The role of accruals in the prediction of future earnings

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Abstract

While current earnings can be explained by past accruals, it is largely unknown whether current accruals can predict future earnings. Earnings management through accrual management and real earnings management can affect the predictive ability of accruals. I find that current accruals can predict future earnings, but current earnings, the sum of cash flows and accruals, is the more accurate predictor of future earning, and the components of accruals are not effective in prediction. Discretionary accruals don't have a negative association with prediction error, but real earnings management measures have. This suggests that discretionary accruals aren't harmful in using accounting information to form a prediction in future earnings. Real earnings management may distort the relationship between current earnings and cash flows, or inflate current cash flows. Thus it can be more harmful in using the accounting information for prediction.

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Can accounting information predict future earnings?

I. Introduction

While the explanatory power of past accruals in current earnings is well documented (Sloan (1996) and Collins and Hribar (2000)) the predictive power of current accruals in forecasting future earnings (out-of-sample) is not. If management manages earnings opportunistically through increased accruals, then the contribution of accruals would decrease. Accruals, in this case, tend to reverse and it will be less effective in the forecast, thus, it is possible that the forecast based on cash flow from operations (cash flow hereafter) alone more accurate. This paper examines whether current accruals contribute into the prediction of future earnings.

If such earnings management through accrual management is widespread, then accruals will be ineffective in the forecast, on average. Meanwhile, real earnings management can have a negative impact on prediction as well. Real earnings management which can be achieved by changing a firm's operation to obtain favorable financial reporting has a cash flow impact. By engaging the adjustment of the timing of investment, R&D expenditure, SG&A expense, firm's cash flow may increases, thus earnings increase. This will obscure the true relationship with current cash flow and future earnings, therefore increasing the prediction error based on the forecast using cash flow. Using the widely used proxy for accruals management (discretionary accruals) and real earnings management (RMproxy), I test whether these proxies are positively associated with prediction error.

Another research interest in this paper is that does cash flows and accruals, or cash flows and components of accruals can be more effective in predicting future earnings than earnings (cash flows, CFO + accruals) alone as the predictor. Past research shows that cash flows and accruals have different persistence, in particular, accruals are less persistent. Francis and Smith (2005) argues that accruals used in research has implications in both current and non-current transaction, and non-current period portion leads to lower persistence. In other words, current accruals, defined as earnings less cash flows should have different (lower) persistence, compared to current cash flows. This should lead to a conjecture that earnings alone are not a better predictor than cash flows and accruals. Barth et al (2001), argues that disaggregated accruals components can have a different impact on future cash flows, while earnings can mask such impact. Thus, the past literature suggests that prediction based on CFO and accruals separately (or CFO and the components of accruals) would be more accurate. On the other hand, if a firm engages in earnings smoothing, regardless of earnings components such as accruals or components of accruals, it would want to produce stable earning trend, therefore prediction based on earnings alone is a more accurate predictor.

The result shows that accruals have the predictive power beyond CFO in out-of-sample prediction. The prediction based on current cash flows and accruals (CFO & ACC model) was more accurate than CFO alone (CFO only model) in predicting future earnings. However, the prediction based on current earnings (earnings model) was more accurate than the predictor based on CFO & ACC model. CFO and the component of accruals (component model) was least accurate in predicting future earnings, while the in-sample R-squared of the component model was highest. Therefore, there is evidence that accruals contribute to the prediction of future earnings beyond CFO, however, earnings alone are the most accurate predictor.

In subsequent regression, the prediction errors from CFO only, CFO & ACC and earnings model were regressed on a proxy for discretionary accruals and real earnings management, along with control variables. This is to find the prediction based on the accounting information such as cash flows, accruals and earnings are negatively impacted in the presence of the accruals management and real earnings management. If accruals management or real earnings management distorts the earnings, the prediction formed based would be less accurate, therefore I expect that the coefficients on discretionary accruals and RMProxy are positive. The result shows that while discretionary accruals are positively associated with the prediction error based on CFO only model, those positive associations disappear for CFO & accruals model, once I control for firm specific fixed effect. For all the prediction errors based on CFO & ACC model and earnings model, discretionary accruals are not positively associated. This suggests that accruals distortion based on accruals management is not serious enough to harm the financial reporting in forming a prediction of future earnings.

On the other hands, real earnings management proxy, RMproxy, is consistently positively associated with the prediction error based on CFO & ACC model and earnings model. This result is consistent with the conjecture that real earnings management affecting future earnings negatively by increasing current cash flows artificially. This can distort the true relationship between current earnings and past accounting information in coefficient estimation and unreliable current information being used in the predictor for future earnings.

This paper contributes to accounting literature by showing that accruals can be useful in predicting future earnings. One of the objective in financial reporting concept is predictive value and it appears that accruals information does provide such predictive value. However, it is earnings than the components of earnings, cash flows and accruals, that is most accurate predictor. Also, it shows that accruals management (discretionary accruals) is not a significant obstacle in predicting future earnings, but the real earnings management (RM proxy) is.

The rest of the paper is organized as follows. Section 2 explains background, describes prediction models, and develops the hypothesis. Section 3 describes the data and sample construction. Descriptive statistics and the univariate result on the prediction errors are examined in Section 4. Section 5 shows the result of multivariate regression analysis of prediction error on discretionary accruals and real earnings management proxy. Section 6 concludes.

2. Background, prediction model and hypothesis

The relation between current earnings and past cash flows and accruals has been popular research topic. (Sloan [1996], Collins and Hribar [2000], Xie [2001], Chan et al. [2004]). This line of research finds the lower regression coefficients on past accruals and concludes that accruals are less persistent than cash flows. Regression in in-sample setting shows the explanatory power, thus providing feedback value. Basic premise of my research is that, given the past research that shows the accruals' explanatory power, in turn, how good are accruals in prediction of future earnings? After all, when investors read financial statement, feedback value is important, but predictive value of accounting information in financial report would be at least as equally important. This study aims to find such predictive value of accruals.

Accruals is adjustment for current earnings, but also it can affect future earnings, through change in future cash flows. Barth (2001) shows the predictive ability (in-sample) of past accruals and components of accruals in current cash flows and show that components of past accruals have different association in explaining current cash flows. Also it's plausible to expect some positive relationship between current accruals and future accruals, such as business practice, contracts and commitment. Current accruals having predictive ability in future earnings is not a surprising proposition under objective financial reporting.

To the extent that accruals is managed subjectively or opportunistically to meet current earnings target, such predictive ability would decrease. Increased revenue or decreased expense by managing time increases earnings at t-1 by increasing accruals. Accruals will be reversed in current period t, thus in estimation, accruals can be less persistent. However, cash flows at t will increase. Such manipulation could increase the persistency of cash flows, but lower accruals persistence, thus making accruals unreliable predictor for future earnings. Deferred revenue by delaying the revenue recognition in current period would decrease current accruals, but increases future earnings. This also either obfuscates the persistency of accruals or prediction would be based on lower-than-normal accruals. Distorted earnings in this case can't continue. Overall, the existence of earnings management could decrease the predictability of current accruals in future earnings.

The research method in this paper tries to test the accruals' contribution in out-of-sample prediction setting instead of in-sample regression. The purpose of out-of-sample is not to contradict the in-sample predictability tests in prior research or prove the prior models are misspecified. When investors read financial reports, it is the most likely that the first thought in their mind is based on the available information, whether they can form a reliable prediction of future earnings. While there are other forecasts such as analysts forecast and management forecast, they would be interested in what kind of expectation of future earnings can be formed using the information in financial reports.

Basic premise of this study is not to find the best accounting model to predict future earnings, but to find whether accruals contribute in prediction or not. For this reason, I use most parsimonious model to predict future earnings. There may be better model to predict future earnings based on available information in financial report, but I take the simplest approach to tease out the accruals contribution. First, the following two models are employed.

CFO only model: $Earnings_t = \alpha + \beta_1 CFO_{t-1} + \varepsilon$ (1)

CFO & ACC model: $Earnings_t = \alpha + \beta_1 CFO_{t-1} + \beta_2 ACC_{t-1} + \theta$ (2),

where ACC is accruals, which equals to Earnings - CFO

Following the estimation of the coefficients, the out-of-sample prediction errors are calculated.

CFO only model: $ABSE_{CFO} = \left| Earnings_{t+1} - \hat{\alpha} - \hat{\beta}_1 CFO_t \right|$, where $\hat{\alpha}$ and $\hat{\beta}_1$ are estimated in (1)

CFO & ACC model: $ABSE_{CFO\ ACC} = \left| Earnings_{t+1} - \hat{\alpha} - \hat{\beta}_1 CFO_t - \hat{\beta}_2 ACC_t \right|$, where $\hat{\alpha}$, $\hat{\beta}_1$ and $\hat{\beta}_2$ are estimated in (2)

And accruals contribution is $ABSE_{CFO}$-$ABSE_{CFO\ ACC}$. These models are parsimonious; the purpose of the models is not to predict future earnings at the most precise way, but it is to see if accruals contribute and tease out the contribution. CFO only model in (1) is misspecified. It is likely that $\beta_1$is model (1) is larger than β in model (2) due to omitted variable. Since it forces the coefficient on accruals to be zero, $ABSE_{CFO}$ is likely to be negatively associated with accruals, if future earnings can be predicted with current accruals.

CFO and ACC model can be expanded or reduced. Earnings, which is sum of cash flows and accruals, could be also considered as a predictor, instead of cash flows and accruals separately. In this case, the coefficients on cash flows and accruals are set to equal, implying that the persistence of cash flows and accruals are same. Past accruals' association with current earnings can be different than cash flows', as past literature shows. On the other hands, Barth et al. 2001 that accruals alone mask the different contribution of the components of accruals in predicting cash flows, therefore, by including the components of accruals can be also effective in forecasting future earnings. Thus, I consider the following models for comparison.

Earnings model: $Earnings_t = \alpha + \beta_1 Earnings_{t-1} + \varepsilon$ (3)

Components model: $Earnings_t = \alpha + \beta_1 CFO_{t-1} + \beta_2 \Delta AR_{t-1} + \beta_3 \Delta AP_{t-1} + \beta_4 \Delta Inv_{t-1} + \beta_5 \mathrm{DEPAMOR}_{t-1} + \beta_6 \mathrm{Other}_{t-1} + \theta$ (4),

where AR is accounts receivable, AP is accounts payable, Inv is inventory, DEPAMOR is depreciation and amortization, and others is the rest of accruals, that is $Other = \mathrm{ACC} - (\Delta AR_{t-1} + \Delta AP_{t-1} + \Delta Inv_{t-1} + \mathrm{DEPAMOR}_{t-1})$

Following the estimation of the coefficients, the out-of-sample prediction errors are calculated.

Earnings model: $ABSE_{Earn} = \left| Earnings_{t+1} - \hat{\alpha} - \hat{\beta}_1 Earnings_t \right|$, where $\hat{\alpha}$ and $\hat{\beta}_1$ are estimated in (3).

Components model: $ABSE_{Components} = \left| Earnings_{t+1} - \hat{\alpha} - \hat{\beta}_1 CFO_t - \hat{\beta}_2 \Delta AR_t - \hat{\beta}_3 \Delta AP_t - \hat{\beta}_4 \Delta Inv_t - \hat{\beta}_5 \mathrm{DEPAMOR}_t - \hat{\beta}_6 \mathrm{Other}_t \right|$, where $\hat{\alpha}$, $\hat{\beta}_1$, $\hat{\beta}_2$, $\hat{\beta}_3$, $\hat{\beta}_4$, $\hat{\beta}_5$ and $\hat{\beta}_6$ are estimated in (4).

Model (3) assumes that the persistency of accruals and cash flows are equal, therefore, investors only need current earnings from financial reports in prediction of future earnings. In regression setting, this has been already shown not the case (see Sloan [1996], Collins and Hribar [2000], Xie [2001], Chan et al. [2004]), the coefficient on accruals is smaller, therefore, accruals are less persistent.

In component model, the coefficients on the components of accruals are allowed be different. The model would have higher explanatory power in in-sample regression, since it incorporates different persistence of the components. In theory, the most accurate model in regression would be components model in (4). On the other hands, Francis and Smith (2005) reexamines the accrual's persistence, and find that, based on firm specific estimation, in 85% of firms, the persistence of accruals is not different from cash flows. While it is not really the main objective of the paper, my conjecture based on prior research is that the components model should provide most accurate prediction, followed by accrual models, earnings model, and finally cash flows model.

The prediction error would be subject to the quality of accruals. If the accruals are opportunistically managed to meet private gains, it will be less useful in prediction of future earnings. On the other hand, if management tries to smooth the income through accruals management, and opportunistic and excessive accruals management is not wide spread, then discretionary accruals would not have negative association with prediction error.

H1: discretionary accruals have negative association with prediction error.

Real earnings management may have different impact on prediction error, since it affects the cash flows component in earnings. Gunny (2005) identifies the typical earnings management activities: spending R&D, SG&A, timing of disposal of assets, reducing price. All of these affects cash flows, instead of accruals. If real earnings management is one-time event, happens at t-1, then cash flow at t-1 is overstated, and cash flow at t is understated than true value. Then the increased cash flow at t-1 will more likely means that current income will decrease, therefore reducing the persistence of cash flows in coefficient estimation. It also affects the prediction in next period, since the understated cash flow at t is used in prediction of future earnings. Under real earning management, lower persistence and lower cash flows at t would imply that prediction of future earnings is smaller than it should be, therefore the prediction error is larger. If real earnings management is repeated, however, it is difficult to conclude. It is possible that persistence may not reduce, and cash flows at t would not be understated.

H2: real earnings management has negative association with prediction error.

I use RMProxy for proxy of real earnings management. The definition of RMproxy is explained in section 3.

3. Data, main variable and Sample

In prediction of future earnings based on these four models, I focus on the two aspects: (1) whether accruals have predictive ability, by comparing $ABSE_{CFO}$ and $ABSE_{CFO\ ACC}$ and (2) among 4 models, which is the most accurate on average. Comparison in (1) means that the firm specific estimation and prediction are required. To achieve firm specific estimation, I used quarterly data instead of annual data. Typical study that uses firm specific regression uses 20-40 years of observations. (for example, Francis and Smith 2005). This would limit the sample significantly. Accrual accounting is based on management's discretionary inputs. Over the times, different management would employ different estimates and accounting methods, therefore running a firm specific regression using such a long period time may not capture the true relationship of current earnings and past accounting data. In addition, the quarterly setting is more ideal in short investment horizon, since the most imminent investment decision is based on next quarter's earning. Quarterly data also make it possible to compare with quarterly analysts forecast errors. In this study, the sample requirement for the firm specific regression is 8 years, or 32 quarters.

Quarterly data, however, can suffer from seasonality. Accounting literature typically deals with the seasonality by regressing quarter t dependent variables on t-4 independent variables. Instead, in this study, I use X11 procedure to deseasonalize the quarterly data. X11 procedure is based on U.S Bureau of the Census X-11 seasonal adjustment program, and it adjusts monthly or quarterly time series for seasonality, by taking out the seasonal component from the seasonal data.

For example, if original series is O_t, t=1,…n, then X11 decomposes O_t into four components: $O_t = S_t + C_t + D_t + I_t$

S_t represents the seasonal components, C_t is known as trend cycle components that can be explained by long-term trend, business cycle and other long-term cyclical factors, D_t is the variation that can be attributable to calendar composition and I_t is the irregular component, which is residual variation. Seasonally adjusted or deseasonalized series would be $C_t + I_t$. X11 also predicts the seasonal components in t+1, S_{t+1}.

Thus, in prediction of earnings at t+1, the estimation of model (1) - (4) is based on deseasonalized data. However, in the prediction, I predict actual earnings. To illustrate, in CFO & ACC model in (2), $Earnings_t = \alpha + \beta_1 CFO_{t-1} + \beta_2 ACC_{t-1} + \theta$, estimation uses the deseasonlized data of Earnings and CFO (where accruals = Earnings – CFO). In the prediction of earnings at t+1, using the deasonalized CFO_t and ACC_t, seasonally adjusted earnings at t+1 is predicted. Then, prediction error is the difference between actual earnings at t+1 and the sum of predicted seasonal component of earnings at t+1 (S_{t+1}) to the prediction (predicted $C_{t+1} + I_{t+1}$). To the extent that Earnings, CFO and

Accruals are unstable in deseasonalization process or predicted seasonal component of earnings at t+1 is unstable, this process would suffer, therefore it would lead to less precise prediction of earnings at t+1. To check the reliability of X11 process and prediction methodology used in this research, I employ the models based on regressing earnings at t and CFO, accruals or components of accruals at t-4. For example, CFO & ACC model (2) would become $\boldsymbol{Earnings_t = \alpha + \beta_1 CFO_{t-4} + \beta_2 ACC_{t-4} + \theta}$, and prediction for earnings at t+1 would be $\boldsymbol{\hat{\alpha} + \hat{\beta}_1 CFO_{t-3} + \hat{\beta}_2 ACC_{t-3}}$. The result based on the two different methods, X11 based and 4 quarter model, is compared in table 2c.

Discretionary accruals are measured by the well known proxy, modified Jones (1992) model.

$$\frac{ACC_t}{TA_{t-1}} = \alpha \frac{1}{TA_{t-1}} + \beta_1 \left(\frac{\Delta REV_t - \Delta REC_t}{TA_{t-1}} \right) + \beta_2 \frac{PPE_t}{TA_{t-1}} + \varepsilon_t$$

where ACC is accruals, measured by the difference between earnings before the extraordinary items and CFO before extraordinary items, TA is total assets, REV is sales, REC is accounts receivable and PPE is gross property, plant and equipment.

The fitted value of the modified Jones model is non-discretionary accruals, and the residual is discretionary accruals. I estimate the modified Jones (1991) model by firm-specific regression also. Since the sample already requires firm specific regression and it requires 32 past observations for each firm, the reduced sample size is not an issue. It is argued that estimating the modified Jones model by cross sectional industry regression captures the industry effect (Defond and Jiambalvo 1994 and Kasznik 1999). However, the discretionary accruals are firm specific, and capturing the such effect is more important in this case. [2] Among the variables in modified Jones model, the income statement variables (ACC and REV) are seasonally adjusted using X11, whereas balance sheet variables (REC, PPE and total assets) are not.

The proxy for real earnings management follows Cohen et al (2008). Cohen et al (2008) focuses on three manipulations models (1. Acceleration of timing of sale through increased price discount) 2. Reporting of lower cost of goods through increased production and 3. Decreases in discretionary expense such as advertising expense, research and development expenditure and SG&A expense)) and calculate RMproxy as sum of the residual from the three models. Specifically, the three models are following.

$$\frac{CFO_t}{TA_{t-1}} = \alpha \frac{1}{TA_{t-1}} + \beta_1 \frac{REV_t}{TA_{t-1}} + \beta_2 \frac{\Delta REV_t}{TA_{t-1}} + \varepsilon_t$$

$$\frac{Production\ cost_t}{TA_{t-1}} = \alpha \frac{1}{TA_{t-1}} + \beta_1 \frac{REV_t}{TA_{t-1}} + \beta_2 \frac{\Delta REV_t}{TA_{t-1}} + \beta_3 \frac{\Delta REV_{t-1}}{TA_{t-1}} + \varepsilon_t$$

$$\frac{Discretionary\ expense_t}{TA_{t-1}} = \alpha \frac{1}{TA_{t-1}} + \beta_1 \frac{REV_t}{TA_{t-1}} + \varepsilon_t$$

where CFO is cash flows from operation, TA is total assets, REV is sales, production cost is sum of cost of goods sold and change in inventory, and discretionary expense is sum of advertising expense, research and development expense and SG&A expense. The difference between actual value and fitted value from these model proxies for real earning management, and RMproxy is sum of abnormal CFO, abnormal production cost and abnormal discretionary expense. Again, the income statement variables (CFO, REV,

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[2] In addition, I also consider discretionary accruals based on cross-sectional industry regression and CF-Jones model, and obtain similar result. CF-Jones model includes change in CFO as independent variable: $\frac{ACC_t}{TA_{t-1}} = \alpha \frac{1}{TA_{t-1}} + \beta_1 \left(\frac{\Delta REV_t - \Delta REC_t}{TA_{t-1}}\right) + \beta_2 \frac{PPE_t}{TA_{t-1}} + \beta_3 \frac{\Delta CFO_t}{TA_{t-1}} + \varepsilon_t$

production costs, discretionary expense) are seasonally adjusted using X11 procedure, whereas balance sheet variable (TA) is not.

Sample is gathered from Compustat (1993-2017), and it requires that 1. past 32 observations of earnings (data item IBQ, earnings before extraordinary items), cash flows (data item OANCFY, operating activities – Net cash flows, less XIDOCY, Extraordinary Items and Discontinued Operations, Statement of Cash Flows), 2. One quarter ahead earnings are available, 3. Dependent and independent variables for modified Jones model and real earnings management models (data items is described later). Since modified Jones model requires sales at t-1, and one of the real earnings management model requires sales at t-2, the data requirement is in fact 35 consecutive quarters of data. 4. Control variables for ABSEs regression, Size, Loss, ROA, BTM, LEV, VolEARN and VolCFO (The variables are defined in section 5)   I also require market capitalization[3] to be greater than $100 millions. The final sample has 72,038 firm-quarter (2,896 firms) observations[4]. On average, in each quarter, 1,254 firms are included in the sample. Sample requirement of past 32 quarters (or 8 years) of earnings and cash flows is not severe as previous research and have relatively large number of time-series data to run regression. For example, Chan et al (2004) runs VAR based approach to predict earnings, and use annual data. Its sample requirement is 11 consecutive earnings and accruals data. To run VAR system, they use 10 time-series observation.

4. Descriptive statistics and the univariate result

Table 1 describes the sample and univariate result of prediction errors of the model (1) - (4). Sample period is 1995 to 2017. First, the firms in the sample has total

[3] Market capitalization is measured by PRCCQ (price close at quarter t) times CSHOQ (common stock outstanding).
[4] For components model in equation (5), all the components, change in Accounts Receivable, change in Accounts Payable, change in Inventory, and depreciation and amortization are not available for these firm-quarter (total sample size for equation (5) is 67,656.

assets of $ 6.7 billions of total assets and $8.2 billions of market capitalization, on average. 18.3% of the firm had a loss at quarter t. On average, return on assets is 1.0%, and book-to-market is 0.474. Leverage, measured as total debt divided by total assets is 22.3%.

Model (1) - (4) is estimated using the seasonally adjusted earnings and cash flows. Accruals is defined as the difference between seasonally earnings and cash flows. First, R-squared of *CFO only* model in (1) is much smaller (8.7%) than *CFO & ACC* model in (2) (27.4%). R-squared of *Earnings* model in (3) is smaller (25.4%), and *Components* model in (5) has the highest R-squared (28.5%). Therefore, current earnings are explained by the accruals beyond the cash flows. *Earnings* model has less explanatory power. Although the degree of freedom is smaller, *Components* model, which incorporates the different impact of accruals' components, explains current earnings better than the other 3 models in terms of R-squared. The coefficients on *CFO & ACC* model, which many previous research have estimated in cross sectional regression, show the less persistent accruals. On average, the coefficient on ACC is 0.413, compared to 0.543 for the coefficient on CFO. 67.2% of times, the coefficient on CFO was larger (untabulated).

Out-of-sample prediction shows different result. ABSE is absolute value of the difference between actual earnings and predicted earnings using the model in (1) – (4), scaled by the total assets at quarter t. I expect that *CFO only* model would perform worst. This is confirmed by the mean of $ABSE_{CFO}$ (0.0174) or the median (0.0078). Compared to *CFO only* model, *CFO & ACC* model in (2), the mean and median of $ABSE_{CFO\ ACC}$ (0.0169 and 0.0062) are smaller. However, the best model in this case is *Earnings* model. $ABSE_{Earn}$ has mean of 0.0164 and 0.0061. While the current earnings are explained by past cash flow and accruals separately, the best predictor for future earnings is current earnings. The two means and medians of ABSE $_{CFO\ ACC}$ and ABSE $_{EARN}$ are significantly different from each other at 0.1% level (based on pair wise t-test and Wilcoxon signed rank test respectively). This suggests that earnings are smoothed, rather than opportunistically managed. Quarter-to-quarter, the management could be attempting to smooth the earnings, using either cash flows or accruals or both. Therefore, in one period, accruals may be used to meet certain expectation of earnings, but in next period, it could be cash flows. The components model has higher mean (0.0188) and median (0.007) prediction error compared to CFO & ACC and earnings model. One possible explanation is that this is due to volatility of the components is higher than its sum. While the past components can explain current earnings better, using the current components in prediction could result in more volatile prediction, if the components are more volatile. [5]

In table 2a and 2b, I compare the ABSEs from firm specific regression of models (1) - (4) using seasonally adjusted data with ABSEs from industry pooled quarterly regressions, loosened sample requirement and different method to treat the seasonality. First, if instead cross sectional regression is run among firms in same industry each quarter, then the implication to the coefficients is that they are set to equal across the all the firms in a given quarter and industry (industry is defined as 2-digit SIC code). The prediction based on this regression method would be less accurate, since the regression coefficients ignore the firm specific persistence of cash flows and/or accruals, or earnings. Table 2a confirms this conjecture. The ABSEs using the coefficients from

[5] It is possible that there may be seasonality in components of accruals, that drives the higher prediction errors. In Table 1, I do not adjust the balance sheet variables such as accounts receivable, accounts payable, inventory. Thus, the change in those variables could contain seasonality. However, even with the potential seasonality in those variables, R-squared the components is significantly higher than the other. Additionally, I ran the Components model in (5) with the seasonally adjusted components and computed the ABSE $_{Component}$. The result (untabulated) was similar.

industry pooled quarterly regression are bigger than when coefficients from firm specific regressions. For example, the mean of $ABSE_{CFO\ ACC}$ under industry pooled quarterly regression is 17.58%, compared to 1.69% from firm specific regression. Additionally, the pattern among the ABSEs is different: $ABSE_{Earn}$, is smaller than $ABSE_{CFO\ ACC}$ whether it's comparison of mean (12.71% versus 15.37%) or median (5.39% versus 5.90 %), but ABSE component has lowest prediction error (mean = 8.33% and median is 2.12%).

To test the usefulness of X11 procedure in this study, I also made a different approach and compare with the main result in table 1. In table 2c, model (1) – (4) uses the independent variables at t-4, and the variables are not adjusted for seasonality (quarter t to quarter t-4 regression). For example, model (2) is run as follows. $Earnings_t = \alpha + \beta_1 CFO_{t-4} + \beta_2 ACC_{t-4} + \theta$ and CFO, earnings and ACC are not seasonally adjusted. Then the $ABSE_{CFO\ ACC} = \left|Earnings_{t+1} - \hat{\alpha} - \hat{\beta}_1 CFO_{t-3} - \hat{\beta}_2 ACC_{t-3}\right|$. Therefore, instead of adjusting the variables in (2) for seasonality, 4 quarter ago data is used to control for seasonality. All others data requirements remain same and same sample was used to preserve the comparison. The result shows largely that the ABSEs in model (1) – (4) increase. For example, the mean of $ABSE_{CFO\ ACC}$ is 1.86%, compared to 1.69% when the variables are adjusted for seasonality. The difference in means is significant at 0.1%. The median is 0.72%. This is larger than when the variables are adjusted for seasonality where the median is 0.62%. Again, the difference in median is significant at 0.1%. More importantly, this approach shows that $ABSE_{CFO}$ (mean = 1.80%) is smaller than $ABSE_{CFO\ ACC}$ (1.85%) or $ABSE_{EARN}$ (1.82%). Therefore, based on this approach, one could conclude the current CFO alone predicts future earnings better, when current accruals contribute to prediction of future earnings.

4. Multivariate regression analysis

Now I turn to the multivariate analysis where accruals management and real earnings management are examined. Specifically, I run following OLS regression model.

$$ABSE_{it+1} = \alpha + \beta_1 Size_{it} + \beta_2 Loss_{it} + \beta_3 ROA_{it} + \beta_4 BTM_{it} + \beta_5 LEV_{it} + \beta_6 AbsDiscAcc_{it} + \beta_7 AbsRM\,\Pr oxy_{it} + \beta_8 VOLEARN_{it} + \beta_9 VOLCFO_{it} + \upsilon_{it} \quad \ldots(5)$$

The dependent variables that I examine are the prediction errors from models in (1) - (3), ABSE CFO, ABSE $_{\text{CFO ACC}}$ and ABSE $_{\text{EARN}}$. Discretionary accruals are captured in AbsDiscAcc (Absolute value of discretionary accruals, DiscACC). AbsRMproxy (Absolute value of RMproxy) are the proxy for the accruals management and real earnings management. Based on H1 and H2, I expect that the both variables are positively associated with the dependent variables, ABSE $_{\text{CFO ACC}}$ and ABSE $_{\text{EARN}}$.

To control for the other variables that explain the predictability of future earnings, I use Size, Loss, profitability, book-to-market, leverage, volatility of earnings and volatility of cash flows. First, firm size (measured as log of market capitalization at quarter t+1) controls for the information environment. The larger the size, the more information is available, therefore it is possible that more information can contribute into prediction of future earnings. I expect size to be negatively associated with the prediction errors. Loss (equals 1 when earnings at t is negative, otherwise 0) could make the prediction difficult directly or indirectly. Hayn (1995) imply that firms with losses are characterized by a higher degree of information asymmetry. Also, in the prediction environment, loss would mean that the predicted earnings at t is also negative, especially in earnings model (3). If the actual earnings are positive, then the prediction error will increase. Therefore, I expect the loss indicator is positively associated with the prediction error. The accounting profitability is measured by ROA (defined as earnings at t, divided by average of total assets at t-1 and t). It is difficult to predict the sign of association for ROA. One could argue that information environment for profitable firm is better, however, it is possible that successful firm could engage in riskier project or profitability is reverting under high competition (Stigler 1963). Mean reversion would mean that the actual earnings will be reduced, and if the prediction is made based on the past growth, the prediction would be more inaccurate. Therefore, under mean reversion, profitability should have negative association with the prediction error. However, the prediction horizon is a quarter, therefore the mean reversion may not occur in short time span. BTM is Book-to-market (where book value is equity at t, and market is market capitalization) and it is a measure of growth. The lower the book-to-market, the higher the growth, and for firms in high growth stage, the regression coefficient in the model could be understated, thus result in higher prediction error.[6] I expect the book-to-market to be negatively associated with prediction errors. LEV is leverage (measured as total debt at t, divided by total assets at t). The leverage could either imply fewer risky projects (Myers, 1977) or higher financial risk. For this variable, it's difficult to forecast the direction of association. Vol_{EARN} is volatility of earnings (measured as standard deviation of past 16 quarters' earnings at t, divided by average of beginning and ending total assets at t). Higher volatility of earnings can reduce the predictive ability of earnings, CFO and accruals, thus, I expect that VolEARN to be positively associated with prediction errors. Vol_{CFO} is volatility of CFO (measured as standard deviation of past 16 quarters' cash flows from operation at t, divided by average of beginning and ending total assets at t). This considers the volatility of a predictor variable, cash flows. If the cash flows are volatile, then the so does prediction based on models in (1) – (3). While I expect Vol_{CFO}

[6] I also replaced the BTM with sales growth and obtain similar result.

to be positively associated with prediction errors, VolEARN and VolCFO are positively correlated. Therefore, it may be spuriously associated due to the correlations.

Table 3 shows the correlations of dependent variables ($ABSE_{CFO}$, $ABSE_{CFO\ ACC}$ and $ABSE_{EARN}$) and independent variables. As expected, AbsDiscAcc and AbsRMProxy are positively correlated with the dependent variables (significant at 0.1% level). With $ABSE_{CFO\ ACC}$, AbsDiscAcc is positively correlated (0.146, significant at 0.1%,) and AbsRMProxy is also positively correlated (0.166, significant at 0.1%). These support the hypotheses 1 and 2, accruals managements and real earnings management are associated with higher prediction errors. AbsDiscAcc and AbsRMProxy are not positively correlated, suggesting that managements do not engage in both accruals management and real earnings management. Among the control variables, three variables that have the strongest correlation with the dependent variables are Vol_{EARN}, Vol_{CFO} and ROA. For example, with $ABSE_{CFO\ ACC}$, the Pearson correlation is 0.339, 0.279 and -0.240, respectively. All three numbers are significant at 0.1%. Past volatile earnings or cash flows indicates the prediction based on model (1) – (3) will have higher prediction error. Since Vol_{EARN} and Vol_{CFO} are positively correlated (0.781, significant at 0.1%), it could be Vol_{EARN} that drives the correlations. ROA is negatively correlated with ABSEs. With $ABSE_{CFO\ ACC}$, the Pearson correlation is -0.212 (significant at 0.1%). Therefore, it shows that higher the profitability, the easier to predict. Since the prediction is made over a quarter, the mean reversion may not be observed in the data.

Table 4 reports the regression result. In addition to the control variables, I control for either time and industry fixed effects or time and firm fixed effects. First the coefficient on AbsDiscAcc is positive and significant in regression of $ABSE_{CFO\ ACC}$, when there are no fixed effects (0.104, significant at 1% level) or time and industry fixed effects. (0.110 significant at 1% level). But it becomes insignificant when fixed effects for time and firms are controlled for. In the $ABSE_{Earn}$ regression, the results are similar. Overall, the statistical association between accruals management and prediction errors are mixed, possibly weak. In the case of $ABSE_{CFO}$ regression, the significant association of AbsDiscAcc is perhaps due to the fact that accruals are missing in the forecast.

One possible explanation is that some amount of discretion in accruals adds to the earnings predictability, but excessive discretionary accruals can be harmful to the predictability. This would happen when earnings are smoothed. Alternatively, it could be correlated other variables (such as Vol_{EARN} and Vol_{CFO}) that explains the variability of ABSEs better. If discretionary accruals add to the volatility of earnings or cash flows, and volatility could be absorbing the impact of discretionary accruals in the regression.

AbsRMproxy, which is proxy for real earnings management is consistently positively associated with the ABSEs, regardless of model, or whether fixed effects are included or not. And the magnitude of the coefficient is also consistent. For example, in $ABSE_{EARN}$ regressions, the coefficient on ABSRMproxy is 0.144 (no fixed effect) 0.142 (time and industry fixed effects) and 0.151 (time and firm fixed effects). All three coefficients are significant at 1% level. The coefficient in $ABSE_{CFO\ ACC}$ regressions, the magnitude and significance is similar. Therefore, the results suggest that real earnings management negatively affects the predictability.

The other important variable in the regressions is ROA. The profitability is negatively associated with $ABSE_{CFO\ ACC}$ and $ABSE_{EARN}$. In other words, empirical results show that higher profitability is associated with the more precise prediction. With time and firm fixed effect, the coefficient on ROA is -0.253 (significant at 1%) in $ABSE_{CFO\ ACC}$ regression and -0.255 (significant at 1%) in $ABSE_{EARN}$ regression. The magnitude of the coefficient is significant, since, if firm engages in accruals management or real earnings management and increase current earnings, it really doesn't harm the predictability. $1 increase in discretionary accruals or real earnings management increases profitability by $1, and may eventually decrease the prediction errors, ABSE $_{CFO\ ACC}$ and ABSE $_{EARN}$, as the sum of the coefficients of ROA and AbsDiscAcc is still positive.

In table 5, current ABSE is included as an explanatory variable in the regression and I repeat the estimation. This tests the documented association in Table 4 further, and it also attempts to address whether the past history of prediction errors can be a determinant to use a particular model. At quarter t, investors would be able to figure out how useful past CFO and ACC are in predicting current earnings, thus providing feedback on what model is best to estimate and predict. That is captured in current prediction error, $ABSE_t$. If current prediction based on a specific model was useful, investors would be inclined to use the same model to predict future earnings. For example, if earnings model has lowest prediction errors to predict $earning_t$, it could be wise to use the CFO only model to predict earnings $_{t+1}$. The ABSE $_{t+1}$ is positively correlated with ABSE $_t$ in table 3. The correlation is highest in *Earnings* models (0.375) and lowest in CFO only model (0.292). Based on the correlation, earnings model looks like most repeating. Table 5 tests this in mulitivariate analysis.

Table 5 first shows similar associations as in table 4. The AbsDiscAcc is not significant in time and firm fixed effects in $ABSE_{CFO\ ACC}$ and $ABSE_{EARN}$ regressions. In addition, AbsRMProxy is positively associated in $ABSE_{CFO\ ACC}$ and $ABSE_{EARN}$ regressions. In addition, it shows that for each regression, the $ABSE_t$ is positively associated with $ABSE_{t+1}$. However, the magnitude of the coefficient is different. In CFO

& ACC model, the coefficient is 0.331 (significant at 1%). And in earnings model, the coefficient is 0.373 (significant at 1%). All the coefficients above are from regression with time and firm fixed effects. In addition, these coefficients are significantly different from each other based on Z-test at 1% level.[7] Based on the result, the *Earnings* model is more persistent. If *Earnings* model predicts the current earnings well, then it's most likely to have lower prediction errors in predicting future earnings using *Earnings* model, all else considered. This further suggests positively for the *Earnings* model. It not only has the lowest prediction errors, but also most persistent.

6. Conclusion

This research examines the role of current accruals in predicting future earnings, and found that the accruals can be useful in reducing prediction error. However, the more accurate predictor in terms of lowest prediction error is earnings. This suggests that accruals' persistence observed in in-sample is not affecting the future earnings' prediction. Also, I examine whether the accruals management or real earnings management in current period is associated with the predictability of future earnings, and found that accrual management has weak significant association, but the current period real earnings management is positively associated with the prediction error. Accruals management may not lead to higher prediction error, but real earnings management may decrease the quality of financial report in terms of predictability.

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[7] Z-test is based on Clogg et al (1995).

$$Z = \frac{\beta_1 - \beta_2}{\sqrt{\left(SE_{\beta_1}\right)^2 + \left(SE_{\beta_2}\right)^2}}$$

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Table 1. Descriptive Statistics (N Obs = 72,038)

Variables	Mean	Standard Deviation	1st Percentile	10th Percentile	Median	90th Percentile	99th Percentile
ABSE $_{CFO}$	0.01745	0.05586	0.00013	0.00128	0.00781	0.03516	0.15545
ABSE $_{CFO\ ACC}$	0.01693	0.06187	0.00009	0.00093	0.00620	0.03363	0.16765
ABSE $_{EARN}$	0.01645	0.05944	0.00009	0.00089	0.00608	0.03276	0.16458
ABSE $_{Component}$	0.01878	0.06510	0.00010	0.00103	0.00696	0.03957	0.18605
R-Squared $_{CFO}$	0.08690	0.15483	-0.03332	-0.03141	0.02371	0.30981	0.65540
R-Squared $_{CFO\ ACC}$	0.27440	0.27658	-0.06675	-0.04095	0.21270	0.70150	0.90427
R-Squared $_{EARN}$	0.25448	0.27384	-0.03330	-0.02958	0.17249	0.68848	0.89899
R-Squared $_{Component}$	0.28533	0.27956	-0.09831	-0.04758	0.23455	0.70928	0.90569
Loss	0.18326	0.38689	0	0	0	1	1
Market Capitalization	8,276.25	28,647.64	107.19	187.36	1,276.22	16,161.82	140,618.15
Total assets	6,763.61	23,267.09	42.40	164.10	1,186.97	13,573.00	104,922.00
ROA	0.01040	0.07150	-0.14202	-0.01252	0.01381	0.03796	0.08301
BTM	0.47436	0.46450	-0.35347	0.13373	0.40818	0.91834	1.79387
Leverage	0.22273	0.21163	0.00000	0.00000	0.19753	0.47327	0.88682
AbsDiscAcc	0.01658	0.01765	0.00017	0.00184	0.01100	0.03816	0.08628
AbsRMproxy	0.02588	0.03007	0.00028	0.00292	0.01703	0.05754	0.14206
Vol$_{EARN}$	0.02189	0.09179	0.00199	0.00402	0.01070	0.04520	0.15296
Vol$_{CFO}$	0.03350	0.09638	0.00621	0.01099	0.02307	0.05936	0.16382

Variable definition

ABSE$_{CFO}$ is absolute value of prediction error, $|Earnings_{t+1} – (\alpha + \beta_1 CFO_t)|$/Total asset$_t$, where α and $\beta_1$are estimated in a firm-specific regression of Earnings$_t$ on CFO$_{t-1}$ using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure. Earnings is data item IBQ and CFO is data item OANCFY, operating activities – Net cash flows, less XIDOCY, Extraordinary Items and Discontinued Operations, Statement of Cash Flows.
R-Squared $_{CFO}$ is adjusted R-squared of the regression.
ABSE$_{CFO\ ACC}$ is absolute value of prediction error, $|Earnings_{t+1} – (\alpha + \beta_1 CFO_t + \beta_2 ACC_t)|$ /Total asset$_t$, where α, β_1 and β_2 are estimated in a firm-specific regression of Earnings$_t$ on CFO$_{t-1}$ and ACC $_{t-1}$ using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure.
R-Squared $_{CFO\ ACC}$ is adjusted R-squared of the regression.
ABSE$_{EARN}$ is absolute value of prediction error, $|Earnings_{t+1} – (\alpha + \beta_1 Earnings_t)|$ /Total asset$_t$, where α and β_1 are estimated in a firm-specific regression of Earnings$_t$ on Earnings$_{t-1}$ using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure.
R-Squared $_{EARN}$ is adjusted R-squared of the regression.
ABSE$_{Component}$ is absolute value of prediction error, $|Earnings_{t+1} – (\alpha + \beta_1 CFO_t + \beta_2 \Delta AR_t + \beta_3 \Delta AP_t + \beta_4 \Delta INV_t + \beta_5 DEPAMOR_t + \beta_6 Other_t)|$ /Total asset$_t$, where α, β_1, β_2, β_3, β_4, β_5, and β_6 are estimated in a firm-specific regression of Earnings$_t$ on CFO$_{t-1}$, ΔAR$_{t-1}$, ΔAP$_{t-1}$, ΔINV$_{t-1}$, DEPAMOR$_{t-1}$, Other$_{t-1}$ using past 32 observations.
R-Squared $_{Component}$ is adjusted R-squared of the regression.
Loss is an indicator variable that equals one if Earnings$_t$ <0, otherwise 0.
Total assets is measured at fiscal quarter end t.

Market capitalization is measured by PRCCQ (price close at quarter t) times CSHOQ (common stock outstanding).
ROA is return on assets, defined as $Earnings_t$, divided by average of Total $asset_{t-1}$ and Total $asset_t$
BTM is book-to-market ratio, book value (equity), divided by market capitalization at fiscal quarter end t.
Leverage is defined as total debt, divided by total asset at the fiscal quarter end t.
AbsDiscAcc is absolute value of discretionary accruals at fiscal end, based on modified Jones model.
AbsRMProxy is absolute value of RM proxy at fiscal end
Vol_{EARN} is standard deviation of Earnings, divided by average of Total $asset_{t-1}$ and Total $asset_t$ in the past 16 quarters. Earnings is deseasonalized for the seasonality adjustment.
Vol_{CFO} is standard deviation of CFO, divided by average of Total $asset_{t-1}$ and Total $asset_t$ in the past 16 quarters. CFO is deseasonalized for the seasonality adjustment.

Table 2a. Descriptive Statistics: The impact of Firm specific regression and cross sectional regression on prediction error (N obs = 72,038)

Variable	Mean	Standard Deviation	1st Percentile	10th Percentile	Median	90th Percentile	99th Percentile
Panel A. Firm specific regression							
ABSE $_{CFO}$	0.01745	0.05586	0.00013	0.00128	0.00781	0.03516	0.15545
ABSE $_{CFO\ ACC}$	0.01693	0.06187	0.00009	0.00093	0.00620	0.03363	0.16765
ABSE $_{EARN}$	0.01645	0.05944	0.00009	0.00089	0.00608	0.03276	0.16458
ABSE $_{Component}$	0.01720	0.05909	0.00009	0.00095	0.00638	0.03484	0.16821
Panel B. Industry pooled regression							
ABSE $_{CFO}$	0.16770	0.44209	0.00088	0.00886	0.05864	0.43428	1.48830
ABSE $_{CFO\ ACC}$	0.17583	0.51069	0.00070	0.00720	0.06420	0.43598	1.58451
ABSE $_{EARN}$	0.13863	0.37300	0.00054	0.00554	0.05500	0.34040	1.13124
ABSE $_{Component}$	0.08333	0.48837	0.00033	0.00315	0.02123	0.12917	1.12081

Variable definition

ABSE$_{CFO}$ is absolute value of prediction error, $|Earnings_{t+1} - (\alpha + \beta_1 CFO_t)|$/Total asset$_t$, where α and $\beta_1$are estimated in a firm-specific regression of Earnings$_t$ on CFO$_{t-1}$ using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure. Earnings is data item IBQ and CFO is data item OANCFY, operating activities – Net cash flows, less XIDOCY, Extraordinary Items and Discontinued Operations, Statement of Cash Flows.

ABSE$_{CFO\ ACC}$ is absolute value of prediction error, $|Earnings_{t+1} - (\alpha + \beta_1 CFO_t + \beta_2 ACC_t)|$ /Total asset$_t$, where α, β_1 and β_2 are estimated in a firm-specific (panel A) or cross sectional (panel B) regression of Earnings$_t$ on CFO$_{t-1}$ and ACC $_{t-1}$ using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure. ACC is Earnings – CFO.

ABSE$_{EARN}$ is absolute value of prediction error, $|Earnings_{t+1} - (\alpha + \beta_1 Earnings_t)|$ /Total asset$_t$, where α and β_1 are estimated in firm-specific (panel A) or cross sectional (panel B) regression of Earnings$_t$ on Earnings$_{t-1}$ using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure.

ABSE$_{Component}$ is absolute value of prediction error, $|Earnings_{t+1} - (\alpha + \beta_1 CFO_t + \beta_2 \Delta AR_t + \beta_3 \Delta AP_t + \beta_4 \Delta INV_t + \beta_5 DEPAMOR_t + \beta_6 Other_t)|$ /Total asset$_t$, where α, β_1, β_2, β_3, β_4, β_5, and β_6 are estimated in firm-specific (panel A) or cross sectional (panel B) regression of Earnings$_t$ on CFO$_{t-1}$, ΔAR$_{t-1}$, ΔAP$_{t-1}$, ΔINV$_{t-1}$, DEPAMOR$_{t-1}$, Other$_{t-1}$ using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure.

Table 2b. Descriptive statistics: ABSE using coefficient from quarterly regression (N obs = 72,038)

Variable	Mean	Standard Deviation	1st Percentile	10th Percentile	Median	90th Percentile	99th Percentile
Firm Specific Regression							
ABSE $_{CFO}$	0.01804	0.05639	0.00014	0.00141	0.00842	0.03686	0.15085
ABSE $_{CFO\ ACC}$	0.01856	0.09850	0.00011	0.00109	0.00723	0.03710	0.17731
ABSE $_{EARN}$	0.01818	0.08211	0.00010	0.00104	0.00698	0.03553	0.17530
ABSE $_{Component}$	0.02250	0.15880	0.00013	0.00128	0.00841	0.04415	0.20686

Variable definition

ABSE$_{CFO}$ is absolute value of prediction error, $|Earnings_{t+1} - (\alpha + \beta_1 CFO_{t-3})|$/Total asset$_t$, where α and $\beta_1$are estimated in a firm-specific regression of Earnings$_t$ on CFO$_{t-4}$ using past 32 observations.

ABSE$_{CFO\ ACC}$ is absolute value of prediction error, $|Earnings_{t+1} - (\alpha + \beta_1 CFO_{t-3} + \beta_2 ACC_{t-3})|$ /Total asset$_t$, where α, β_1 and β_2 are estimated in a firm-specific regression of Earnings$_t$ on CFO$_{t-4}$ and ACC $_{t-4}$ using past 32 observations.

$ABSE_{EARN}$ is absolute value of prediction error, $|Earnings_{t+1} – (\alpha + \beta_1 Earnings_{t-3})|$ /Total $asset_t$, where α and β_1 are estimated in firm-specific regression of $Earnings_t$ on $Earnings_{t-4}$ using past 32 observations.
$ABSE_{Component}$ is absolute value of prediction error, $|Earnings_{t+1} – (\alpha + \beta_1 CFO_{t-3} + \beta_2 \Delta AR_{t-3} + \beta_3 \Delta AP_{t-3} + \beta_4 \Delta INV_{t-3} + \beta_5 DEPAMOR_{t-3} + \beta_6 Other_{t-3})|$ /Total $asset_t$, where α, β_1, β_2, β_3, β_4, β_5, and β_6 are estimated in firm-specific regression of $Earnings_t$ on CFO_{t-4}, ΔAR_{t-4}, ΔAP_{t-4}, ΔINV_{t-4}, $DEPAMOR_{t-4}$, $Other_{t-4}$ using past 32 observations.

Table 3. Correlation table (N obs = 72,038; lower Pearson and upper Spearman)

	$ABSE_{CFO}$	$ABSE_{CFO\ ACC}$	$ABSE_{EARN}$	Size	Total assets	Loss	ROA	BTM	LEV	AbsDiscAcc	AbsRMproxy	Vol_{EARN}	Vol_{CFO}	Lag($ABSE_{CFO}$)	Lag($ABSE_{CFO\ ACC}$)	Lag($ABSE_{EARN}$)
$ABSE_{CFO}$	1	0.767	0.687	-0.177	-0.194	0.206	-0.086	-0.026	-0.088	0.169	0.186	0.433	0.344	0.416	0.360	0.365
$ABSE_{CFO\ ACC}$	0.731	1	0.885	-0.169	-0.154	0.251	-0.144	0.008	-0.048	0.160	0.198	0.456	0.347	0.368	0.407	0.408
$ABSE_{EARN}$	0.720	0.964	1	-0.160	-0.149	0.247	-0.136	-0.005	-0.047	0.146	0.193	0.454	0.342	0.370	0.408	0.423
Size	-0.110	-0.099	-0.099	1	0.879	-0.222	0.266	-0.360	0.179	-0.217	-0.191	-0.191	-0.331	-0.181	-0.174	-0.166
Total assets	-0.048	-0.038	-0.037	0.641	1	-0.104	0.016	-0.049	0.403	-0.228	-0.195	-0.195	-0.319	-0.198	-0.160	-0.155
Loss	0.157	0.182	0.183	-0.213	-0.063	1	-0.640	0.136	0.073	0.104	0.152	0.304	0.222	0.311	0.315	0.321
ROA	-0.159	-0.240	-0.240	0.232	0.044	-0.659	1	-0.395	-0.240	-0.033	-0.057	-0.140	-0.118	-0.095	-0.148	-0.139
BTM	-0.002	0.018	0.018	-0.316	-0.033	0.173	-0.246	1	-0.071	0.014	0.014	-0.016	0.041	-0.030	0.003	-0.009
LEV	-0.011	-0.001	0.001	0.117	0.087	0.099	-0.165	-0.130	1	-0.107	-0.094	-0.096	-0.109	-0.088	-0.048	-0.047
AbsDiscAcc	0.146	0.135	0.126	-0.218	-0.129	0.125	-0.082	0.004	-0.089	1	0.366	0.182	0.354	0.183	0.177	0.173
AbsRMproxy	0.166	0.212	0.209	-0.194	-0.108	0.198	-0.207	0.015	-0.068	0.439	1	0.248	0.366	0.257	0.244	0.243
Vol_{EARN}	0.322	0.339	0.331	-0.182	-0.080	0.270	-0.249	-0.015	-0.031	0.204	0.304	1	0.642	0.488	0.509	0.509
Vol_{CFO}	0.275	0.279	0.270	-0.255	-0.137	0.212	-0.175	0.001	-0.054	0.351	0.385	0.781	1	0.371	0.374	0.369
Lag($ABSE_{CFO}$)	0.292	0.381	0.379	-0.163	-0.075	0.339	-0.351	-0.007	-0.028	0.241	0.417	0.523	0.425	1	0.768	0.686
Lag($ABSE_{CFO\ ACC}$)	0.270	0.378	0.373	-0.148	-0.061	0.324	-0.355	0.016	-0.001	0.225	0.386	0.534	0.422	0.878	1	0.883
Lag($ABSE_{EARN}$)	0.262	0.370	0.375	-0.144	-0.057	0.332	-0.356	0.014	0.000	0.224	0.391	0.523	0.410	0.824	0.942	1

Variable definition

$ABSE_{CFO}$ is absolute value of prediction error, $|Earnings_{t+1} - (\alpha + \beta_1 CFO_t)|$/Total $asset_t$, where α and $\beta_1$are estimated in a firm-specific regression of $Earnings_t$ on CFO_{t-1} using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure. Earnings is data item IBQ and CFO is data item OANCFY, operating activities – Net cash flows, less XIDOCY, Extraordinary Items and Discontinued Operations, Statement of Cash Flows.

$ABSE_{CFO\ ACC}$ is absolute value of prediction error, $|Earnings_{t+1} - (\alpha + \beta_1 CFO_t + \beta_2 ACC_t)|$ /Total $asset_t$, where α, β_1 and β_2 are estimated in a firm-specific regression of $Earnings_t$ on CFO_{t-1} and ACC_{t-1} using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure.

$ABSE_{EARN}$ is absolute value of prediction error, $|Earnings_{t+1} - (\alpha + \beta_1 Earnings_t)|$ /Total $asset_t$, where α and β_1 are estimated in a firm-specific regression of $Earnings_t$ on $Earnings_{t-1}$ using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure.

Size is log of market capitalization and it is measure at fiscal quarter end t. Market capitalization is measured by PRCCQ (price close at quarter t) times CSHOQ (common stock outstanding).

Loss is an indicator variable that equals one if $Earnings_t < 0$

Total assets is measured at fiscal quarter end t.

ROA is return on assets, defined as $Earnings_t$, divided by average of Total $asset_{t-1}$ and Total $asset_t$

BTM is book-to-market ratio, book value (equity), divided by market capitalization at fiscal quarter end t.

Leverage is defined as total debt, divided by total asset at the fiscal quarter end t.

AbsDiscAcc is absolute value of discretionary accruals at fiscal end, based on modified Jones (1992) model.
AbsRMProxy is absolute value of RM proxy at fiscal end
Vol_{EARN} is standard deviation of Earnings, divided by average of Total $asset_{t-1}$ and Total $asset_t$ in the past 16 quarters. Earnings is deseasonalized for the seasonality adjustment.
Vol_{CFO} is standard deviation of CFO, divided by average of Total $asset_{t-1}$ and Total $asset_t$ in the past 16 quarters. CFO is deseasonalized for the seasonality adjustment.

Table 4. Regression of prediction error (N obs = 72,038)

$$ABSE_{it} = \alpha + \beta_1 Size_{it} + \beta_2 Loss_{it} + \beta_3 ROA_{it} + \beta_4 BTM_{it} + \beta_5 LEV_{it} + \beta_6 AbsDiscAcc_{it}$$
$$+ \beta_7 AbsRM\text{Proxy}_{it} + \beta_8 VOL_{EARN\,it} + \beta_9 VOL_{CFOit} + \eta_{it} \ldots\ldots\ldots (1)$$

Dependent Variable		$ABSE_{CFO}$	$ABSE_{CFO\ ACC}$	$ABSE_{EARN}$	$ABSE_{CFO}$	$ABSE_{CFO\ ACC}$	$ABSE_{EARN}$	$ABSE_{CFO}$	$ABSE_{CFO\ ACC}$	$ABSE_{EARN}$
		Coeff (T-stat)			Coeff (T-stat)			Coeff (T-stat)		
Constant	α	0.01062	0.00384	0.00492	0.01956	0.01171	0.01103	0.01423	0.00451	0.00667
		(11.698)**	(2.741)**	(3.774)**	(4.959)**	(3.770)**	(3.909)**	(3.021)**	(0.804)	(1.177)
Size	β_1	-0.00067	0.00017	0.00009	-0.00087	0.00003	-0.00005	-0.00144	0.00015	-0.00018
		(7.558)**	(1.266)	(0.701)	(8.488)**	(0.168)	(0.313)	(3.045)**	(0.224)	(0.276)
Loss	β_2	0.0019	0.00288	0.00221	0.00174	0.00315	0.0025	0.00312	0.00243	0.00252
		(1.385)	(2.130)*	(1.679)$	(1.281)	(2.367)*	(1.915)$	(5.085)**	(2.254)*	(2.426)*
ROA	β_3	-0.1227	-0.28875	-0.27692	-0.12371	-0.29961	-0.28607	0.02543	-0.25288	-0.25536
		(3.507)**	(7.422)**	(7.459)**	(3.560)**	(7.888)**	(7.812)**	(1.546)	(6.337)**	(6.973)**
BTM	β_4	-0.00423	-0.00236	-0.00245	-0.00448	-0.00322	-0.00323	0.00475	0.00429	0.00394
		(4.442)**	(2.188)*	(2.411)*	(4.576)**	(2.929)**	(3.059)**	(3.527)**	(2.420)*	(2.252)*
LEV	β_5	-0.00146	-0.00248	-0.00222	-0.00174	-0.00405	-0.00319	0.01843	0.00108	0.00376
		(0.772)	(1.487)	(1.373)	(0.848)	(2.150)*	(1.765)$	(2.018)*	(0.170)	(0.593)
AbsDiscAcc	β_6	0.16294	0.10370	0.07352	0.16714	0.10972	0.07906	0.09279	0.06613	0.03567
		(5.963)**	(3.658)**	(2.675)**	(6.185)**	(3.901)**	(2.892)**	(4.540)**	(1.570)	(1.421)
AbsRMproxy	β_7	0.03866	0.13864	0.14382	0.04286	0.13685	0.14196	0.04332	0.15113	0.15144
		(2.070)*	(6.384)**	(6.829)**	(2.288)*	(6.384)**	(6.810)**	(2.501)*	(7.413)**	(7.675)**
Vol_{EARN}	β_8	0.49186	0.5851	0.55137	0.48229	0.57382	0.54055	0.05445	0.27202	0.24634
		(19.104)**	(21.331)**	(20.770)**	(17.448)**	(20.094)**	(19.252)**	(2.610)**	(7.500)**	(7.028)**
Vol_{CFO}	β_9	0.03873	0.00517	-0.00132	0.04185	0.0039	-0.00046	0.02475	-0.0037	0.00508
		(2.551)*	(0.272)	(0.070)	(2.691)**	(0.206)	(0.024)	(1.754)$	(0.171)	(0.238)
Fixed effect		None			Time and Industry			Time and Firm		
Adj. R^2		0.112	0.145	0.14	0.121	0.154	0.149	0.300	0.258	0.253

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

Variable definition in Table 4

$ABSE_{CFO}$ is absolute value of prediction error, $|Earnings_{t+1} – (\alpha + \beta_1 CFO_t)|$/Total $asset_t$, where α and $\beta_1$are estimated in a firm-specific regression of $Earnings_t$ on CFO_{t-1} using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure. Earnings is data item IBQ and CFO is data item OANCFY, operating activities – Net cash flows, less XIDOCY, Extraordinary Items and Discontinued Operations, Statement of Cash Flows.

$ABSE_{CFO\ ACC}$ is absolute value of prediction error, $|Earnings_{t+1} – (\alpha + \beta_1 CFO_t + \beta_2 ACC_t)|$ /Total $asset_t$, where α, β_1 and β_2 are estimated in a firm-specific regression of $Earnings_t$ on CFO_{t-1} and ACC_{t-1} using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure.

$ABSE_{EARN}$ is absolute value of prediction error, $|Earnings_{t+1} – (\alpha + \beta_1 Earnings_t)|$ /Total $asset_t$, where α and β_1 are estimated in a firm-specific regression of $Earnings_t$ on $Earnings_{t-1}$ using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure.

Size is log of market capitalization and it is measure at fiscal quarter end t. Market capitalization is measured by PRCCQ (price close at quarter t) times CSHOQ (common stock outstanding).

Loss is an indicator variable that equals one if $Earnings_t < 0$

Total assets is measured at fiscal quarter end t.

ROA is return on assets, defined as $Earnings_t$, divided by average of Total $asset_{t-1}$ and Total $asset_t$

BTM is book-to-market ratio, book value (equity), divided by market capitalization at fiscal quarter end t.

Leverage is defined as total debt, divided by total asset at the fiscal quarter end t.

AbsDiscAcc is absolute value of discretionary accruals at fiscal end, based on modified Jones (1992) model.
AbsRMProxy is absolute value of RM proxy at fiscal end
Vol_{EARN} is standard deviation of Earnings, divided by average of Total $asset_{t-1}$ and Total $asset_t$ in the past 16 quarters. Earnings is deseasonalized for the seasonality adjustment.
Vol_{CFO} is standard deviation of CFO, divided by average of Total $asset_{t-1}$ and Total $asset_t$ in the past 16 quarters. CFO is deseasonalized for the seasonality adjustment.

Table 5. Regression of prediction error (N obs = 72,038)

$$ABSE_{it} = \alpha + \beta_1 Size_{it} + \beta_2 Loss_{it} + \beta_3 ROA_{it} + \beta_4 BTM_{it} + \beta_5 LEV_{it} + \beta_6 AbsDiscAcc_{it} + \beta_7 AbsRM\text{Proxy}_{it} + \beta_8 VOL_{EARN\,it} + \beta_9 VOL_{CFO\,it} + \beta_{10} ABSE_{it-1} + \eta_{it} \ldots\ldots\ldots(2)$$

Dependent Variable		$ABSE_{CFO}$	$ABSE_{CFO\ ACC}$	$ABSE_{EARN}$	$ABSE_{CFO}$	$ABSE_{CFO\ ACC}$	$ABSE_{EARN}$	$ABSE_{CFO}$	$ABSE_{CFO\ ACC}$	$ABSE_{EARN}$
		Coeff (T-stat)			Coeff (T-stat			Coeff (T-stat		
Constant	α	0.00859	0.00398	0.00491	0.00666	0.00346	0.00389	0.00918	0.00426	0.00573
		(9.329)**	(3.168)**	(4.074)**	(2.560)*	(1.227)	(1.503)	(1.921)+	(0.780)	(1.087)
Size	β1	-0.00066	0.00004	-0.00004	-0.00083	-0.00002	-0.0001	-0.00141	-0.00004	-0.00032
		(7.307)**	(0.316)	(0.322)	(7.978)**	(0.139)	(0.685)	(3.384)**	(0.056)	(0.501)
Loss	β2	0.00158	0.00419	0.00402	0.00152	0.0042	0.00404	0.00304	0.00359	0.00389
		(1.263)	(3.170)**	(3.088)**	(1.214)	(3.215)**	(3.129)**	(5.251)**	(3.193)**	(3.578)**
ROA	β3	-0.06127	-0.22452	-0.21723	-0.06339	-0.2262	-0.21944	0.03551	-0.22214	-0.22559
		(2.121)*	(6.577)**	(6.635)**	(2.189)*	(6.647)**	(6.707)**	(2.223)*	(5.857)**	(6.608)**
BTM	β4	-0.00227	-0.00158	-0.00151	-0.00252	-0.00182	-0.00179	0.00507	0.0042	0.00379
		(2.724)**	(1.610)	(1.608)	(3.007)**	(1.720)$	(1.771)$	(4.017)**	(2.414)*	(2.228)*
LEV	β5	-0.00045	-0.0025	-0.0023	-0.00084	-0.00339	-0.00281	0.01328	-0.00251	-0.00019
		(0.265)	(1.665)$	(1.590)	(0.456)	(2.029)*	(1.740)$	(1.664)$	(0.548)	(0.041)
AbsDiscAcc	β6	0.12753	0.05907	0.03278	0.1326	0.06509	0.03883	0.07327	0.03992	0.01048
		(6.571)**	(2.439)*	(1.403)	(6.982)**	(2.706)**	(1.671)$	(4.588)**	(1.710)$	(0.462)
AbsRMproxy	β7	-0.00528	0.06471	0.06302	0.0004	0.0677	0.06564	0.02526	0.08863	0.08411
		(0.406)	(3.516)**	(3.490)**	(0.031)	(3.718)**	(3.669)**	(1.814)$	(5.248)**	(5.011)**
Vol_{EARN}	β8	0.36528	0.34525	0.32081	0.35533	0.34582	0.31985	-0.00158	0.10763	0.08596
		(19.546)**	(17.923)**	(16.229)**	(17.744)**	(16.790)**	(15.104)**	(0.069)	(3.341)**	(2.718)**
Vol_{CFO}	β9	0.04201	0.02686	0.02889	0.04255	0.02616	0.02847	0.02451	0.00981	0.01946
		(2.940)**	(1.441)	(1.563)	(2.908)**	(1.391)	(1.526)	(1.634)	(0.458)	(0.919)
Lag($ABSE_{CFO}$)	β10	0.27039			0.26887			0.09636		
		(10.607)**			(10.415)**			(5.645)**		
Lag($ABSE_{CFO\ ACC}$)	β10		0.45962			0.45748			0.33107	
			(14.392)**			(14.305)**			(11.293)**	
Lag($ABSE_{EARN}$)	β10			0.46671			0.4659			0.37332
				(14.684)**			(14.493)**			(11.207)**
Fixed effect		None			Time and Industry			Time and Firm		
Adj. R^2		0.155	0.182	0.179	0.170	0.190	0.187	0.30	0.253	0.258

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

Variable definition in Table 5

$ABSE_{CFO}$ is absolute value of prediction error, $|Earnings_{t+1} - (\alpha + \beta_1 CFO_t)|/\text{Total asset}_t$, where α and β_1 are estimated in a firm-specific regression of $Earnings_t$ on CFO_{t-1} using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure. Earnings is data item IBQ and CFO is data item OANCFY, operating activities – Net cash flows, less XIDOCY, Extraordinary Items and Discontinued Operations, Statement of Cash Flows.

$ABSE_{CFO\ ACC}$ is absolute value of prediction error, $|Earnings_{t+1} - (\alpha + \beta_1 CFO_t + \beta_2 ACC_t)|$ /Total $asset_t$, where α, β_1 and β_2 are estimated in a firm-specific regression of $Earnings_t$ on CFO_{t-1} and ACC_{t-1} using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure.

$ABSE_{EARN}$ is absolute value of prediction error, $|Earnings_{t+1} – (\alpha + \beta_1 Earnings_t)| / Total asset_t$, where α and β_1 are estimated in a firm-specific regression of $Earnings_t$ on $Earnings_{t-1}$ using past 32 observations. Variables in the regression are treated for seasonality using X11 procedure.
Size is log of market capitalization and it is measure at fiscal quarter end t. Market capitalization is measured by PRCCQ (price close at quarter t) times CSHOQ (common stock outstanding).
Loss is an indicator variable that equals one if $Earnings_t < 0$
Total assets is measured at fiscal quarter end t.
ROA is return on assets, defined as $Earnings_t$, divided by average of Total $asset_{t-1}$ and Total $asset_t$
BTM is book-to-market ratio, book value (equity), divided by market capitalization at fiscal quarter end t.
Leverage is defined as total debt, divided by total asset at the fiscal quarter end t.
AbsDiscAcc is absolute value of discretionary accruals at fiscal end, based on modified Jones (1992) model.
AbsRMProxy is absolute value of RM proxy at fiscal end
Vol_{EARN} is standard deviation of Earnings, divided by average of Total $asset_{t-1}$ and Total $asset_t$ in the past 16 quarters. Earnings is deseasonalized for the seasonality adjustment.
Vol_{CFO} is standard deviation of CFO, divided by average of Total $asset_{t-1}$ and Total $asset_t$ in the past 16 quarters. CFO is deseasonalized for the seasonality adjustment.
Lag(ABSE) is ABSE at t-1.