equations (4) and (5) ignore "other information", v_t, in the Ohlson [1995] LIM. This is equivalent to assuming that the Ohlson [1995] LIM is $x^a_{t+1} = \omega x^a_t + \varepsilon_{t+1}$. Ohlson [2001] and Dechow *et al*. [1999] demonstrate how other information, v_t, can be estimated. Let f_t and f^a_t denote a forecast of t+1 period's earnings and abnormal earnings at time t and assume that f_t is the expected earnings for period t+1 at time t: $f_t = E_t[x_{t+1}]$. Following the definition of abnormal earnings, f^a_t can be expressed as $E_t[x^a_{t+1}] \equiv f^a_t = f_t - rb_t$. By substituting this equation into equation (2a), other information, v_t, can be measured as $v_t = f_t - rb_t - \omega x_t^a$. Replacing v_t in equation (3) with $f_t - rb_t - \omega x_t^a$ and rearranging the equation yields

$$V_t = \delta_1 b_t + \delta_2(\varphi x_t - d_t) + \delta_3(r^{-1} f_t), \tag{6}$$

where $\varphi = \dfrac{1+r}{r}$, $\delta_1 = \dfrac{(1+r)(1-\omega)(1-\gamma)}{(1+r-\omega)(1+r-\gamma)}$, $\delta_2 = \dfrac{-r\omega\gamma}{(1+r-\omega)(1+r-\gamma)}$, and $\delta_3 = \dfrac{r(1+r)}{(1+r-\omega)(1+r-\gamma)}$.

Note that $\delta_1 + \delta_2 + \delta_3 = 1$. Equation (6) indicates that firm value can be viewed as a linear function of the book value of equity, earnings, and forecasted earnings.[1] Based on this insight, the following price and return models can be developed:

$$V_t = \lambda_0 + \lambda_1 b_t + \lambda_2 x_t + \lambda_3 f_t + \varepsilon_t, \tag{7}$$

$$Ret_t = \lambda_0 + \lambda_1 x_t/V_{t-1} + \lambda_2 \Delta x_t/V_{t-1} + \lambda_3 \Delta f_t/V_{t-1} + \varepsilon_t, \tag{8}$$

where $\Delta f_t = f_t - f_{t-1}$.

2.2 RETURN AND PRICE MODELS

Both the price and the return models are used in this study. However, a price model regression is known to suffer from potentially serious scale problems, often referred to as "scale effects" (see Brown *et al*. [1999], Easton [1999], Easton and Sommers [2000], Lo and Lys [2000], and Ota [2001]). Therefore, the return model is used as a primary regression model and the price model is used as a secondary regression model in this study. Based on equations (4), (5), (7), and (8), the following four regressions are used to investigate the value-relevance of accounting variables.

$$Ret_{i,t} = \alpha_0 + \alpha_1 E_{i,t} + \alpha_2 \Delta E_{i,t} + \varepsilon_{i,t}, \tag{R1}$$

$$Ret_{i,t} = \alpha_0 + \alpha_1 E_{i,t} + \alpha_2 \Delta E_{i,t} + \alpha_3 \Delta MF_{i,t} + \varepsilon_{i,t}, \tag{R2}$$

[1] See Ohlson [2001, Appendix 1] for the demonstration of this result.

where $Ret_{i,t}$ is the return of firm i over the 12-month period commencing on the third month after year-end t-1, $E_{i,t}$ is the earnings per share of firm i for period t deflated by $P_{i,t\text{-}1}$, $\Delta E_{i,t}$ is the annual change in earnings per share ($\Delta E_{i,t} = E_{i,t} - E_{i,t\text{-}1}$) of firm i deflated by $P_{i,t\text{-}1}$, and $\Delta MF_{i,t}$ is the annual change in the management forecast of next period's earnings per share ($\Delta MF_{i,t} = MF_{i,t} - MF_{i,t\text{-}1}$) of firm i deflated by $P_{i,t\text{-}1}$.

$$P_{i,t} = \beta_0 + \beta_1 B_{i,t} + \beta_2 E_{i,t} + \varepsilon_{i,t}, \tag{P1}$$

$$P_{i,t} = \beta_0 + \beta_1 B_{i,t} + \beta_2 E_{i,t} + \beta_3 MF_{i,t} + \varepsilon_{i,t}, \tag{P2}$$

where $P_{i,t}$ is the stock price of firm i three months after year-end t, $B_{i,t}$ is the book value per share of firm i at year-end t, $E_{i,t}$ is the earnings per share of firm i for period t, and $MF_{i,t}$ is the management forecast of t+1 period's earnings per share of firm i that is announced simultaneously with $E_{i,t}$ usually within 10 weeks after year-end t. (After this section, subscript i that denotes a firm will be omitted for ease of exposition.)

2.3 DECOMPOSITION OF R^2

Yearly regressions are run using equations (R1), (R2), (P1), and (P2) and the obtained R^2s are decomposed to examine the incremental explanatory power of each explanatory variable. This decomposition method is derived theoretically by Theil [1971] and widely used to investigate the relative importance of explanatory variables in the model.

Let subscripts of R^2 denote the regressors in the model. The total R^2 of equation (R2) is then expressed as $R^2_{\mathrm{E \bullet \Delta E \bullet \Delta MF}}$. Because (R2) has three regressors, namely E, ΔE, and ΔMF, $R^2_{\mathrm{E \bullet \Delta E \bullet \Delta MF}}$ can be decomposed into four components:

$$\mathrm{incr}E \;= R^2_{\mathrm{E \bullet \Delta E \bullet \Delta MF}} - R^2_{\mathrm{\Delta E \bullet \Delta MF}},$$

$$\mathrm{incr}\Delta E = R^2_{\mathrm{E \bullet \Delta E \bullet \Delta MF}} - R^2_{\mathrm{E \bullet \Delta MF}},$$

$\text{incr}\Delta MF = R^2_{\text{E}\bullet\Delta\text{E}\bullet\Delta\text{MF}} - R^2_{\text{E}\bullet\Delta\text{E}}$, and

$\text{Common} = R^2_{\text{E}\bullet\Delta\text{E}\bullet\Delta\text{MF}} - (\text{incr}E + \text{incr}\Delta E + \text{incr}\Delta MF)$,

where incr$E$, incrΔE, and incrΔMF represent the incremental explanatory power provided by E, ΔE, and ΔMF respectively. Common represents the explanatory power common to all regressors and it is the discrepancy between the total R^2 and the sum of the incremental explanatory power of all regressors.

3. Data and Descriptive Statistics

3.1 SAMPLE SELECTION

The sample is selected from the period 1979-1999 using the following criteria:[2]

(i) the firms are listed on one of the eight stock exchanges in Japan or traded on the over-the-counter (OTC) market,[3]

(ii) the accounting period ends in March,

(iii) banks, securities firms, and insurance firms are excluded, and

(iv) management forecasts of earnings are reported in the *Nihon Keizai Shinbun*.[4]

Annual accounting data are extracted from *NIKKEI-ZAIMU DATA*, and stock prices are extracted from *Kabuka CD-ROM 2000*. Other necessary data such as stock splits, capital reduction, and changes in par values are all collected from *Kaisha Shikihou CD-ROM*. Management forecasts of earnings are manually collected from the *Nihon Keizai Shinbun*.[5]

[2] The *Nihon Keizai Shinbun* started to report management forecasts of next period's earnings together with current earnings from the accounting period that ends in March 1974. In the early years, not all firms announced management forecasts. However, most firms provided management forecasts by the year 1979. Therefore, the sample period of this study is limited to the period 1979 to 1999.

[3] The eight stock exchanges are Tokyo, Osaka, Nagoya, Sapporo, Niigata, Kyoto, Hiroshima, and Fukuoka.

[4] Although almost all firms announce management forecasts of next period's earnings, forecasts are technically voluntary. Therefore, there are a few firms that do not provide the forecasts.

[5] Firms provide forecasts of next period's sales, earnings from continuing operations, net income (earnings), earnings per share, and dividends per share in the form of point forecasts except for dividends per

The selection process yields 29,587 firm-year observations. To ensure that the results are not sensitive to extreme values, observations in the top and bottom one percent of all variables are removed.[6] This results in the final sample of 25,569 observations for the return model and 27,939 observations for the price model.[7]

3.2 DESCRIPTIVE STATISTICS

Table 1 about here

Panel A of Table 1 contains descriptive statistics and the Pearson correlation coefficients among variables for equation (R2). It reveals that three explanatory variables are all positively correlated with returns. Above all, changes in management forecasts of earnings have the highest correlation coefficient of 0.249.

Panel B of Table 1 contains descriptive statistics and the Pearson correlation coefficients among variables for equation (P2). The correlation coefficients of the three explanatory variables are distinctively higher than their counterparts in equation (R2). As with equation (R2), management forecasts of earnings exhibit the highest correlation coefficient of 0.691 with stock prices.

High correlations among the explanatory variables are also observed, particularly the correlation coefficient between earnings and management forecasts of earnings, which yields a value of 0.773. This may raise a concern about multicollinearity in the estimation

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share that are sometimes provided in the form of range forecasts. The term 'earnings' used in this paper indicates net income.

[6] The results presented later are robust to the removal of observations in the top and bottom 0.5%, 1.5%, 2.0%, and 2.5%.

[7] The sample for the return model is smaller because the model requires first-differenced data, which are earnings changes and changes in management forecasts of earnings. Therefore, the analysis period for the return model is one year shorter than for the price model.

of equation (P2). However, multicollinearity is not only determined by intercorrelations among the explanatory variables but also by the variance of the explanatory variables (Maddala [1992, p. 294]). Thus, the impact of multicollinearity is not clear given these descriptive statistics. The variance-inflation factor (VIF) and the condition index (Greene [2000, p. 40]) are calculated to measure the degree of collinearity among the three explanatory variables in equation (P2).

$$\text{VIF}(B_t) = 1.79,\ \text{VIF}(E_t) = 2.24,\ \text{VIF}(MF_t) = 3.04, \text{ and Condition Index} = 4.59.$$

The benchmarks of the VIF and the condition index for collinearity are VIF > 10 and Condition Index > 30 (Kennedy [1998, p. 190]). The values obtained are far below the benchmarks. Therefore, multicollinearity is not expected to pose a material problem in the estimation of the model.

4. *Value-Relevance of Management Forecasts*

4.1 RETURN MODEL

Table 2 about here

Figure 1 about here

Table 2 summarizes the results of yearly cross-sectional regressions for equations (R1) and (R2). When returns are regressed on earning and earnings changes in (R1), the coefficients are significant in 13 and 17 of the 20 years at the 0.05 level respectively. When changes in management forecasts of earnings are included in (R2), the coefficients on earnings do not change materially. However, the coefficients on earnings changes become noticeably smaller and their statistical significance weakens considerably. The average of the 20 years diminishes from 1.40 in equation (R1) to 0.22 in equation (R2) and they are significant in only 5 of the 20 years at the 0.05 level. The coefficients on changes in management forecasts of earnings are significant in all 20 years at the 0.01 level.

Fig.1(a) and Fig.1(b) illustrate the incremental explanatory power of accounting variables using equations (R1) and (R2) respectively. The incremental explanatory power of each regressor and the common effect are stacked on one another so that they collectively add up to the total explanatory power of the model. The comparison of Fig.1(a) and Fig.1(b) shows that the total R^2s of equation (R2) are considerably higher than those of equation (R1). It also reveals that the incremental explanatory power of earnings changes is very much suppressed by the presence of changes in management forecasts of earnings. The differences in incremental explanatory power among explanatory variables in equation (R2) are examined in Table 3. The result of the two-way ANOVA rejects the null of no difference in incremental explanatory power among the three variables. The further analysis by Tukey's multiple comparison method indicates that the incremental explanatory power of changes in management forecasts of earnings is significantly larger than that of earnings and earnings changes. The nonparametric Friedman test also produces the same results.[8]

Table 3 about here

Table 4 about here

Table 4 reports the results of the panel analysis using equation (R2). With regard to the model specification, minimal differences are observed when individual firm effects are accounted for using fixed effects models. This is because, as the return model is already first-differenced, individual firm effects are essentially removed form the model. Allowing

[8] The two factors in the two-way ANOVA are accounting variables and time. See Glantz and Slinker [2001] for Tukey's multiple comparison method and Siegel and Castellan [1988] for the Friedman test.

for time effects in the model increases the adj.R^2 dramatically. This may indicate the importance of controlling for the impact of market return volatility over the sample period as suggested by Francis and Schipper [1999]. However, the overall results do not change materially in any specification. Changes in management forecasts of earnings have the largest coefficients and *t*-statistics, and appear to dominate other variables.

4.2 PRICE MODEL

Table 5 about here

Panel A of Table 5 summarizes the results of yearly cross-sectional regressions for equations (P1) and (P2). The findings are similar to those for the return models. The results not tabulated show, when stock prices are regressed against book values and earnings in (P1), the coefficients on both variables are significant in all 21 years at the 0.01 level. However, when management forecasts of earnings are included in (P2), the coefficients on earnings are significant in only 8 of the 21 years at the 0.05 level and become negative in 14 of the 21 years. The coefficients on book values diminish and their statistical significance weakens in equation (P2), although they are all significant at the 0.05 level. The coefficients on management forecasts of earnings are significant in all 21 years at the 0.01 level.

The total R^2s of equation (P2) are higher than those of equation (P1) with the 21-year average of 0.540 and 0.455 respectively. The incremental explanatory power of earnings almost disappears when management forecasts of earnings are included in equation (P2). The incremental explanatory power of management forecasts of earnings is higher than that of book values and earnings. In addition, the total R^2s for (P1) and (P2) are much larger than those for (R1) and (R2). This finding is consistent with many prior studies that use both the return and the price models (e.g., Harris *et al*. [1994], Francis and Schipper [1999], Nwazee [1998], Lev and Zarowin [1999], and Ely and Waymire [1999]).

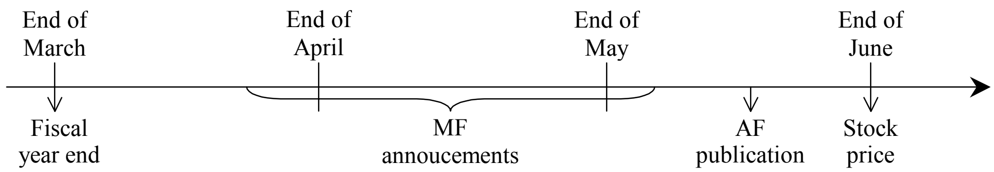
Panel B of Table 5 reports the results of the panel analysis using equation (P2). Unlike the return model, when fixed effects models are used, individual firm effects are significant at the 0.01 level. Time effects are also statistically significant. It appears that controlling both individual firm and time effects is important in the price model. However, overall results do not change materially in any specification. Management forecasts of earnings have the largest coefficients and *t*-statistics, and appear to dominate other variables.

Thus, the results of both the return and the price models present strong evidence that management forecasts of next period's earnings are more value-relevant than book values and current earnings.

5. *Impact of Management Forecasts on Analysts' Forecasts*

5.1 VALUE-RELEVANCE OF ANALYSTS' FORECASTS

In the previous section, management forecasts of earnings are used as a proxy variable for expected earnings. However, analysts' forecasts of earnings are also available as a proxy for expected earnings. This subsection compares the value-relevance of analysts' forecasts of earnings with that of management forecasts of earnings. Analysts' forecasts of earnings are collected from *Kaisha Shikihou Vol.3* (1979-1999, Toyo Keizai Inc.), which is generally accepted by the Japanese securities industry as the standard publication source for analysts' earnings forecasts (see Conroy *et al*. [1998], and Conroy *et al*. [2000]).[9] These forecasts are published every year in mid June, and all management forecasts are already announced by then. Therefore, the value-relevance of analysts' forecasts is expected to be higher than that of management forecasts. The time-series line below depicts the sequence of events.



Equations (R2) and (P2), which we call the MF return and price models, and Equations (R2) and (P2) with MF_t replaced by AF_t (analysts' forecasts of earnings per share), which we call the AF return and price models, are estimated.

Figure 2 about here

Figure 2 plots the total R^2s for the AF return model, the MF return model, the AF price model, and the MF price model from 1980 to 1999 (1979 to 1999 for the price models). It shows that there is little difference to whether *AF* or *MF* is used as a proxy for expected earnings for both the return and price models. The average R^2 for the AF return model and the AF price model is 0.145 and 0.538, and for the MF return model and the MF price model is 0.149 and 0.540.

[9] Conroy *et al*. [1993] and Conroy and Harris [1995] document evidence of the better accuracy of *Kaisha Shikihou* (Toyo Keizai Inc.) forecasts compared to forecasts in the U.S. and to other sources of forecasts in Japan. Conroy *et al*. [1993] find that earnings forecasts for Japanese firms reported by *Kaisha Shikihou* (Toyo Keizai Inc.) are more accurate than for U.S. firms reported by I/B/E/S. Conroy and Harris [1995] find earnings forecasts from *Kaisha Shikihou* (Toyo Keizai Inc.) are more accurate than the mean forecasts from I/B/E/S in Japan. The results presented later suggest that the high accuracy of *Kaisha Shikihou* (Toyo Keizai Inc.) forecasts may be due to the availability of management forecasts in Japan.

To examine the difference between analysts' forecasts and management forecasts further, the following two nonnested models are compared using the Davidson and MacKinnon *J* test.

$$Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta AF_t + \alpha_4 YearDummy80\text{-}98 + \varepsilon_t,$$

$$Ret_t = \beta_0 + \beta_1 E_t + \beta_2 \Delta E_t + \beta_3 \Delta MF_t + \beta_4 YearDummy80\text{-}98 + \varepsilon_t.$$

These two models are estimated with the panel data using fixed effects model to account for individual firm effects. The results are (figures in parentheses are *t*-statistics)

$$\widehat{Ret}_t = \alpha_0 + \underset{(5.06)^{**}}{0.36E_t} - \underset{(-1.31)}{0.07\Delta E_t} + \underset{(7.89)^{**}}{1.94\Delta AF_t} + \underset{(11.4)^{**}}{0.62\,\widehat{Ret}_{MF\ t}} + \alpha_4 YearDummy80\text{-}98, \quad \text{adj.}R^2 = 0.526$$

$$\widehat{Ret}_t = \beta_0 + \underset{(7.20)^{**}}{0.51E_t} - \underset{(-0.80)}{0.04\Delta E_t} + \underset{(11.4)^{**}}{2.95\Delta MF_t} + \underset{(7.89)^{**}}{0.43\,\widehat{Ret}_{AF\ t}} + \beta_4 YearDummy80\text{-}98. \quad \text{adj.}R^2 = 0.526$$

The coefficients on $\widehat{Ret}_{MF\ t}$ and $\widehat{Ret}_{AF\ t}$ are both significant at the 0.01 level. Therefore, the superiority of one model over the other cannot be determined from the given data. The *J* test for price-based models gives the same results.

5.2 ANALYST FORECAST DEVIATIONS FROM MANAGEMENT FORECAST

Contrary to the prediction, little difference in value-relevance is found between analysts' forecasts and management forecasts. This subsection, therefore, examines deviation of analysts' forecasts from management forecasts using the scale below,

$$\text{AF deviation} = \frac{AF_t - MF_t}{P_t}.$$

Table 6 about here

The results are summarized in Table 6. Of the total 27,939 analysts' earnings forecasts, 22,780 are identical to management forecasts, which is 81.5% of the entire sample. Table 6 also reveals that even those analysts' forecasts that are not the same as management forecasts do not deviate considerably from management forecasts. The Pearson correlation coefficient between analysts' forecasts and management forecasts is 0.995. Thus, management forecasts appear to have a substantial impact on analysts' forecasts and seem to provide a basis for analysts in making their own forecasts.

5.3 ACCURACY OF MANAGEMENT FORECASTS

Managers have access to inside information that is not available to outsiders. Therefore, they are considered to be in a superior position over analysts with regard to the information about future performance of firms. Consequently, analysts will regard the forecasts made by management as important information if those forecasts are relatively accurate. The results reported earlier show that more than 80% of analysts' forecasts are identical to management forecasts. This implies that analysts consider management forecasts credible information. This subsection investigates the accuracy of management forecasts of earnings using the scale below,

$$\text{MF error} = \frac{E_{t+1} - MF_t}{P_t}$$

Figure 3 about here

Figure 3 shows the distribution of MF errors. Descriptive statistics for MF errors are; mean = -0.0087, median = -0.0010, variance = 0.0010, skewness = -3.94, kurtosis = 23.63. The normal distribution with the same mean and variance is superimposed on the graph for the purpose of comparison.

The small negative mean and median values seem to suggest that management forecasts are slightly optimistic. The optimism is then statistically tested. First, the null hypothesis that the mean of MF errors equals zero is tested. Since the number of observations is large, the t test based on the central limit theorem can be employed. The result is $t_{(25672)} = -43.93$, and rejects the null at the 0.01 level. Second, with regard to the median of MF errors, the null hypothesis that the numbers of positive and negative MF errors are equal is tested using the χ^2 goodness-of-fit test. The result is $\chi^2_{(1)} = 484.6$, and rejects the null at the 0.01 level. Thus, optimism in management forecasts is statistically significant.

Compared with the normal distribution, the MF error distribution has a long tail to the left and a distinct peak around zero. The negative skewness and the high kurtosis value confirm this observation. Tests for normality of the MF error distribution show; the Jarque-Bera test $\chi^2_{(2)} = 511208.5$, and the Lilliefors nonparametric test $d_{(25673)} = 0.242$ (1% critical value = $1.031/\sqrt{25673} = 0.0064$). Thus, both tests reject the hypothesis of normality for the MF error distribution at the 0.01 level. The shape of the MF error distribution is similar to a leptokurtic distribution that is said to be consistent with jump processes (Kritzman [1994]). This implies that there are too many MF errors near the mean and at the extremes relative to a normal distribution, although extreme MF errors are mostly negative. This is consistent with accounting earnings reflecting conservatism as defined by Basu [1997], though further analysis of this question is left to future research.[10]

[10] Basu [1997] interprets conservatism as resulting in earnings reflecting 'bad news' more quickly and completely than 'good news'. As an example he describes different accounting treatments of a change in the estimated productive life of a fixed asset. When the estimated life increases (good news), it results in lower depreciation charges over the new remaining life. On the other hand, when the estimated life decreases (bad news), an impairment of the asset is expensed immediately.

As a whole, MF errors appear to be small except for some extreme errors.[11] This may explain the high value-relevance of management forecasts in the stock market and why they serve as the basis for analysts' forecasts.

6. *Usefulness of Management Forecasts in Predicting Future Returns*

This section investigates the predictive ability of management forecasts with respect to future returns. First, in addition to the conventional P/E and P/B ratios, the P/MF (price-to-management forecasts of earning) and P/AF (price-to-analysts' forecasts of earnings) ratios are calculated at the end of June from 1979 to 1999. Second, quintile portfolios are formed for each ratio with the top quintile portfolio comprising high-ratio firms and the bottom quintile portfolio comprising low-ratio firms. The strategy is to take a short-position in the top quintile portfolio and a long-position in the bottom quintile portfolio, and maintain these positions till the end of the accounting period, which is March for all sample firms.

Figure 4 about here

Figure 4 illustrates the average of the twenty-one year returns for the P/E, P/B, P/MF, and P/AF strategies. The P/MF and P/AF strategies both which are based on earnings forecasts perform better than the P/B and P/E strategies. Little difference is found between the P/MF and P/AF strategies, which is not surprising because more than 80% of analysts' forecasts are the same as management forecasts. Thus, the P/MF ratio appears to be a good predictor of future stock returns.

[11] Of the 25,673 management forecast errors, 64.4% are within the range of MF error ±1% and 80.4% are within the range of MF error ±2%. When current earnings are used as expected earnings for the next period (random walk: RW) and RW errors are calculated, 57.9% and 75.7% of the entire sample are within the range of RW error ±1% and ±2% respectively. Thus, management forecasts are more accurate than naïve forecasts based on a random walk time-series property of earnings.

However, returns for each year is unknown from Figure 4 because it shows the average of the twenty-one year returns. There might be large variation in year-by-year returns. Moreover, semiannual financial statements are required in Japan as interim reporting. Therefore, March-ending firms have to publicize semiannual earnings after the end of September, and at the same time they are requested to announce revised management forecasts of annual earnings for the current period. When there is no change in their forecasts about annual earnings, they simply publicize the same forecasts as those announced at the beginning of the current period (usually within ten weeks into the current period). The P/MF strategy uses management forecasts of earnings that were announced at the beginning of the current period. Thus, the actual usefulness of the P/MF strategy is considered to be only until the end of September, for the sample used in this study are all March-ending firms. Figure 5 illustrates returns produced by the four strategies at the end of September (for a three month period) for each year from 1979 to 1999.

Figure 5 about here

There is considerable variation in returns across the twenty-one years. As for the P/MF strategy, the highest return is 16.5% in 1989 and the lowest return is -4.2% in 1984. However, the P/MF and P/AF strategies do not yield large negative returns and earn positive returns more consistently than the other strategies.

7. Conclusion

This paper investigates the usefulness of management forecast information from the perspective of its value-relevance in the stock market, its influence on analysts' forecasts, and its ability as a predictor of future returns.

First, the value-relevance of management forecasts of earnings is examined based on the Ohlson/RIV model. Ohlson [2001] demonstrates that other information v can be estimated if next-period's expected earnings are observable, and expresses firm value as a function of the book value of equity, current earnings, and expected earnings. This study uses management forecasts of earnings as a proxy for expected earnings. The results show that management forecasts of earnings are more value-relevant than book values and current earnings.

Second, the value-relevance of analysts' forecasts and management forecasts is compared. The results show little difference in value-relevance between analysts' and management forecasts. When deviation of analysts' forecasts from management forecasts is examined, more than 80% of analysts' forecasts are identical to management forecasts. Further analysis suggests that the relatively high accuracy of management earnings forecasts may be the reason for their high value-relevance in the stock market and their large impact on analysts' earnings forecasts.

Finally, the predictive ability of P/E, P/B, and P/MF ratios with respect to future returns is examined. The strategy based on the P/MF ratio yields the highest abnormal returns.

Thus, the results of this paper provide supportive evidence for the usefulness of management forecast information. The findings also have a potential policy implication for the disclosure of forward-looking information in other countries. Currently, Japan is the only country that requests all publicly traded firms to disclose forecasts for the next period and this unique disclosure system appears to be functioning effectively. It was initiated by the stock exchanges in 1974 by sending a letter to all listed firms requesting them to disclose forecasts of key accounting information. Perhaps other countries may find it beneficial to encourage firms to disclose forward-looking information about future performance.

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Table 1
Descriptive statistics and correlations among variables for return and price models

Panel A Return model[a]

Descriptive statistics

Variable	Average	S.D.	Min	1Q	Median	3Q	Max
Returns (Ret_t)	0.0588	0.4311	-0.7749	-0.2448	-0.0004	0.2693	3.3998
Earnings (E_t)	0.0189	0.0553	-1.1874	0.0106	0.0218	0.0366	0.2699
Earnings changes (ΔE_t)	-0.0036	0.0545	-1.2298	-0.0084	0.0005	0.0066	0.8845
Changes in MF earnings (ΔMF_t)	0.0002	0.0186	-0.1585	-0.0056	0.0000	0.0057	0.2912

Pearson correlation coefficients

Variable	Returns	Earnings	Earnings changes	Changes in MF earnings
Returns (Ret_t)	1.000			
Earnings (E_t)	0.115	1.000		
Earnings changes (ΔE_t)	0.095	0.617	1.000	
Changes in MF earnings (ΔMF_t)	0.249	0.005	0.176	1.000

Panel B Price model[b]

Descriptive statistics (in yen)

Variable	Average	S.D.	Min	1Q	Median	3Q	Max
Stock Price (P_t)	964.4	940.6	85	401	699	1160	12560
Book value (B_t)	449.8	364.6	-19.4	184.2	344.8	603.0	2859.4
Earnings (E_t)	20.9	31.6	-277.3	6.7	15.8	32.7	216.6
MF earnings (MF_t)	26.0	26.8	-45.9	8.3	17.3	34.8	244.0

Pearson correlation coefficients

Variable	Stock Price	Book value	Earnings	MF earnings
Stock Price (P_t)	1.000			
Book value (B_t)	0.540	1.000		
Earnings (E_t)	0.542	0.498	1.000	
MF earnings (MF_t)	0.691	0.655	0.773	1.000

[a] The sample consists of 25,569 firm-year observations. Ret_t : the return over the 12-month period commencing on the third month after year-end t-1. E_t : earnings per share for period t deflated by P_{t-1}. ΔE_t : annual change in earnings per share ($\Delta E_t = E_t - E_{t-1}$) deflated by P_{t-1}. ΔMF_t : annual change in management forecast of next period's earnings per share ($\Delta MF_t = MF_t - MF_{t-1}$) deflated by P_{t-1}. P_{t-1} : stock price three months after year-end t-1.

[b] The sample consists of 27,939 firm-year observations. P_t : stock price three months after year-end t. B_t : book value per share at year-end t. E_t : earnings per share for period t. MF_t : management forecast of t+1 period's earnings per share announced simultaneously with E_t usually within 10 weeks after year-end t.

Table 2
Estimates from yearly cross-sectional regressions using return models

		R1: $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \varepsilon_t$[a]			R2: $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta MF_t + \varepsilon_t$[b]			
Year	# obs.	E_t	ΔE_t	R^2	E_t	ΔE_t	ΔMF_t	R^2
1980	709	0.29 (1.36)	0.79 (4.40)**	0.048	0.27 (1.32)	0.36 (1.98)*	2.75 (8.09)**	0.129
1981	728	2.02 (6.43)**	0.64 (2.08)*	0.102	2.13 (7.57)**	-0.44 (-1.54)	6.31 (13.19)**	0.276
1982	746	0.15 (0.83)	0.51 (3.12)**	0.021	0.11 (0.65)	0.14 (0.92)	2.87 (10.31)**	0.143
1983	759	0.46 (1.97)*	1.24 (4.62)**	0.061	0.50 (2.25)*	0.39 (1.42)	3.39 (8.78)**	0.148
1984	766	0.17 (0.55)	0.83 (2.46)*	0.014	1.05 (3.40)**	-0.13 (-0.39)	4.59 (9.05)**	0.110
1985	802	0.06 (0.16)	0.83 (2.66)**	0.011	0.12 (0.34)	0.54 (1.76)	3.97 (5.92)**	0.053
1986	815	1.28 (2.05)*	1.11 (1.65)	0.016	1.34 (2.22)*	0.21 (0.32)	7.65 (7.74)**	0.084
1987	846	1.39 (2.66)**	1.18 (2.18)*	0.025	1.64 (3.21)**	0.13 (0.23)	7.02 (7.04)**	0.079
1988	942	0.69 (1.05)	5.82 (7.59)**	0.074	0.64 (1.04)	3.06 (3.98)**	10.67 (10.86)**	0.177
1989	1093	1.16 (2.00)*	2.77 (4.20)**	0.035	-0.50 (-0.88)	0.78 (1.20)	10.72 (10.63)**	0.125
1990	1290	13.65 (13.58)**	4.92 (3.62)**	0.203	10.91 (10.97)**	0.01 (0.01)	21.50 (10.96)**	0.271
1991	1427	4.72 (10.82)**	1.60 (2.93)**	0.136	3.92 (9.72)**	-1.01 (-1.93)	13.60 (16.55)**	0.275
1992	1530	2.20 (7.70)**	0.85 (2.72)**	0.082	2.46 (9.00)**	-0.48 (-1.52)	6.38 (12.41)**	0.166
1993	1610	-0.21 (-1.00)	0.51 (2.25)*	0.003	-0.23 (-1.13)	-0.14 (-0.61)	3.99 (8.59)**	0.047
1994	1645	0.06 (0.29)	1.49 (6.80)**	0.031	0.25 (1.37)	0.46 (2.08)*	6.67 (14.25)**	0.138
1995	1746	1.37 (10.50)**	0.47 (3.68)**	0.080	1.75 (13.48)**	-0.08 (-0.60)	3.38 (11.78)**	0.148
1996	1846	-1.16 (-5.87)**	1.94 (9.69)**	0.052	-0.50 (-2.53)*	1.26 (6.35)**	6.11 (13.14)**	0.133
1997	1974	2.17 (11.46)**	0.07 (0.42)	0.073	2.56 (14.25)**	-0.60 (-3.60)**	6.64 (16.38)**	0.184
1998	2097	0.82 (7.61)**	0.27 (2.58)**	0.073	0.94 (9.21)**	0.01 (0.10)	3.40 (15.67)**	0.171
1999	2198	0.59 (5.64)**	0.15 (1.44)	0.037	0.87 (8.54)**	-0.10 (-1.01)	4.41 (14.54)**	0.122
Average	1278.5	1.59 (3.99)	1.40 (3.55)	0.059	1.51 (4.70)	0.22 (0.46)	6.80 (11.29)	0.149

[a] Eq.(R1): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \varepsilon_t$
[b] Eq.(R2): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta MF_t + \varepsilon_t$
Ret_t : the return over the 12-month period commencing on the third month after year-end t-1. E_t : earnings per share for period t deflated by $P_{t\text{-}1}$. ΔE_t : annual change in earnings per share ($\Delta E_t = E_t - E_{t\text{-}1}$) deflated by $P_{t\text{-}1}$. ΔMF_t : annual change in management forecast of next period's earnings per share ($\Delta MF_t = MF_t - MF_{t\text{-}1}$) deflated by $P_{t\text{-}1}$. $P_{t\text{-}1}$: stock price three months after year-end t-1.
t-statistics are provided in parentheses.
* significant at the 0.05 level. ** significant at the 0.01 level.

Table 3
Two-way ANOVA and multiple comparisons of incremental explanatory power between earnings, earnings changes, and changes in management forecasts of earnings

	Parametric[a]	Nonparametric[b]
Two-way ANOVA	$F_{(2, 38)}$ 72.65**	$\chi^2_{(2)}$ 25.9**
Multiple Comparisons[c]		
incrΔMF – incr$E$	0.0652**	31**
incrΔMF – incrΔE	0.0871**	23**
incr$E$ – incrΔE	0.0219*	8

[a] For parametric tests, the two-way analysis of variance without replication method and Tukey's multiple comparison method are used.
[b] For nonparametric tests, the Friedman two-way analysis of variance by ranks and its multiple comparison method are used.
[c] Eq.(R2): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta MF_t + \varepsilon_t$ is used. incr$E = R^2_{\mathrm{E\bullet\Delta E\bullet\Delta MF}} - R^2_{\mathrm{\Delta E\bullet\Delta MF}}$, incr$\Delta E = R^2_{\mathrm{E\bullet\Delta E\bullet\Delta MF}} - R^2_{\mathrm{E\bullet\Delta MF}}$, incr$\Delta MF = R^2_{\mathrm{E\bullet\Delta E\bullet\Delta MF}} - R^2_{\mathrm{E\bullet\Delta E}}$. Subscripts of R^2 denote the regressors.
Ret_t : the return over the 12-month period commencing on the third month after year-end t-1. E_t : earnings per share for period t deflated by P_{t-1}. ΔE_t : annual change in earnings per share ($\Delta E_t = E_t - E_{t-1}$) deflated by P_{t-1}. ΔMF_t : annual change in management forecast of next period's earnings per share ($\Delta MF_t = MF_t - MF_{t-1}$) deflated by P_{t-1}. P_{t-1} : stock price three months after year-end t-1.
* significant at the 0.05 level. ** significant at the 0.01 level.

Table 4
Panel analysis using return models[a]

	# obs.	E_t	ΔE_t	ΔMF_t	Firm effects[b]	Time effects[c]	adj.R^2
Pooled OLS	25569	1.04 (10.90)**	-0.25 (-2.78)**	5.90 (28.27)**			0.076
Pooled OLS with Time effects	25569	0.83 (10.66)**	0.03 (0.38)	4.97 (27.01)**		1259.9**	0.522
Fixed effects	25569	1.08 (9.97)**	-0.32 (-3.22)**	5.70 (28.54)**	0.71		0.050
Fixed effects with Time effects	25569	0.86 (10.01)**	-0.03 (-0.39)	4.80 (28.87)**	1.06*	1222.8**	0.525

[a] Eq.(R2): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta MF_t + \varepsilon_t$ is used as a basic model for panel analysis.
Ret_t : the return over the 12-month period commencing on the third month after year-end t-1. E_t : earnings per share for period t deflated by P_{t-1}. ΔE_t : annual change in earnings per share ($\Delta E_t = E_t - E_{t-1}$) deflated by P_{t-1}. ΔMF_t : annual change in management forecast of next period's earnings per share ($\Delta MF_t = MF_t - MF_{t-1}$) deflated by P_{t-1}. P_{t-1} : stock price three months after year-end t-1.
[b] Individual firm effects are estimated using a fixed effects model. F-statistics are provided in this column.
[c] Time effects are estimated using year dummy variables. F-statistics are provided in this column.
t-statistics are provided in parentheses.
* significant at the 0.05 level. ** significant at the 0.01 level.

Table 5
Yearly cross-sectional regressions and panel analysis using price models

Panel A Yearly estimates[a]

	# obs.	B_t	E_t	MF_t	R^2	incr B_t	incr E_t	incr MF_t
P1: Average 1979-1999[b]	1330.4	1.12 (11.63)	8.69 (7.97)		0.455	0.109	0.065	
P2: Average 1979-1999[b]	1330.4	0.64 (6.39)	-1.33 (-0.86)	16.98 (9.34)	0.540	0.031	0.002	0.086

Panel B Panel analysis[c]

	# obs.	B_t	E_t	MF_t	Firm effects[d]	Time effects[e]	adj.R^2
Pooled OLS	27939	0.39 (17.39)**	0.68 (1.91)	20.09 (33.60)**			0.491
Pooled OLS with Time effects	27939	0.50 (20.38)**	-0.57 (-1.66)	19.65 (34.78)**		450.2**	0.614
Fixed effects	27939	0.39 (8.53)**	2.38 (8.20)**	18.93 (30.90)**	6.57**		0.654
Fixed effects with Time effects	27939	0.44 (7.46)**	1.18 (4.64)**	16.16 (29.77)**	9.10**	659.0**	0.772

[a] Eq.(P1): $P_t = \beta_0 + \beta_1 B_t + \beta_2 E_t + \varepsilon_t$ and Eq.(P2): $P_t = \beta_0 + \beta_1 B_t + \beta_2 E_t + \beta_3 MF_t + \varepsilon_t$ are used. P_t : stock price three months after year-end t. B_t : book value per share at year-end t. E_t : earnings per share for period t. MF_t : management forecast of t+1 period's earnings per share announced within 10 weeks after year-end t.

[b] Average 1979-1999 indicates the average of the yearly cross-sectional estimates from 1979 to 1999.

[c] Eq.(P2): $P_t = \beta_0 + \beta_1 B_t + \beta_2 E_t + \beta_3 MF_t + \varepsilon_t$ is used as a basic model for panel analysis.

[d] Individual firm effects are estimated using a fixed effects model. F-statistics are provided in this column.

[e] Time effects are estimated using year dummy variables. F-statistics are provided in this column.

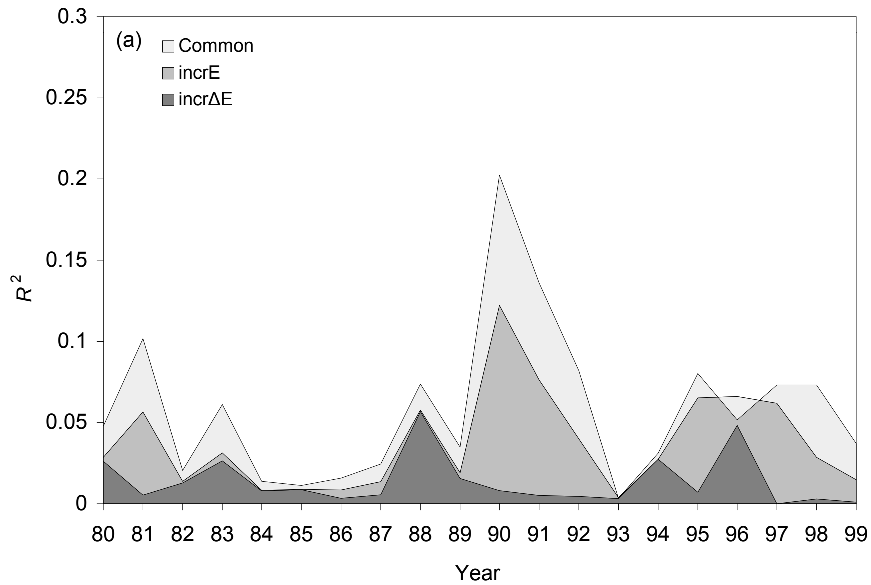
t-statistics are provided in parentheses and they are based on White's heteroskedastic-consistent SE.

* significant at the 0.05 level. ** significant at the 0.01 level.

Table 6
Deviation of analysts' forecasts of earnings from management forecasts of earnings[a]

Deviation	# obs.	%
More than 2%	263	0.9%
1~2%	255	0.9%
0~1%	2480	8.9%
0%	22780	81.5%
-1~0%	1998	7.2%
-2~-1%	101	0.4%
Less than -2%	62	0.2%
Total	27939	100.0%

[a] Analyst forecast deviations are calculated as AF deviation = $(AF_t – MF_t)/P_t$. AF_t : analysts' forecast of t+1 period's earnings per share published after MF_t announcement. MF_t : management forecast of t+1 period's earnings per share announced within 10 weeks after year-end t. P_t : stock price three months after year-end t.



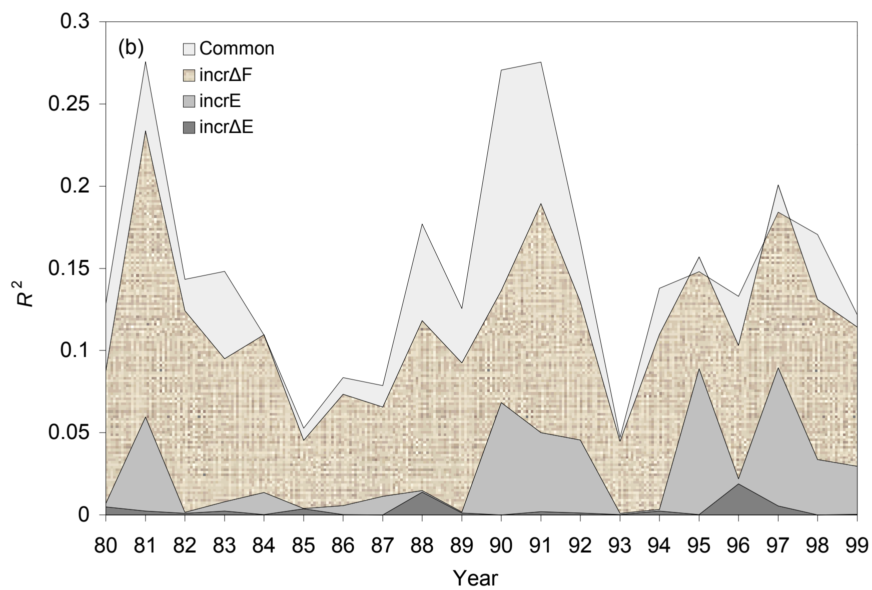


Fig.1 (a) Yearly cross-sectional regressions showing the incremental explanatory power of earnings and earnings changes, and the common effect. (b) Yearly cross-sectional regressions showing the incremental explanatory power of earnings, earnings changes and changes in management forecasts of earnings, and the common effect. The incremental explanatory power of each variable and the common effect are stacked on one another so that they collectively add up to the total R^2 of the model.

(a) Eq.(R1): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \varepsilon_t$ is used. incr$E$ = $R^2_{\mathrm{E\bullet\Delta E}} - R^2_{\mathrm{\Delta E}}$, incr$\Delta E$ = $R^2_{\mathrm{E\bullet\Delta E}} - R^2_{\mathrm{E}}$, Common = $R^2_{\mathrm{E\bullet\Delta E}}$ – (incr$E$ + incrΔE).

(b) Eq.(R2): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta MF_t + \varepsilon_t$ is used. incr$E$ = $R^2_{\mathrm{E\bullet\Delta E\bullet\Delta MF}} - R^2_{\mathrm{\Delta E\bullet\Delta MF}}$, incr$\Delta E$ = $R^2_{\mathrm{E\bullet\Delta E\bullet\Delta MF}} - R^2_{\mathrm{E\bullet\Delta MF}}$, incr$\Delta MF$ = $R^2_{\mathrm{E\bullet\Delta E\bullet\Delta MF}} - R^2_{\mathrm{E\bullet\Delta E}}$, Common = $R^2_{\mathrm{E\bullet\Delta E\bullet\Delta MF}}$ – (incr$E$ + incrΔE + incrΔMF).

Subscripts of R^2 denote the regressors. Ret_t : the return over the 12-month period commencing on the third month after year-end t-1. E_t : earnings per share for period t deflated by $P_{t\text{-}1}$. ΔE_t : annual change in earnings per share ($\Delta E_t = E_t - E_{t\text{-}1}$) deflated by $P_{t\text{-}1}$. ΔMF_t : annual change in management forecast of next period's earnings per share ($\Delta MF_t = MF_t - MF_{t\text{-}1}$) deflated by $P_{t\text{-}1}$. $P_{t\text{-}1}$: stock price three months after year-end t-1.

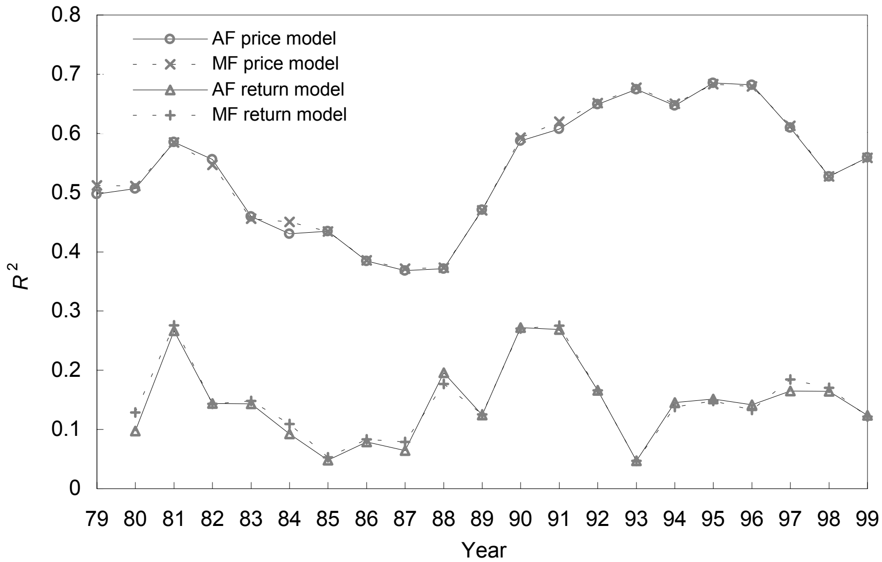


Fig.2 The value-relevance of analysts' forecasts of earnings in comparison with management forecasts of earnings. This graph plots the total R^2s for the AF return model, the MF return model, the AF price model, and the MF price model for the period 1980 to 1999 (1979 to 1999 for the price models).

AF return model: $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta AF_t + \varepsilon_t$

MF return model: $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta MF_t + \varepsilon_t$

Ret_t : the return over the 12-month period commencing on the third month after year-end t-1. E_t : earnings per share for period t deflated by P_{t-1}. ΔE_t : annual change in earnings per share ($\Delta E_t = E_t - E_{t-1}$) deflated by P_{t-1}. ΔAF_t : annual change in analysts' forecast of next period's earnings per share ($\Delta AF_t = AF_t - AF_{t-1}$) deflated by P_{t-1}. ΔMF_t : annual change in management forecast of next period's earnings per share ($\Delta MF_t = MF_t - MF_{t-1}$) deflated by P_{t-1}. P_{t-1} : stock price three months after year-end t-1.

AF price model: $P_t = \beta_0 + \beta_1 B_t + \beta_2 E_t + \beta_3 AF_t + \varepsilon_t$

MF price model: $P_t = \beta_0 + \beta_1 B_t + \beta_2 E_t + \beta_3 MF_t + \varepsilon_t$

P_t : stock price three months after year-end t. B_t : book value per share at year-end t. E_t : earnings per share for period t. AF_t : analysts' forecast of t+1 period's earnings per share published after MF_t announcement. MF_t : management forecast of t+1 period's earnings per share announced within 10 weeks after year-end t.

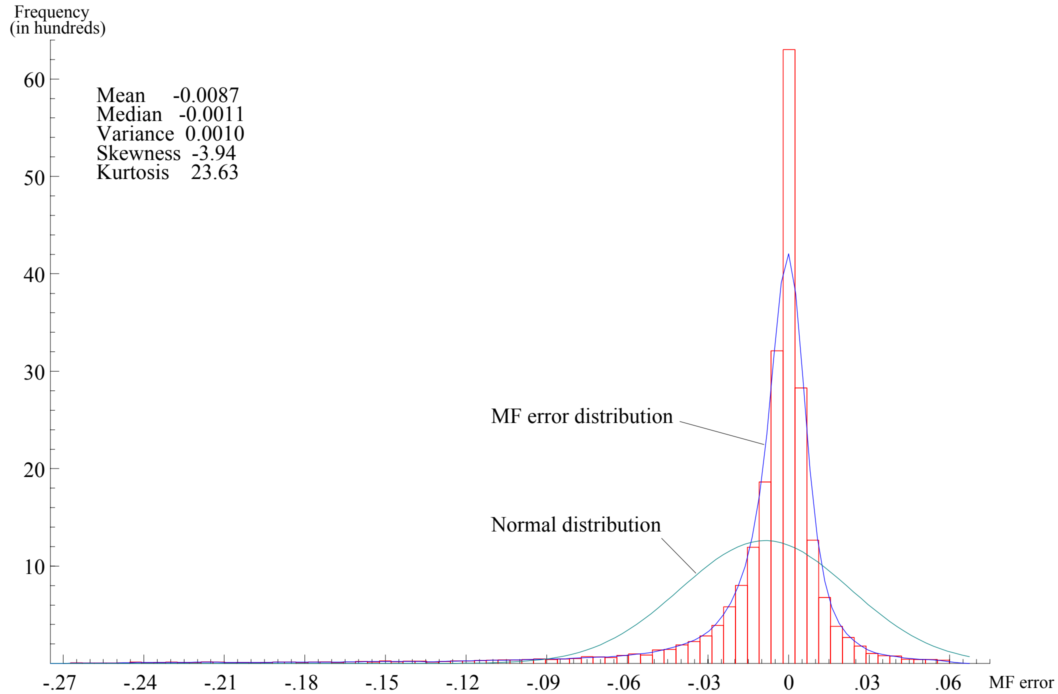


Fig.3 The distribution of management forecast errors.
Management forecast errors are calculated as MF error = $(E_{t+1} - MF_t)/P_t$. E_{t+1} : earnings per share for period t+1. MF_t : management forecast of t+1 period's earnings per share announced within 10 weeks after year-end t. P_t : stock price three months after year-end t.
Note: Management forecasts of earnings for the year 1999 are excluded because earnings data for the year 2000 are not available. As a result, the total number of MF error observations is 25,673. The top and bottom 1% of the observations are removed from the distribution graph.

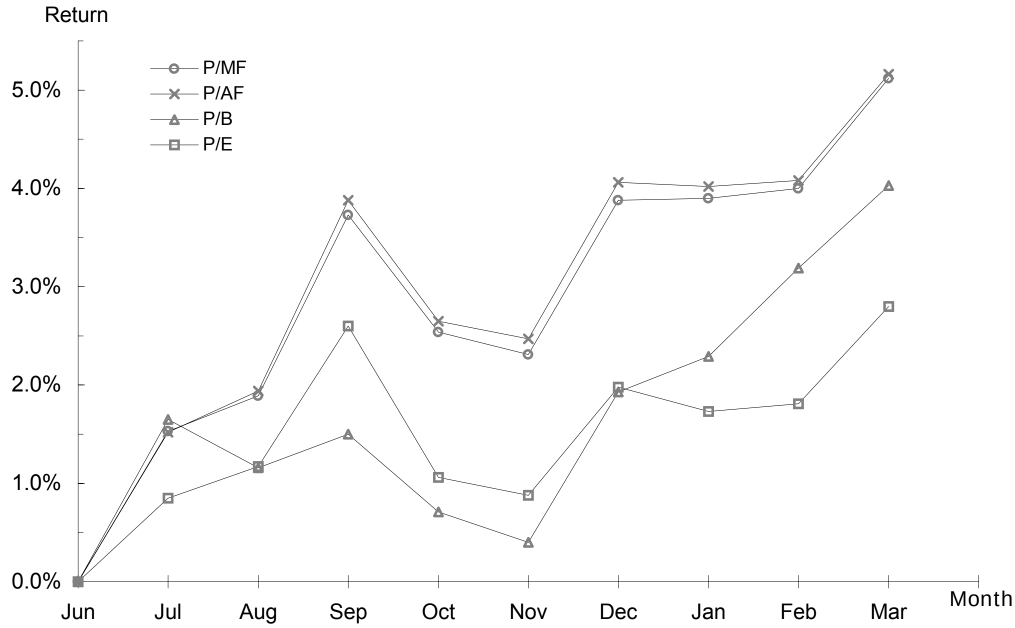


Fig.4 The average of the twenty-one year abnormal returns produced by the P/B, P/E, P/MF, and P/AF strategies.

The P/B, P/E, P/MF, and P/AF ratios are calculated at the end of June from 1979 to 1999 and quintile portfolios are constructed each year for each ratio with the top quintile portfolio comprising high-ratio firms and the bottom quintile portfolio comprising low-ratio firms The strategy is to take a short-position in the top quintile portfolio and a long-position in the bottom quintile portfolio and maintain these investments until March. This figure depicts the average of the twenty-one year returns produced by the P/B, P/E, P/MF, and P/AF strategies.

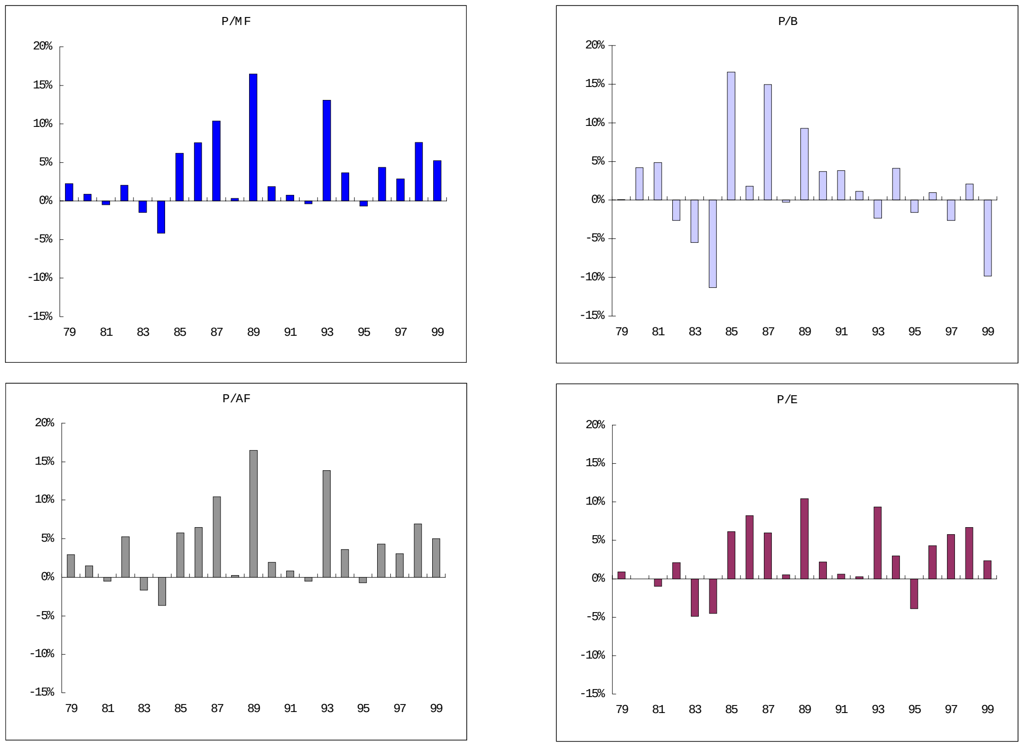


Fig.5 Abnormal returns at the end of September (for a three-month period) produced by the P/B, P/E, P/MF, and P/AF strategies from 1979-1999.

The P/B, P/E, P/MF, and P/AF ratios are calculated at the end of June from 1979 to 1999 and quintile portfolios are constructed each year for each ratio with the top quintile portfolio comprising high-ratio firms and the bottom quintile portfolio comprising low-ratio firms The strategy is to take a short-position in the top quintile portfolio and a long-position in the bottom quintile portfolio and maintain these investments until the end of September. These figures depict abnormal returns at the end of September (for a three month period) produced by the P/B, P/E, P/MF, and P/AF strategies for each year from 1979-1999.