The Value-Relevance of Book Value, Current Earnings, and Management Forecasts of Earnings

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Abstract: This paper investigates the value-relevance of book value, earnings, and management forecasts of earnings in Japan over the past twenty years. Although most value-relevance studies in the U.S. use return and price based models whose theoretical foundations are derived from the Ohlson (1995) linear information model, other information, v_t, in the Ohlson's model is ignored in both types of model. This research exploits the unique setting in Japan where managers simultaneously announce the most recently completed period's earnings as well as forecasts of next period's earnings. In this case, management forecasts are available for use as a proxy for v_t. The results in this paper indicate that management forecasts of earnings (changes) have the highest correlation with stock price (returns) and the incremental explanatory power of current earnings (changes) almost disappears when management forecasts of earnings (changes) are included in the models. The market also appears to place more importance on management forecast information when firms are growing rapidly and when firms' current earnings exceed the forecasts made at the beginning of the period.

Key Words: Value-relevance, Return and price models, Management forecasts of earnings, Other information v_t.

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

I. INTRODUCTION

This paper investigates the value-relevance of book value, earnings, and management forecasts of next period's earnings in Japan over the past twenty years. This research is motivated by numerous studies on the value-relevance of accounting numbers in the U.S. in which the empirical relation between stock market values or changes in values and various accounting numbers is examined. Two types of models are commonly used to investigate the relation, namely the price model and the return model. The price model examines the relation between stock price, book value, and earnings, and the return model examines the relation between stock returns, earnings, and earnings changes. Although the theoretical foundations of both models are derived from the Ohlson (1995) linear information model, an important component of the Ohlson's model, v_t, is ignored in both models. This variable, v_t, denotes the value-relevant information that is not yet captured by current financial statements and it is often referred to as "other information". This research exploits the unique setting in Japan where managers simultaneously announce the recently completed period's earnings and forecasts of upcoming period's earnings. These management forecasts of next period's earnings are used as a proxy for other information, v_t.

First, the value-relevance of earnings, earnings changes, and changes in management forecasts of earnings is investigated using the return model. Yearly cross-sectional regressions for a 20-year period spanning 1980 to 1999 are estimated and the R^2s obtained are used as a metric to measure the value-relevance over the period. To measure the contribution of each explanatory variable, the total explanatory power of earnings, earnings changes, and changes in management forecasts of earnings is decomposed into four components using a technique described in Theil (1971): (1) the incremental explanatory power of earnings, (2) the incremental explanatory power of earnings changes, (3) the incremental explanatory power of changes in management forecasts of earnings, (4) the multicollinearity effect. The results indicate that earnings changes have little incremental explanatory power when changes in management forecasts of earnings are included in the return model. The results also reveal that changes in management forecasts of earnings have more incremental explanatory power than earnings.

The value-relevance of book value, earnings, and management forecasts of earnings is also examined using the price model. The results obtained are similar to those of the return model. The incremental explanatory power of earnings almost disappears when management forecasts of earnings are included in the price model. Management forecasts of earnings have higher incremental explanatory power than book value.

Next, the effects of one-time items and negative earnings reported in prior research are investigated (e.g., Collins *et al.* 1997; Ely and Waymire 1999; Easton *et al.* 2000). To remove the effect of one-time items on the value-relevance of accounting variables, earnings from continuing operations and management forecasts of earnings from continuing operations are used instead of earnings and management forecasts of earnings. The tone of the results does not change materially except for some improvement in the R^2. Management forecasts of earnings still have the highest incremental explanatory power. To investigate the effect of negative earnings, the total sample is divided into four groups according to the sign (negative or positive) of earnings and changes in management forecasts of earnings. The results indicate that, when current earnings are negative, the market looks to management forecasts, and if they are improving, the market appears to react to them.

Alternatively, when the management forecasts are deteriorating, the market appears to react to current earnings if they are positive.

Lastly, several factors that are expected to enhance the value-relevance of management forecast information are investigated. The results reveal that management forecast information is more value-relevant to high-growth firms when growth is measured using the annual growth rate in sales. The results also indicate that management forecast information is more value-relevant when current reported earnings are better than their forecasts made by management at the beginning of the period.

In sum, management forecasts of earnings appear to be more value-relevant than book value or current earnings. When management forecasts of earnings are included in the valuation models, the value-relevance of earnings changes in the return model and earnings in the price model diminishes considerably. These findings are robust to removal of the impact of one-time items. Both negative earnings and negative changes in management forecasts have little association with stock returns. Moreover, it appears that the market places more weight on management forecast information when firms are growing fast and when firms' actual earnings exceed the forecasts made last year.

The remainder of this paper proceeds as follows. Section II develops hypotheses concerning the value-relevance of management forecasts of earnings. Section III discusses the valuations models that are based on the Ohlson (1995) model and shows how other information, v_t, can be incorporated into the return and the price models. Decomposition of total R^2 to investigate the relative incremental explanatory power of explanatory variables is also discussed. Section IV outlines the sample selection procedure and describes the sample. Section V presents the empirical results and Section VI concludes the paper.

II. RESEARCH HYPOTHESES

FASB Statement of Financial Accounting Concepts No.2 names feedback value and predictive value as primary components of relevance. Similarly, *ASB* Statement of Principles for Financial Reporting paragraph 3.1 states that relevant information has predictive value or confirmatory value.

A major disclosure difference between the U.S. and Japan is that the stock exchanges in Japan request that management 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.[1] Current earnings information could have both confirmatory value and predictive value. However, the inherent nature of the information suggests that current earnings information has more confirmatory value than predictive value, while management forecast information has predictive value.

Darrough and Harris (1991), Conroy *et al*. (1998), and Conroy *et al*. (2000) examine the information content of current earnings and management forecasts of earnings. They report that stock price reactions around the announcement date are much more pronounced to management forecasts of future earnings than to current earnings and conclude that the corporate insiders' views of future earnings are far more crucial to market pricing than the publication of historical numbers.

[1] Firms provide management forecasts for next period's sales, earnings from continuing operations, earnings, earnings per share, and dividends per share in the form of point forecasts except for dividends per share that are sometimes provided in the form of range forecasts.

In a similar vein, there is a growing concern that current earnings do not reflect the underlying economic events in a timely manner and, therefore, are not synchronized with stock price movements (e.g., Basu 1997; Easton 1999; Easton *et al*. 2000). This accounting recognition lag is also noted in Kothari and Zimmerman (1995). They refer to a portion of earnings that the market had already anticipated before the announcement of earnings as a "stale" component. This concern and the results presented in Darrough and Harris (1991), Conroy *et al*. (1998) and Conroy *et al*. (2000) form the basis for the first hypothesis:

H1: Management forecasts of next period's earnings are more value-relevant than current earnings.

Figure 1 about here

Fig.1 illustrates hypothesis 1. Current earnings mainly have confirmatory value and management forecasts have predictive value. However, the value-relevance of current earnings is expected to be less than that of management forecasts of earnings because current earnings information contains a larger proportion of the "stale" component than management forecast of earnings information.

The next hypothesis concerns the characteristics of firms that influence the relative importance of management forecasts of earnings. Predicting future performance seems to be more difficult in the case of growing firms than in the case of mature firms. Therefore, it can be hypothesized that management forecasts are more useful for predicting the performance of high-growth firms. The accuracy of prior management forecasts also seems to be related to the relative importance of current management forecasts (see Williams

1996; Hirst *et al*. 1999). If a firm fails to meet its prior forecasts, the market will not have much faith in the current forecast of the firm. These lead to the second hypothesis:

H2: Management forecasts of earnings are more value-relevant to high-growth firms and to those firms whose prior forecasts are more accurate.

III. MODEL DEVELOPMENT

Valuation models

Investigating the relation between accounting numbers and firm value requires a valuation model. The Ohlson (1995) linear information model (hereafter LIM) coupled with the residual income valuation model allows a firm value to be expressed as a function of book value and earnings. Based on this function, the price and the return models are derived and they are probably the most pervasive valuation models today (see Barth 2000, 13; Barth *et al*. 2001, 20; Ota 2001). The price model regresses stock price on book value and earnings, and the return model regresses stock returns on earnings and earnings changes.

However, both models ignore an important variable in the Ohlson (1995) LIM, which is 'other information' v_t. This variable, v_t, symbolizes information that is not captured by current financial statements but value-relevant in equity valuation. Further analysis by Ohlson (1998) and Dechow *et al*. (1999) demonstrates that earnings forecasts can be used as a proxy for other information, v_t, and a firm value can be expressed as a function of book value, current earnings, and earnings forecasts. Based on this insight, the price and return models that incorporate earnings forecasts are developed (see Appendix).

Both the price and the return models are used in this study. However, the price model regressions are 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; Ota 2001). Kothari and Zimmerman (1995, 183) state, "Using the price model, perhaps in addition to the return model, could permit more definitive inferences".[2] Therefore, the return model is used as a primary valuation model and the price model is used as a secondary valuation model in this study. The following four regressions are used to investigate the value-relevance of accounting variables.

$Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \varepsilon_t,$ R1 (Return model without v_t)

$Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta F_t + \varepsilon_t,$ R2 (Return model with v_t)

where Ret_t is the return over the 12-month period commencing on the third month after year-end t-1, E_t is earnings per share for period t deflated by $P_{t\text{-}1}$, ΔE_t is annual changes in earnings per share ($\Delta E_t = E_t - E_{t\text{-}1}$) deflated by $P_{t\text{-}1}$, and ΔF_t is annual changes in management forecasts of next period's earnings per share ($\Delta F_t = F_t - F_{t\text{-}1}$) deflated by $P_{t\text{-}1}$.

$P_t = \beta_0 + \beta_1 B_t + \beta_2 E_t + \varepsilon_t,$ P1 (Price model without v_t)

$P_t = \beta_0 + \beta_1 B_t + \beta_2 E_t + \beta_3 F_t + \varepsilon_t,$ P2 (Price model with v_t)

where P_t is stock price three months after year-end t, B_t is book value per share at year-end t, E_t is earnings per share for period t, and F_t is management forecasts of t+1 period's earnings per share that are announced simultaneously with E_t usually within 10 weeks after year-end t.

Decomposition of R^2

[2] Amir and Lev (1996, Note 9) also use both the return and the price models citing the same reason.

Yearly regressions are run using the R1, R2, P1, and P2 models and the R^2s obtained 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 (e.g., Collins *et al*. 1997; King and Langli 1998; Blacconiere *et al*. 2000).

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

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

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

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

$$\text{Multico-effect} = R^2_{\mathrm{E \bullet \Delta E \bullet \Delta F}} - (\mathrm{incr}E + \mathrm{incr}\Delta E + \mathrm{incr}\Delta F),$$

where incr$E$, incrΔE, and incrΔF represent the incremental explanatory power provided by earnings (E), earnings changes (ΔE), and changes in management forecasts of earnings (ΔF) respectively. Multico-effect denotes the multicollinearity effect and it is the discrepancy between the total R^2 and the sum of the incremental explanatory power of all regressors (Theil 1971, 179). Note that multico-effect can be both positive and negative.

IV. DATA AND DESCRIPTIVE STATISTICS

Sample Selection

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

(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 collected from *Kaisha Shikihou CD-ROM*. Management forecasts of earnings are manually collected from the *Nihon Keizai Shinbun*.[5] 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. The sample for the return model is smaller because the model requires the 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.

Descriptive Statistics

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[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] 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 yearly 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.

[6] The results I present later are qualitatively similar when observations in the extreme 0.5%, 1.5%, 2.0% and 2.5% are removed

Table 1 about here

Panel A of Table 1 contains descriptive statistics and the Pearson correlation coefficients among variables for the return model. It reveals that three explanatory variables, which are earnings, earnings changes, and changes in management forecasts of earnings, 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 the price model. The correlation coefficients of the three explanatory variables, which are book value, earnings, and management forecasts of earnings, as correlated with stock price, are distinctively higher than their counterparts in the return model. 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; Ely and Waymire 1999). As with the return model, management forecasts of earnings exhibit the highest correlation coefficient of 0.691 with stock price.

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 concerns about multicollinearity in the price model when both variables are included in the regression equation. However, multicollinearity is not only determined by intercorrelations among the explanatory variables but also by the variance of the explanatory variables (Maddala 1992, 294). Thus, the impact of multicollinearity is not clear given these descriptive statistics. The variance-inflation factor

(VIF) and the condition index (Greene 2000, 40) are calculated to measure the degree of collinearity among the three explanatory variables in the price model.

VIF(Book value: b_t) = 1.79; VIF(Earnings: x_t) = 2.24; VIF(MF earnings: f_t) = 3.04;

and Condition index = $\sqrt{\dfrac{\text{maximum charateristic root}}{\text{minimum charateristic root}}}$ = 4.59.

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

V. EMPIRICAL ANALYSIS

Return Model

Table 2 about here

Figure 2 about here

Table 2 summarizes the results of yearly cross-sectional regressions of the R1 and the R2 models. When returns are regressed on earning and earnings changes in the R1 model, the coefficients on earnings are significant in 13 of the 20 years and on earnings changes in 17 of the 20 years at the 0.05 level. When changes in management forecasts of earnings are included in the R2 model, the coefficients on earnings are significant in 13 of the 20 years but the coefficients on earnings changes are significant in only 5 of the 20 years at the 0.05 level. The coefficients on earnings changes also become noticeably smaller with the average of the 20 years diminishing from 1.40 in the R1 model to 0.22 in the R2 model.

The coefficients on changes in management forecasts of earnings are significant in all 20 years at the 0.01 level. Thus, changes in management forecasts appear to dominate earnings changes.

Fig.2(a) and Fig.2(b) illustrate the relative incremental explanatory power of explanatory variables using the R1 model and the R2 model respectively. The incremental explanatory power of each regressor and multicollinearity effect are stacked on one another so that they collectively add up to the total explanatory power of the model. The comparison of Fig.2(a) and Fig.2(b) shows that the total R^2s of the R2 model are much higher than those of the R1 model. 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.

Table 3 about here

Table 3 reports the results of the panel analysis using the R2 model. With regard to the model specification, the differences observed are minimal when individual firm effects are considered 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 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). The earnings changes coefficient is negative and statistically significant in Pooled OLS and Fixed effects model. This is consistent with (16) in Appendix that predicts the negative coefficient on earnings changes under the

Ohlson (1995) LIM assumptions, where $0 \leq \omega < 1$ and $0 \leq \gamma < 1$ are assumed. 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.

Price Model

Table 4 about here

Figure 3 about here

Table 4 summarizes the results of yearly cross-sectional regressions of the P1 and the P2 models. These results are similar to those of the return model. When stock price is regressed against book value and earnings in the P1 model, the coefficients on both variables are significantly positive in all 21 years at the 0.01 level. However, when management forecasts of earnings are included in the P2 model, 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, which is consistent with (14) in Appendix. The coefficients on book value diminish in the P2 model along with their weakening statistical significance, although they are significant in all 21 years at the 0.05 level. The coefficients on management forecasts of earnings are significantly positive in all 21 years at the 0.01 level.

Fig.3(a) and Fig.3(b) illustrate the relative incremental explanatory power of explanatory variables using the P1 model and the P2 model respectively. Again, the results are similar to those of the return models. The total R^2s of the P2 model are higher than those of the P1 model and the incremental explanatory power of earnings almost disappears when management forecasts of earnings are included in the model.

Table 5 about here

Table 5 reports the results of the panel analysis using the P2 model. 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 when the price model is used. 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.

The results of both the return and the price models provide strong evidence in support of H1, that is, management forecasts of next period's earnings are more value-relevant than current earnings.

Effects of one-time items

Prior research indicates that yearly measures of the value-relevance of accounting numbers are lower when the incidence of one-time items is higher (see Collins *et al*. 1997; Easton *et al*. 2000). Following Ely and Waymire (1999), the impact of one-time items on the previous results is investigated by replicating the return model in which changes in earnings from continuing operations and changes in management forecasts of earnings from continuing operations are used in lieu of earnings changes and changes in management forecasts of earnings.[7]

Tax applicable to earnings from continuing operations is not reported in the income statement in Japan, so that earnings from continuing operations, net of tax, is estimated using the following formula:

$$\text{ECO (net of tax)}_t = \text{ECO}_t \times \{1 - (\text{CorpTR}_t + \text{ResidentTR}_t)\} \quad (t = 1979\text{-}1999)$$

where ECO_t is earnings from continuing operations for year t, CorpTR_t is corporation tax rate for year t, and ResidentTR_t is residents' tax rate for year t.[8] Likewise, management forecasts of earnings from continuing operations, net of tax, are estimated.

Figure 4 about here

Table 6 about here

Fig.4 shows the incremental explanatory power of each regressor using the R2 model, and Table 6 reports the results of the panel analysis. The comparison of Fig.4 and Fig.2(b) reveals that the total R^2s are generally higher when one-time items are excluded from earnings and management forecasts of earnings. The average of the total R^2s over the 20 years increases from 0.149 in Fig.2(b) to 0.165 in Fig.4. However, minimal difference is observed in terms of the relative explanatory power of each explanatory variable. Changes in management forecasts still exhibit the highest incremental explanatory power in Fig.4 and have the largest coefficients and t-statistics in Table 6.

[7] Strictly speaking, excluding one-time items from bottom-line earnings violates the clean surplus relation that underlies the theoretical development of the RIV in (5).

[8] Residents' tax is levied by local municipalities and the tax rate differs slightly across regions. The standard tax rate is used in this research. Corporation business tax is ignored until 1998, because it is included in general and administrative expenses until 1998. For the year 1999, the effective tax rate is calculated and used.

Effects of negative earnings and negative changes in management forecasts of earnings

Hayn (1995) reports that firms reporting negative earnings have a weaker association with stock returns than firms reporting positive earnings. Hayn hypothesizes that this is because shareholders have a liquidation option so that negative earnings cannot be expected to perpetuate. Collins *et al*. (1997) and Easton *et al*. (2000) find a negative correlation between the value-relevance measures of accounting numbers and the increasing frequency of negative earnings.

In this study, the value-relevance of negative changes in management forecasts of earnings is investigated, in addition to the aforementioned negative earnings, using the return model. This is due to the fact that although shareholders have an option of liquidating the firm, the liquidation is unlikely to occur immediately after reporting negative earnings. Therefore, if management forecasts for next period's earnings are improving, the market will react to the information.

Table 7 about here

Figure 5 about here

Table 7 presents the results. Consistent with prior research (e.g., Hayn 1995; Easton 1999; Easton *et al*. 2000), when returns are regressed on earnings, the estimate of the earnings coefficient and the R^2 for negative earnings firms are small, -0.30 and 0.64% respectively. On the other hand, the estimate of the earnings coefficient and the R^2 for positive earnings firms are 4.62 and 6.69% respectively. Similar results are obtained with negative and positive changes in management forecasts.

Next, the sample is divided into four groups according to combinations of the sign (positive or negative) of earnings and changes in management forecasts of earnings. Fig.5 illustrates the relative incremental explanatory power of variables in the four groups using the R2 model. It shows that, when current earnings are negative, the market looks to management forecasts, and if management forecasts are improving, the market appears to react to them. Alternatively, when the management forecasts are deteriorating, the market appears to look to current earnings, and if current earnings are positive, the market appears to react to them. However, when both current earnings and changes in management forecasts are negative, there does not seem to be any correlation between stock returns and these accounting variables. When current earnings are positive and management forecasts are improving, the market appears to value management forecast information more than current earnings information.

Factors that enhance the value-relevance of management forecasts

In this subsection, the characteristics of firms that seem to influence the relative importance of management forecasts are investigated. When investors predict the future performance of firms, current earnings information seems to be a good enough predictor for mature firms. However, they may not be as useful for predicting the future performance of growing firms. Management forecasts of earnings, on the other hand, seem to provide investors with more useful information about growing firms. It can therefore be hypothesized that management forecasts are more value-relevant to high-growth firms. To test this hypothesis, ten equally sized portfolios are formed based on the annual sales growth rate with portfolio 1 (10) having the lowest (highest) sales growth rate. The sales growth rates are negative for all the firms in portfolios 1 to 3 and for about two-thirds of the firms in portfolio 4. The regressions are run for the ten portfolios using the R2 model and variations in the incremental explanatory power of each variable across the portfolios are examined.

Figure 6 about here

Fig.6 plots the total and incremental explanatory power of variables for the ten portfolios. It reveals that the incremental explanatory power of management forecasts increases almost monotonically with the sales growth rate. It appears that management forecast information is more value-relevant to high-growth firms.

The next factor that is expected to influence the value-relevance of management forecasts of earnings concerns the accuracy of prior management forecasts. If a firm fails to meet its prior forecasts, the market will not have much faith in the current forecast of the firm. Williams (1996) and Hirst *et al*. (1999) report that investors consider the prior accuracy of management forecasts when making their own predictions. Taking that into account, the accuracy of prior management forecasts is measured using the following scale:

$$\text{Management forecast error} = \frac{E_t - F_{t-1}}{P_t},$$

where E_t is earnings per share for period t, $F_{t\text{-}1}$ is management forecasts of t period's earnings per share that are announced within 10 weeks after year-end t-1, and P_t is stock price three months after year-end t.

The difference between actual earnings and the forecast made at the beginning of the period is deflated by the stock price to measure the magnitude of the forecast error. Ten equally sized portfolios are formed based on the management forecast error with portfolio 1 (10) having the most negative (positive) management forecast error. The management forecast errors are negative for all the firms in portfolios 1 to 5 and for about two-thirds of the firms in portfolio 6. The regressions are run for the ten portfolios using the R2 model and variations in the incremental explanatory power of each variable across the portfolios are examined.

Figure 7 about here

Fig.7 plots the total and incremental explanatory power of variables for the ten portfolios. It reveals that the incremental explanatory power of management forecasts becomes higher than that of earnings in portfolio 7, which is where the sign of the management forecast error becomes positive for all the firms in the portfolio. This finding indicates that management forecast information is more value-relevant when current reported earnings are better than their forecasts made by management at the beginning of the period.

Other possible factors such as firm size and intangible intensity are also investigated. To investigate the effects of firm size and intangible intensity, ten portfolios are formed according to the inflation-adjusted (CPI-adjusted) market value of equity and the price-to-book ratio respectively. The regressions are estimated using the return model and the incremental explanatory power of variables are examined. The results do not show any noticeable differences across the portfolios.[9]

The second hypothesis of this study is that management forecasts of earnings are more value-relevant to high-growth firms and to those firms whose prior forecasts are more accurate. The results presented in this subsection appear to support the high-growth firms hypothesis. The market also appears to place more importance on management forecast information when current earnings exceed their forecasts made at the beginning of the period.

VI. CONCLUSION

This paper examines the value-relevance of book value, earnings, and management forecasts of next period's earnings in Japan over the past twenty years. This research is motivated by numerous studies on the value-relevance of accounting numbers in the U.S. in which the return and the price models are commonly used. Although the theoretical foundations of both models are derived from the Ohlson (1995) linear information model, an important component of the Ohlson's model, which is "other information" v_t, is omitted in studies using either model. This research exploits the unique setting in Japan where managers simultaneously announce the recently completed period's earnings and forecasts of upcoming period's earnings. These management forecasts are used as a proxy for other information, v_t.

[9] When intangible intensive firms are defined as firms in chemicals, pharmaceuticals, electrical machinery, precision instruments, and communication according to *Toyokeizai* industry classification, some differences are observed between intangible intensive firms and non-intensive firms. The incremental explanatory power of management forecasts increased from 5.8% for intangible non-intensive firms to 7.8% for intangible intensive firms.

First, the value-relevance of book value, current earnings, and management forecasts of earnings is investigated using both the return and the price models that incorporate other information, v_t. The results indicate that management forecasts of earnings (changes) have the highest correlation with stock price (returns). Management forecasts of earnings (changes) also have higher incremental explanatory power than book value (earnings) and earnings (changes) in the price (return) model. The incremental explanatory power of earnings (changes) almost disappears when management forecasts of earnings (changes) are included in the price (return) model.

Next, the effects of one-time items and negative earnings are examined. The results do not change materially when one-time items are removed from earnings and management forecasts of earnings. Management forecasts still exhibit the highest incremental explanatory power. The tests on negative earnings effect indicate that not only negative earnings but also negative changes in management forecasts have little association with stock returns. However, if either one of the two is positive, the market appears to react to the positive one.

Lastly, the characteristics of firms that are expected to enhance the value-relevance of management forecast information are investigated. The results show that the market places more importance on management forecast information when firms are growing rapidly and when current reported earnings exceed their forecasts made at the beginning of the period.

The analysis in this paper raises a couple of concerns. First, value-relevance studies that do not adequately control for other information, v_t, may result in unreliable associations that may lead to erroneous conclusions. Second, current earnings information, which is a summary of historical events, may be of limited value in the market where expectations about future events tend to determine the value of a firm.

APPENDIX

Residual income valuation model

The residual income valuation model comprises three basic assumptions. First, the dividend discount model defines the value of a firm as the present value of the expected future dividends.

$$P_t \equiv \sum_{\tau=1}^{\infty} E_t\left[\frac{d_{t+\tau}}{(1+r)^\tau}\right], \tag{1}$$

where P_t is the price of the firm's equity at time t, $E_t[d_{t+\tau}]$ is the expected dividends received at time $t+\tau$ conditional on time t information, and r is the discount rate that is assumed to be constant. Second, the clean surplus relation is assumed.

$$b_t = b_{t-1} + x_t - d_t, \tag{2}$$

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. Third, the book value of equity grows at a rate less than $1+r$,

$$(1+r)^{-\tau} E_t[b_{t+\tau}] \rightarrow 0, \text{ as } \tau \rightarrow \infty. \tag{3}$$

Combining the clean surplus relation given by (2) with the dividend discount model in (1) yields[10]

$$P_t = b_t + \sum_{\tau=1}^{\infty} E_t\left[\frac{x_{t+\tau} - rb_{t+\tau-1}}{(1+r)^\tau}\right] - E_t\left[\frac{b_{t+\infty}}{(1+r)^\infty}\right]. \tag{4}$$

The last term of the equation is assumed to be zero by the regularity condition (3) and 'abnormal earnings' is defined as $x_t^a \equiv x_t - rb_{t-1}$. Equation (4) can be restated as a function of the book value of equity and the discounted expected abnormal earnings, which is called the Residual Income Valuation Model (hereafter RIV),

[10] See Ota (2001, Appendix 1) for the demonstration of this result.

$$P_t = b_t + \sum_{\tau=1}^{\infty} E_t\left[\frac{x^a_{t+\tau}}{(1+r)^\tau}\right]. \tag{5}$$

Price and Return models without "other information" v_t

The Ohlson (1995) linear information model (hereafter LIM) postulates that the time-series behavior of abnormal earnings is as follows:

$$x^a_{t+1} = \omega x^a_t + v_t + \varepsilon_{1t+1}, \tag{6a}$$

$$v_{t+1} = \gamma v_t + \varepsilon_{2t+1}, \tag{6b}$$

where v_t is information other than abnormal earnings, ω is the persistence parameter of abnormal earnings and predicted to lie in the range $0 \le \omega < 1$, γ is the persistence parameter of other information and predicted to lie in the range $0 \le \gamma < 1$, and ε_{1t} and ε_{2t} are error terms.

Combining the RIV given by (5) with the Ohlson (1995) LIM in (6a)(6b) yields the following valuation function:[11]

$$P_t = b_t + \alpha_1 x^a_t + \alpha_2 v_t, \tag{7}$$

where $\alpha_1 = \dfrac{\omega}{1+r-\omega}$ and $\alpha_2 = \dfrac{1+r}{(1+r-\omega)(1+r-\gamma)}$.

Given $x^a_t \equiv x_t - rb_{t-1}$ and $b_t = b_{t-1} + x_t - d_t$, equation (7) can be rewritten as

$$P_t = (1\text{-}k)b_t + k(\varphi x_t - d_t) + \alpha_2 v_t, \tag{8}$$

where $k = r\alpha_1 = \dfrac{r\omega}{1+r-\omega}$ and $\varphi = \dfrac{1+r}{r}$.

Equation (8) indicates that the valuation model can be viewed as a weighted average of a book value model and an earnings model. Equation (8) is often cited as the theoretical foundation for many studies of the relation between stock price, book value of equity, and

[11] See Ota (2001, Appendix 2) for the demonstration of this result.

earnings (see Easton 1999, 402; Eaton and Sommers 2000, 34). These studies are based on the following price model:

$$P_t = \beta_0 + \beta_1 b_t + \beta_2 x_t + \varepsilon_t. \qquad \text{(Price model without } v_t\text{)(9)}$$

Equation (8) also can be rewritten to provide the theoretical basis for the return model. Taking the first differences in (8), using the clean surplus relation in (2), and dividing both sides of the equation by beginning-of-period price gives

$$Ret_t = (1\text{-}k)\frac{x_t}{P_{t-1}} + k\varphi\frac{\Delta x_t}{P_{t-1}} + k\frac{d_{t-1}}{P_{t-1}} + \alpha_2\frac{\Delta v_t}{P_{t-1}}, \qquad (10)$$

where $Ret_t = \dfrac{P_t - P_{t-1} + d_t}{P_{t-1}}$, $\Delta x_t = x_t - x_{t\text{-}1}$, and $\Delta v_t = v_t - v_{t\text{-}1}$.

Equation (10) is viewed as the theoretical basis for the following return model:

$$Ret_t = \beta_0 + \beta_1 x_t/P_{t\text{-}1} + \beta_2 \Delta x_t/P_{t\text{-}1} + \varepsilon_t. \qquad \text{(Return model without } v_t\text{)(11)}$$

However, both the price model in (9) and the return model in (11) ignore "other information", v_t, in the Ohlson (1995) LIM. This is equivalent to assuming that the Ohlson (1995) LIM in (6a-b) is $x^a_{t+1} = \omega x^a_t + \varepsilon_{t+1}$.

Price and Return models with "other information" v_t

Ohlson (1998) and Dechow *et al*. (1999) demonstrate how other information, v_t, can be identified. Define a forecast of t+1 period earnings at time t, which is denoted by f_t, as the expected earnings for period t+1 at time t:[12]

$$f_t \equiv E_t[x_{t+1}].$$

[12] Although Dechow *et al*. (1999) use analyst forecasts of next period's earnings for f_t, they can be replaced by other forecasts. In this study, management forecasts of earnings are used to proxy for f_t.

Following the definition of abnormal earnings, the expected abnormal earnings for period t+1 at time t, which is denoted by f_t^a, is equal to

$$E_t[x_{t+1}^a] \equiv f_t^a = f_t - rb_t.$$

By rearranging the Ohlson (1995) LIM in (6a), other information, v_t, can be measured as

$$v_t = f_t^a - \omega x_t^a. \tag{12}$$

Substituting (12) into (7) and simplifying the equation yields the following valuation function:

$$P_t = b_t + (\alpha_1 - \alpha_2\omega)\, x_t^a + \alpha_2 f_t^a, \tag{13}$$

where $\alpha_1 = \dfrac{\omega}{1+r-\omega}$ and $\alpha_2 = \dfrac{1+r}{(1+r-\omega)(1+r-\gamma)}$.

Replacing x_t^a with $x_t - rb_{t-1}$ and f_t^a with $f_t - rb_t$, and invoking the clean surplus relation in (2), the valuation function (13) can be restated as

$$P_t = \delta_1 b_t + \delta_2(\varphi x_t - d_t) + \delta_3(r^{-1}f_t), \tag{14}$$

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 (14) indicates that the valuation model can be viewed as a combination of a book value model, an earnings model, and a forecasted earnings model.[13] Equation (14) can be the theoretical basis for the following price model:

$$P_t = \lambda_0 + \lambda_1 b_t + \lambda_2 x_t + \lambda_3 f_t + \varepsilon_t. \qquad \text{(Price model with } v_t\text{)(15)}$$

Equation (14) also can be rewritten to provide the theoretical basis for the return model. Taking the first differences in (14), using the clean surplus relation in (2), and dividing both sides of the equation by beginning-of-period price yields

[13] See Ohlson (1998, Appendix I) for the demonstration of this result.

$$Ret_t = \delta_1 \frac{x_t}{P_{t-1}} + \delta_2 \varphi \frac{\Delta x_t}{P_{t-1}} + \delta_3 r^{-1} \frac{\Delta f_t}{P_{t-1}} + \delta_2 \frac{d_{t-1}}{P_{t-1}} + \delta_3 \frac{d_t}{P_{t-1}}, \tag{16}$$

where $Ret_t = \dfrac{P_t - P_{t-1} + d_t}{P_{t-1}}$, $\Delta x_t = x_t - x_{t\text{-}1}$, and $\Delta f_t = f_t - f_{t\text{-}1}$.

Equation (16) can be viewed as the theoretical basis for the following return model:

$$Ret_t = \lambda_0 + \lambda_1 x_t/P_{t-1} + \lambda_2 \Delta x_t/P_{t-1} + \lambda_3 \Delta f_t/P_{t-1} + \varepsilon_t. \qquad \text{(Return model with } v_t\text{)(17)}$$

* Equations (11), (17), (9), and (15) correspond to the R1, R2, P1, and P2 models respectively.

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Table 1
Descriptive statistics and correlations among variables for the return and the 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 (ΔF_t)	0.0002	0.0186	-0.1585	-0.0056	0.0000	0.0057	0.2912

Pearson Correlation coefficients

Variable	Returns (Ret_t)	Earnings (E_t)	Earnings changes (ΔE_t)	Changes in MF earnings (ΔF_t)
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 (ΔF_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 (F_t)	26.0	26.8	-45.9	8.3	17.3	34.8	244.0

Pearson Correlation coefficients

Variable	Stock Price (P_t)	Book value (B_t)	Earnings (E_t)	MF earnings (F_t)
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 (F_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}. ΔF_t : annual change in management forecasts of next period's earnings per share ($\Delta F_t = F_t - F_{t-1}$) 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. F_t : management forecasts of t+1 period's earnings per share that are announced simultaneously with E_t usually within 10 weeks after year-end t.

Table 2
Estimates from yearly regressions of returns on earnings, earnings changes, and changes in management forecasts of earnings, 1980-1999

		R1: $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \varepsilon_t$[a]			R2: $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta F_t + \varepsilon_t$[b]			
Year	# obs.	E_t	ΔE_t	R^2	E_t	ΔE_t	ΔF_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] R1(Return model without v_t): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \varepsilon_t$
[b] R2(Return model with v_t): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta F_t + \varepsilon_t$

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}. ΔF_t : annual change in management forecasts of next period's earnings per share ($\Delta F_t = F_t - F_{t-1}$) deflated by P_{t-1}. P_{t-1} : stock price three months after year-end t-1.

t-statistics are provided in parentheses.
* Denotes significance at the 0.05 level using a two-tailed t-test.
** Denotes significance at the 0.01 level using a two-tailed t-test.

Table 3
Panel Analysis using return models[a]

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

[a] R2(Return model with v_t): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta F_t + \varepsilon_t$ is used.
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}. ΔF_t : annual change in management forecasts of next period's earnings per share ($\Delta F_t = F_t - F_{t-1}$) 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.

* Denotes significance at the 0.05 level using a two-tailed t-test.

** Denotes significance at the 0.01 level using a two-tailed t-test.

Table 4
Estimates from yearly regressions of stock price on book value, earnings, and management forecasts of earnings, 1979-1999

		P1: $P_t = \beta_0 + \beta_1 B_t + \beta_2 E_t + \varepsilon_t$[a]			P2: $P_t = \beta_0 + \beta_1 B_t + \beta_2 E_t + \beta_3 F_t + \varepsilon_t$[b]			
Year	# obs.	B_t	E_t	R^2	B_t	E_t	F_t	R^2
1979	710	1.05 (12.71)**	3.00 (5.78)**	0.464	0.77 (8.17)**	0.11 (0.16)	5.79 (5.66)**	0.512
1980	729	1.00 (10.96)**	2.92 (4.91)**	0.462	0.67 (6.74)**	-1.36 (-2.11)*	6.93 (7.34)**	0.511
1981	748	0.91 (7.12)**	5.66 (5.60)**	0.489	0.31 (2.24)*	-2.36 (-2.71)**	13.13 (9.00)**	0.585
1982	758	0.87 (8.19)**	3.10 (3.36)**	0.470	0.44 (3.99)**	-2.76 (-3.95)**	10.26 (7.53)**	0.547
1983	768	1.03 (8.24)**	5.12 (4.94)**	0.411	0.64 (4.14)**	0.13 (0.14)	9.81 (5.67)**	0.456
1984	807	1.11 (8.10)**	6.61 (5.36)**	0.357	0.55 (3.13)**	-0.69 (-0.37)	15.30 (4.47)**	0.451
1985	822	1.17 (7.98)**	6.43 (4.48)**	0.388	0.73 (4.16)**	0.33 (0.30)	11.24 (5.10)**	0.435
1986	846	1.46 (8.48)**	7.13 (4.46)**	0.348	1.07 (5.71)**	-0.43 (-0.29)	14.44 (5.78)**	0.386
1987	944	1.48 (8.52)**	8.46 (4.72)**	0.312	0.93 (5.33)**	-5.62 (-2.45)*	22.64 (7.57)**	0.371
1988	1105	1.29 (9.50)**	10.73 (6.50)**	0.334	0.84 (6.07)**	1.63 (0.86)	15.07 (6.14)**	0.373
1989	1301	1.17 (9.99)**	11.72 (8.78)**	0.422	0.76 (6.23)**	-0.52 (-0.27)	15.60 (7.48)**	0.470
1990	1427	2.21 (10.88)**	22.46 (9.14)**	0.505	1.11 (5.35)**	-4.84 (-1.48)	38.11 (9.06)**	0.593
1991	1539	1.40 (8.96)**	20.04 (9.54)**	0.520	0.75 (4.84)**	-7.57 (-2.96)**	35.35 (11.00)**	0.620
1992	1617	0.92 (13.23)**	9.13 (10.31)**	0.534	0.52 (8.75)**	-1.71 (-1.68)	17.92 (12.62)**	0.651
1993	1662	1.08 (20.41)**	7.17 (11.45)**	0.551	0.67 (13.75)**	-1.36 (-2.18)*	17.55 (14.98)**	0.677
1994	1743	1.35 (20.47)**	8.13 (10.43)**	0.551	0.91 (13.20)**	-2.79 (-3.09)**	20.30 (13.38)**	0.650
1995	1851	0.77 (19.41)**	6.96 (12.68)**	0.581	0.45 (10.35)**	-0.25 (-0.31)	13.72 (10.46)**	0.683
1996	1986	0.95 (15.48)**	10.67 (12.55)**	0.572	0.51 (8.24)**	-0.32 (-0.47)	19.56 (16.15)**	0.680
1997	2103	0.64 (11.02)**	11.76 (13.19)**	0.499	0.28 (4.92)**	0.48 (0.48)	17.70 (12.17)**	0.613
1998	2207	0.62 (12.48)**	6.79 (10.22)**	0.419	0.28 (5.57)**	1.81 (4.05)**	12.01 (11.67)**	0.527
1999	2266	1.05 (12.01)**	8.46 (8.89)**	0.362	0.28 (3.32)**	0.25 (0.27)	24.14 (12.81)**	0.559
Average	1330.4	1.12 (11.63)	8.69 (7.97)	0.455	0.64 (6.39)	-1.33 (-0.86)	16.98 (9.34)	0.540

[a] P1(Price model without v_t): $P_t = \beta_0 + \beta_1 B_t + \beta_2 E_t + \varepsilon_t$

[b] P2(Price model with v_t): $P_t = \beta_0 + \beta_1 B_t + \beta_2 E_t + \beta_3 F_t + \varepsilon_t$

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*. F_t : management forecasts of *t*+1 period's earnings per share announced within 10 weeks after year-end *t*.

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

* Denotes significance at the 0.05 level using a two-tailed *t*-test.

** Denotes significance at the 0.01 level using a two-tailed *t*-test.

Table 5
Panel Analysis using price models[a]

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

[a] P2(Price model with v_t): $P_t = \beta_0 + \beta_1 B_t + \beta_2 E_t + \beta_3 F_t + \varepsilon_t$ is 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. F_t : management forecasts of t+1 period's earnings per share announced within 10 weeks after year-end t.
[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 and they are based on White's heteroskedastic-consistent SE.
* Denotes significance at the 0.05 level using a two-tailed t-test.
** Denotes significance at the 0.01 level using a two-tailed t-test.

Table 6
Return models using earnings from continuing operations[a]

	E_t	ΔE_t	ΔF_t	Firm effects[c]	Time effects[d]	adj.R^2	# obs.
Average 1980-1999[b]	1.49 (4.67)	0.06 (0.10)	8.30 (10.41)			0.165	
Pooled OLS	1.95 (18.03)**	-0.91 (-5.28)**	8.97 (33.89)**			0.121	25491
Fixed effects with Time effects	1.94 (15.14)**	-0.32 (-2.12)*	6.58 (31.42)**	1.04	1194.4**	0.545	25491

[a] R2(Return model with v_t): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta F_t + \varepsilon_t$ is used.

Ret_t : the return over the 12-month period commencing on the third month after year-end t-1. E_t : earnings from continuing operations per share for period t deflated by P_{t-1}. ΔE_t : annual change in earnings from continuing operations per share ($\Delta E_t = E_t - E_{t-1}$) deflated by P_{t-1}. ΔF_t : annual change in management forecasts of next period's earnings from continuing operations per share ($\Delta F_t = F_t - F_{t-1}$) deflated by P_{t-1}. P_{t-1} : stock price three months after year-end t-1.

[b] Average 1980-1999 indicates the average of the yearly cross-sectional estimates from 1980 to 1999.

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

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

t-statistics are provided in parentheses.

* Denotes significance at the 0.05 level using a two-tailed t-test.

** Denotes significance at the 0.01 level using a two-tailed t-test.

Table 7
The value-relevance of negative earnings and negative changes in management forecasts of earnings[a]

Sample partition	# obs.	E_t	ΔE_t	ΔF_t	R^2 (%)	incr E_t	incr ΔE_t	incr ΔF_t
Negative E_t	2564	-0.30 (-4.05)**			0.64%			
Positive E_t	23005	4.62 (40.60)**			6.69%			
Negative Δf_t	12912			0.38 (1.64)	0.02%			
Positive ΔF_t	12657			6.98 (28.84)**	6.17%			
All	25569	1.04 (10.86)**	-0.25 (-2.78)**	5.90 (28.23)**	7.57%	1.08%	0.06%	6.16%
Negative E_t / Negative ΔF_t	1530	-0.48 (-2.49)*	0.33 (1.76)	0.21 (0.51)	0.67%	0.67%	0.35%	0.01%
Negative E_t / Positive ΔF_t	1034	-0.24 (-1.59)	0.25 (1.85)	2.46 (4.61)**	4.17%	0.19%	0.27%	2.54%
Positive E_t / Negative ΔF_t	11382	3.28 (20.35)**	0.23 (1.99)*	1.72 (5.27)**	3.71%	3.38%	0.04%	0.30%
Positive E_t / Positive ΔF_t	11623	2.87 (12.47)**	-0.27 (-1.66)	10.00 (13.35)**	13.24%	2.06%	0.04%	5.68%

[a] $Ret_t = \alpha_0 + \alpha_1 E_t + \varepsilon_t$, $Ret_t = \alpha_0 + \alpha_1 \Delta F_t + \varepsilon_t$, and $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta F_t + \varepsilon_t$ are used.

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}. ΔF_t : annual change in management forecasts of next period's earnings per share ($\Delta F_t = F_t - F_{t-1}$) deflated by P_{t-1}. P_{t-1} : stock price three months after year-end t-1.

t-statistics are provided in parentheses.

* Denotes significance at the 0.05 level using a two-tailed *t*-test.

** Denotes significance at the 0.01 level using a two-tailed *t*-test.

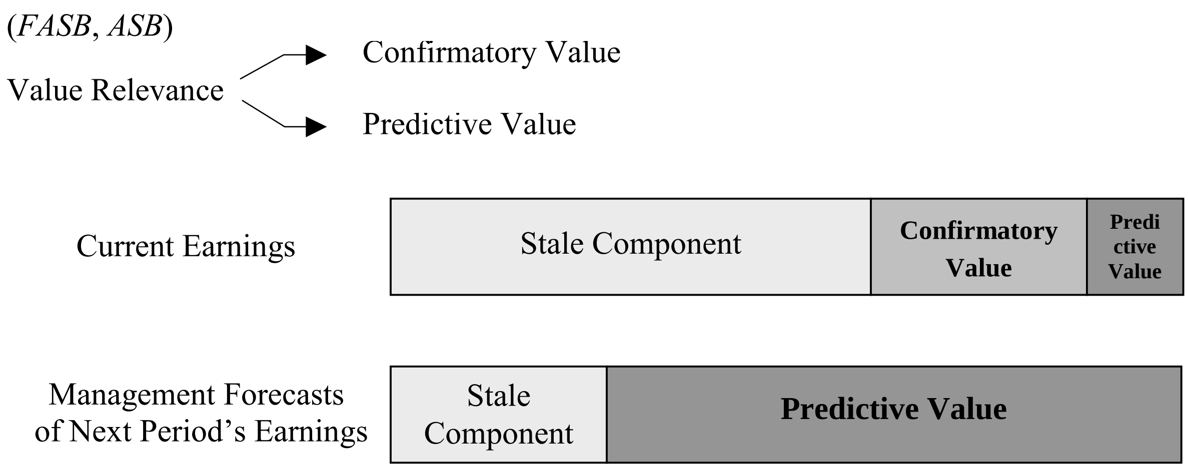
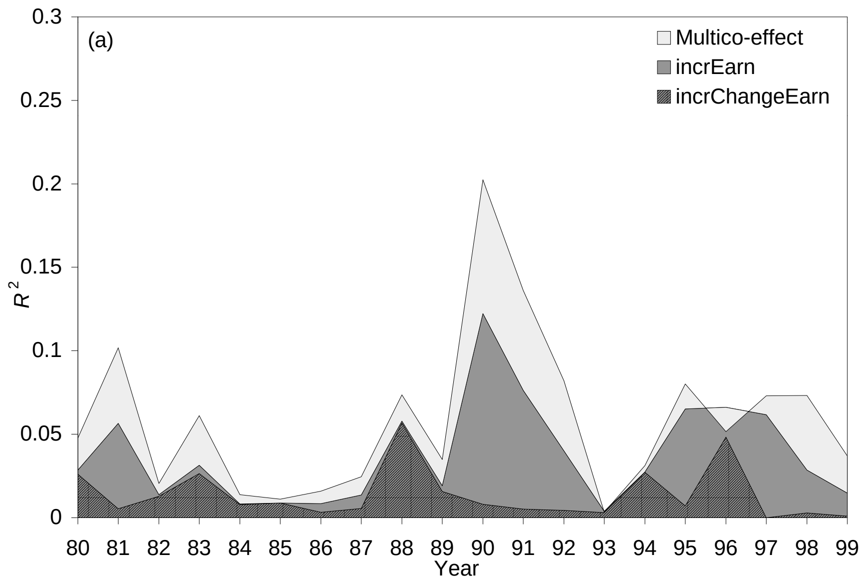


Fig.1 The value-relevance of current earnings and management forecasts of next period's earnings.



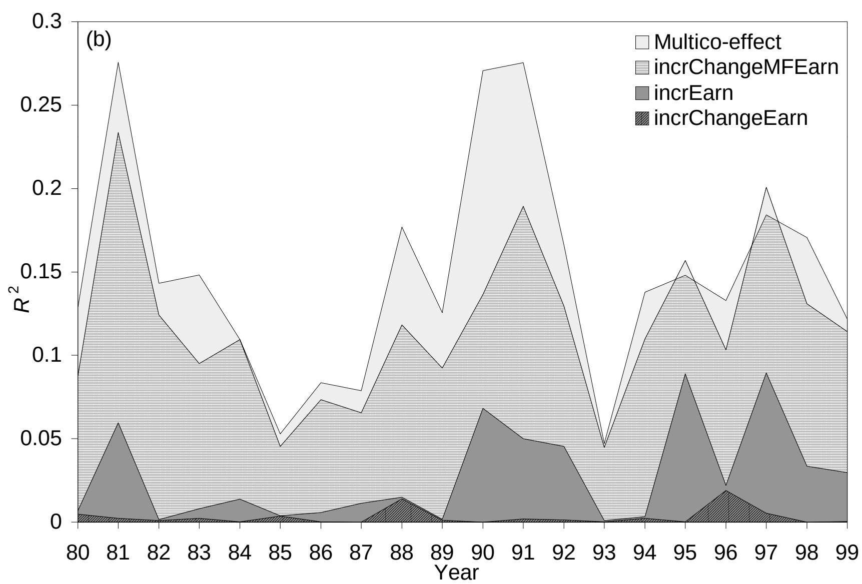


Fig.2 (a) Yearly cross-sectional regressions showing the incremental explanatory power of earnings and earnings changes, and the multicollinearity effect. (b) Yearly cross-sectional regressions showing the incremental explanatory power of earnings, earnings changes and changes in management forecasts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

(a) R1(Return model without v_t): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \varepsilon_t$ is used. incr$E$ (incrEarn) = $R^2_{\mathrm{E\bullet\Delta E}} - R^2_{\mathrm{\Delta E}}$, incr$\Delta E$ (incrChangeEarn) = $R^2_{\mathrm{E\bullet\Delta E}} - R^2_{\mathrm{E}}$, Multico-effect = $R^2_{\mathrm{E\bullet\Delta E}}$ – (incr$E$ + incrΔE).

(b) R2(Return model with v_t): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta F_t + \varepsilon_t$ is used. incr$E$ (incrEarn) = $R^2_{\mathrm{E\bullet\Delta E\bullet\Delta F}} - R^2_{\mathrm{\Delta E\bullet\Delta F}}$, incr$\Delta E$ (incrChangeEarn) = $R^2_{\mathrm{E\bullet\Delta E\bullet\Delta F}} - R^2_{\mathrm{E\bullet\Delta F}}$, incr$\Delta F$ (incrChangeMFEarn) = $R^2_{\mathrm{E\bullet\Delta E\bullet\Delta F}} - R^2_{\mathrm{E\bullet\Delta E}}$, Multico-effect = $R^2_{\mathrm{E\bullet\Delta E\bullet\Delta F}}$ – (incr$E$ + incrΔE + incrΔF).

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 ($\Delta E_t = E_t - E_{t-1}$) deflated by $P_{t\text{-}1}$. ΔF_t : annual change in management forecasts of next period's earnings per share ($\Delta F_t = F_t - F_{t-1}$) deflated by $P_{t\text{-}1}$. $P_{t\text{-}1}$: stock price three months after year-end t-1.

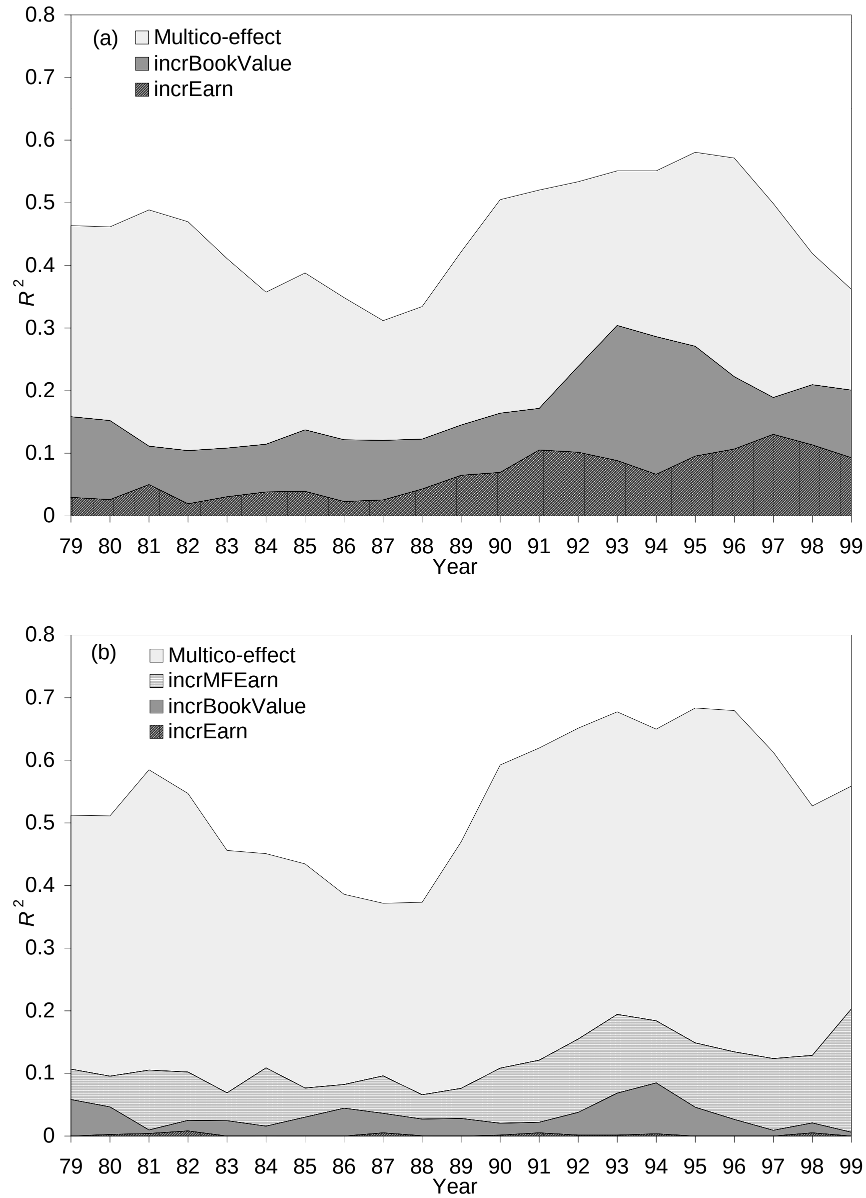


Fig.3 (a) Yearly cross-sectional regressions showing the incremental explanatory power of book value and current earnings, and the multicollinearity effect. (b) Yearly cross-sectional regressions showing the incremental explanatory power of book value, current earnings and management forecasts of earnings, and the multicollinearity effect. The incremental explanatory power of each variable and the multicollinearity effect are stacked on one another so that they collectively add up to the total R^2 of the model.

(a) P1(Price model without v_t): $P_t = \beta_0 + \beta_1 B_t + \beta_2 E_t + \varepsilon_t$ is used. incr$B$ (incrBookValue) = $R^2_{\mathrm{B\bullet E}} - R^2_{\mathrm{E}}$, incr$E$ (incrEarn) = $R^2_{\mathrm{B\bullet E}} - R^2_{\mathrm{B}}$, Multico-effect = $R^2_{\mathrm{B\bullet E}}$ – (incr$B$ + incr$E$).

(b) P2(Price model with v_t): $P_t = \beta_0 + \beta_1 B_t + \beta_2 E_t + \beta_3 F_t + \varepsilon_t$ is used. incr$B$ (incrBookValue) = $R^2_{\mathrm{B\bullet E\bullet F}} - R^2_{\mathrm{E\bullet F}}$, incr$E$ (incrEarn) = $R^2_{\mathrm{B\bullet E\bullet F}} - R^2_{\mathrm{B\bullet F}}$, incr$F$ (incrMFEarn) = $R^2_{\mathrm{B\bullet E\bullet F}} - R^2_{\mathrm{B\bullet E}}$, Multico-effect = $R^2_{\mathrm{B\bullet E\bullet F}}$ – (incr$B$ + incr$E$ + incr$F$).

Subscripts of R^2 denote the regressors. 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. F_t : management forecasts of t+1 period's earnings per share announced within 10 weeks after year-end t.

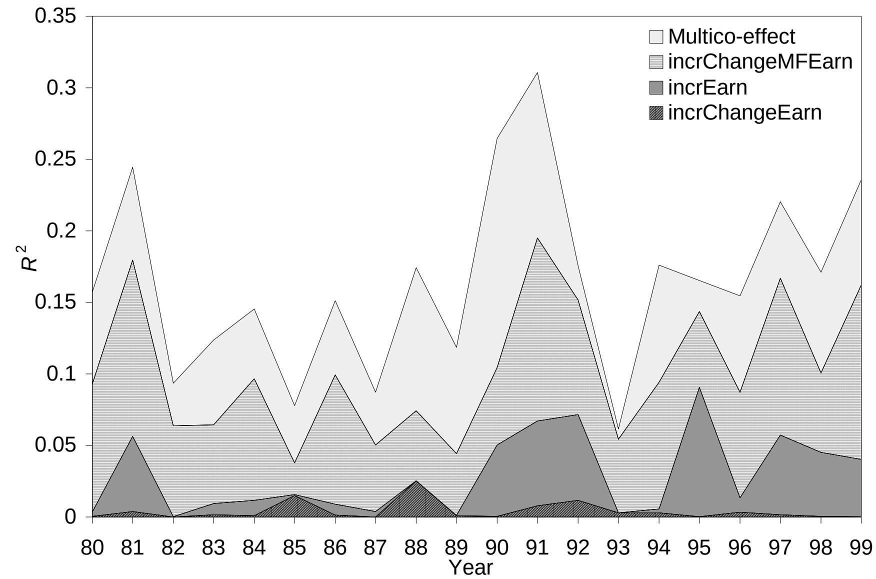


Fig.4 Yearly cross-sectional regressions showing the incremental explanatory power of earnings from continuing operations, changes in earnings from continuing operations and changes in management forecasts of earnings from continuing operations, and the multicollinearity effect. The incremental explanatory power of each variable and the multicollinearity effect are stacked on one another so that they collectively add up to the total R^2 of the model.

R2(Return model with v_t): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta F_t + \varepsilon_t$ is used. incr$E$ (incrEarn) = $R^2_{\mathrm{E{\bullet}\Delta E{\bullet}\Delta F}} - R^2_{\mathrm{\Delta E{\bullet}\Delta F}}$, incr$\Delta E$ (incrChangeEarn) = $R^2_{\mathrm{E{\bullet}\Delta E{\bullet}\Delta F}} - R^2_{\mathrm{E{\bullet}\Delta F}}$, incr$\Delta F$ (incrChangeMFEarn) = $R^2_{\mathrm{E{\bullet}\Delta E{\bullet}\Delta F}} - R^2_{\mathrm{E{\bullet}\Delta E}}$, Multico-effect = $R^2_{\mathrm{E{\bullet}\Delta E{\bullet}\Delta F}}$ – (incr$E$ + incrΔE + incrΔF).

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 from continuing operations per share for period t deflated by P_{t-1}. ΔE_t : annual change in earnings from continuing operations per share ($\Delta E_t = E_t - E_{t-1}$) deflated by P_{t-1}. ΔF_t : annual change in management forecasts of next period's earnings from continuing operations per share ($\Delta F_t = F_t - F_{t-1}$) deflated by P_{t-1}. P_{t-1} : stock price three months after year-end t-1.

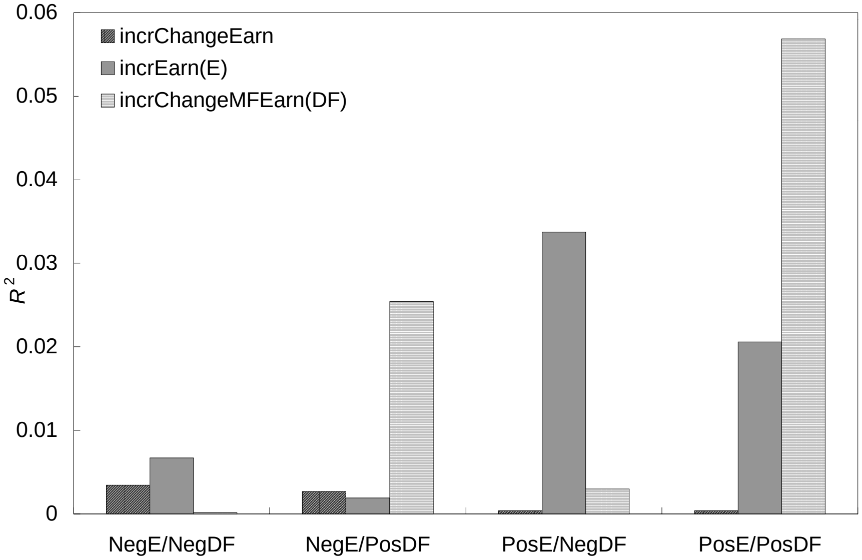


Fig.5 The incremental explanatory power of negative earnings and negative changes in management forecasts of earnings. The sample is divided into four groups according to combinations of the sign (negative or positive) of earnings and changes in management forecasts of earnings. NegE = negative earnings, NegDF = negative changes in management forecasts of earnings, PosE = positive earnings, PosDF = positive changes in management forecasts of earnings. (e.g.) NegE/PosDF consists of a portion of sample that has negative earnings and positive changes in management forecasts of earnings. The regressions are run for each group using the return model.

R2(Return model with v_t): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta F_t + \varepsilon_t$ is used. incr$E$ (incrEarn) = $R^2_{\mathrm{E}\bullet\Delta\mathrm{E}\bullet\Delta\mathrm{F}} - R^2_{\Delta\mathrm{E}\bullet\Delta\mathrm{F}}$, incr$\Delta E$ (incrChangeEarn) = $R^2_{\mathrm{E}\bullet\Delta\mathrm{E}\bullet\Delta\mathrm{F}} - R^2_{\mathrm{E}\bullet\Delta\mathrm{F}}$, incr$\Delta F$ (incrChangeMFEarn) = $R^2_{\mathrm{E}\bullet\Delta\mathrm{E}\bullet\Delta\mathrm{F}} - R^2_{\mathrm{E}\bullet\Delta\mathrm{E}}$. 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 $P_{t\text{-}1}$. ΔE_t : annual change in earnings per share ($\Delta E_t = E_t - E_{t\text{-}1}$) deflated by $P_{t\text{-}1}$. ΔF_t : annual change in management forecasts of next period's earnings per share ($\Delta F_t = F_t - F_{t\text{-}1}$) deflated by $P_{t\text{-}1}$. $P_{t\text{-}1}$: stock price three months after year-end t-1.

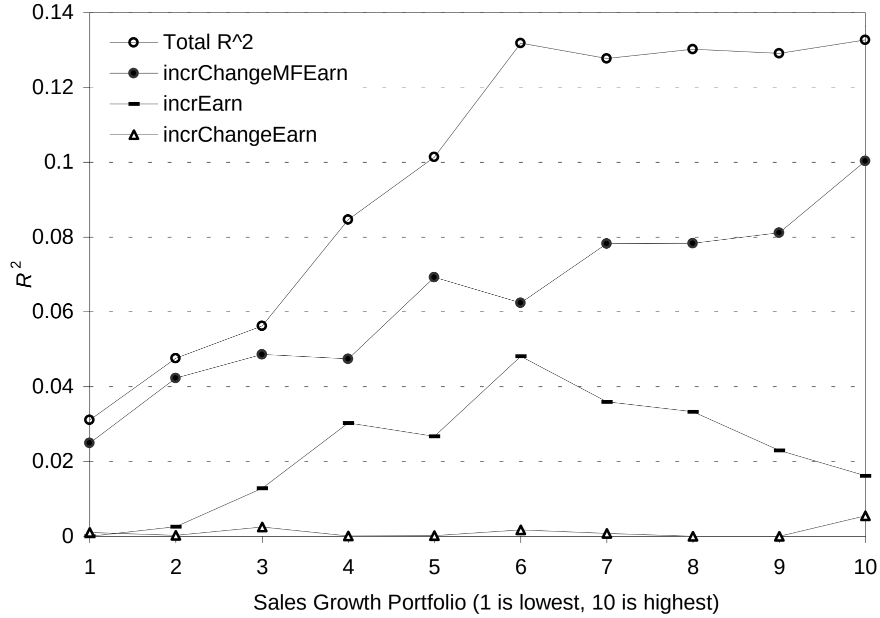


Fig.6 Pooled cross-sectional time-series regressions of portfolios formed by decile of annual growth rate in sales. Ten equally sized portfolios are formed based on annual sales growth rate with portfolio 1 (10) having the lowest (highest) sales growth rate. The regressions are run for each portfolio using the R2 model. The total R^2 and the incremental explanatory power of variables are plotted for each portfolio.

R2(Return model with v_t): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta F_t + \varepsilon_t$ is used. TotalR^2 (Total R^2) = $R^2_{\mathrm{E}\bullet\Delta\mathrm{E}\bullet\Delta\mathrm{F}}$, incr$E$ (incrEarn) = $R^2_{\mathrm{E}\bullet\Delta\mathrm{E}\bullet\Delta\mathrm{F}} - R^2_{\Delta\mathrm{E}\bullet\Delta\mathrm{F}}$, inc$\Delta E$ (incrChangeEarn) = $R^2_{\mathrm{E}\bullet\Delta\mathrm{E}\bullet\Delta\mathrm{F}} - R^2_{\mathrm{E}\bullet\Delta\mathrm{F}}$, incr$\Delta F$ (incrChangeMFEarn) = $R^2_{\mathrm{E}\bullet\Delta\mathrm{E}\bullet\Delta\mathrm{F}} - R^2_{\mathrm{E}\bullet\Delta\mathrm{E}}$.

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}. ΔF_t : annual change in management forecasts of next period's earnings per share ($\Delta F_t = F_t - F_{t-1}$) deflated by P_{t-1}. P_{t-1} : stock price three months after year-end t-1.

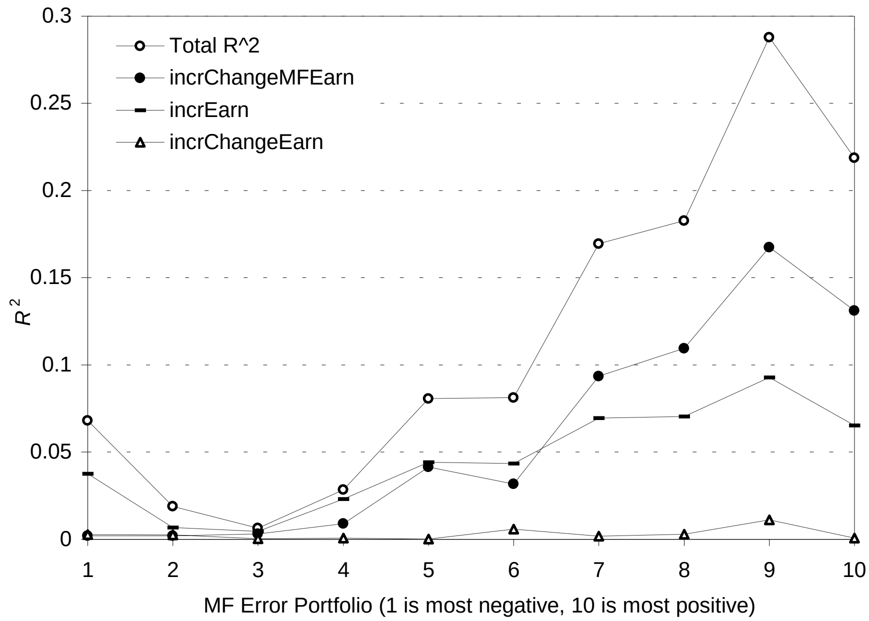


Fig.7 Pooled cross-sectional time-series regressions of portfolios formed by decile of previous year's management forecast error. The management forecast error is computed as; Management forecast error = (E_t – F_{t-1})/ P_t, E_t: earnings per share for period t, F_{t-1}: management forecasts of t period's earnings per share that are announced within 10 weeks after year-end t-1, P_t: stock price three months after year-end t. Ten equally sized portfolios are formed based on the management forecast error with portfolio 1 (10) having the most negative (positive) forecast error. The regressions are run using the R2 model. The total R^2 and the incremental explanatory power of variables are plotted for each portfolio.

R2(Return model with v_t): $Ret_t = \alpha_0 + \alpha_1 E_t + \alpha_2 \Delta E_t + \alpha_3 \Delta F_t + \varepsilon_t$ is used. TotalR^2 (Total R^2) = $R^2_{\mathrm{E \bullet \Delta E \bullet \Delta F}}$, incr$E$ (incrEarn) = $R^2_{\mathrm{E \bullet \Delta E \bullet \Delta F}} - R^2_{\mathrm{\Delta E \bullet \Delta F}}$, inc$\Delta E$ (incrChangeEarn) = $R^2_{\mathrm{E \bullet \Delta E \bullet \Delta F}} - R^2_{\mathrm{E \bullet \Delta F}}$, incr$\Delta F$ (incrChangeMFEarn) = $R^2_{\mathrm{E \bullet \Delta E \bullet \Delta F}} - R^2_{\mathrm{E \bullet \Delta E}}$.

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}. ΔF_t : annual change in management forecasts of next period's earnings per share ($\Delta F_t = F_t - F_{t-1}$) deflated by P_{t-1}. P_{t-1} : stock price three months after year-end t-1.