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Asymmetric persistence and the market pricing of accruals and cash flows

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Abstract

We investigate whether stock prices reflect the asymmetric persistence of accruals and cash flows resulting from conditional conservatism. Using the Mishkin (1983) test (MT), we provide further evidence on the earnings fixation explanation for the accrual anomaly. We also apply panel estimation techniques that significantly affect market efficiency inferences. Our results suggest that over our sample period (1) investors seem to partially anticipate asymmetric persistence in accruals and cash flows; (2) the accrual anomaly originates in the mispricing of accruals in years of economic gains, even though the differential persistence between accruals and cash flows is greatest in years of economic losses; (3) investors respond differently to accrual and cash flow surprises and therefore they do not naively fixate on earnings surprises; and (4) after clustering standard errors in the MT by firm and year dimensions, there is no longer evidence of cash flow mispricing, while the statistical significance of accrual mispricing falls. All our findings contradict the earnings fixation explanation for the accrual anomaly. Our study has implications for understanding the accrual anomaly in relation to accrual dynamics, as well as for researchers interested in using the MT framework to test the rationality of investor expectations more generally.

Keywords Accrual mispricing · Cash flow mispricing · Asymmetric persistence · Conditional conservatism · Mishkin test · Clustered standard errors

JEL Classification C33 · G14 · M41

1. Introduction

The negative correlation between accruals and future stock returns first identified by Sloan (1996) is now a well-established empirical regularity found in many stock markets.[1] The label "accrual anomaly", often used to describe this effect, reveals a lack of consensus on whether accruals capture exposure to un-modeled risk factors (Khan 2008; Wu et al. 2010) or they are mispriced as a result of irrational information processing. A common conjecture consistent with irrational behavior is that investors behave as if they 'fixate' on earnings and do not fully understand differences in the persistence of accruals relative to cash flows (Sloan 1996; Richardson et al. 2005). A recent paper by Shi and Zhang (2012) provides further evidence in support of the earnings fixation hypothesis.[2] In this paper we re-examine the accrual anomaly in light of two relevant strands of the accounting research. The first strand identifies asymmetry in the persistence of accruals resulting from timely loss recognition under conservative accounting (Basu 1997; Ball and Shivakumar 2006). The second strand suggests that the differential ability of accruals and cash flows to predict (abnormal) earnings and the differential persistence of each earnings component result in the components having different pricing implications (Barth et al. 1999; Ohlson 1999; Pope and Wang 2005).

We conduct our analysis by adapting the Mishkin (1983) test (hereafter MT), first introduced to the accounting literature by Sloan (1996), to incorporate both the asymmetric persistence of accruals and the differential pricing of accruals and cash flows. While the MT does not offer advantages relative to a single step OLS regression when the sole research objective is to identify market inefficiencies (Kraft et al. 2007), it is capable of providing additional insights to the channels through which market inefficiencies arise (Abel and Mishkin 1983). Our findings indicate that once asymmetric persistence in accruals and differential pricing of accruals and cash flows are introduced, the earnings fixation hypothesis is no longer able to explain the accrual anomaly.[3] More importantly, even though the differential persistence between accruals and cash flows is greatest in years of economic losses, the accrual anomaly appears to originate in the mispricing of accruals in years of economic gains – a result that is inconsistent with the earnings fixation hypothesis.

It is well known that when firms experience economic losses accruals contain more transitory negative components, whereas when firms experience economic gains good news is realized in earnings slowly

[1] See Richardson et al. (2010) for a recent review and discussion.

[2] Further non-mutually exclusive explanations offered in the literature include the possibility that accruals are associated with the growth anomaly (Zhang 2007), and that mispricing related to accruals persists because of limits to arbitrage (Mashruwala et al. 2006). See Shi and Zhang (2012) for further discussion.

[3] We note that it would be possible to modify the MT in various ways, by replacing or supplementing earnings components with other variables correlated with future returns (Lewellen 2010). We confine our analysis to accruals and cash flows because this allows us to simultaneously examine the accrual anomaly and the earnings fixation hypothesis.

and in a more persistent manner.[4] The lower persistence of accruals when firms experience economic losses is important in forecasting future earnings, accruals, and cash flows. Consequently, expectations models that do not accommodate the effects of timely loss recognition will be biased, and inferences concerning market efficiency and mispricing could be sensitive to such bias. Our results provide evidence that investors partially anticipate the asymmetric persistence of accruals. We find little evidence of accrual mispricing when firms experience economic losses, even though this is precisely when differences in persistence between accruals and cash flows are highest. In contrast, our results indicate that accruals are mispriced in gain years and not in loss years.[5]

We also modify the MT in order to allow the market response to accrual and cash flow surprises to differ. Prior research proposing earnings fixation as an explanation for the accrual anomaly assumes that earnings are sufficient for valuation and therefore the pricing of accrual and cash flow surprises is identical. At the same time, theoretical valuation models suggest that the pricing of accruals and cash flows should differ depending on their persistence and their ability to predict earnings (Ohlson 1999; Pope and Wang 2005). Consistent with Barth et al. (1999), our evidence based on the modified MT confirms that investors price the accrual and cash flow components of earnings surprises differently. While this result does not necessarily imply efficient pricing, it is contrary to the earnings fixation hypothesis.

A further contribution of our study is to introduce recent panel regression techniques to the implementation of the MT. We document that market efficiency tests based on panel data are sensitive to the cross-sectional correlation of residuals, suggesting that clustering the standard errors in the MT by year is important. Year-by-year estimation based on Fama-MacBeth (1973) methods is an alternative approach that corrects for the cross-sectional correlation in the residuals, but has informational and statistical disadvantages relative to the MT based on pooled data[6] (Kraft et al. 2007). Furthermore, Petersen (2009) shows that Fama-MacBeth methods result in biased standard errors in the presence of firm effects. In our panel estimation of the MT, when we cluster standard errors either by year, or by both firm and year, efficiency tests no longer reject the rational pricing of cash flows, even under a parsimonious model specification assuming identical pricing of accruals and cash flows and no

[4] Additionally if firms experience negative cash flow shocks, management is more likely to take action to reverse such shocks than when firms experience positive shocks. Therefore asymmetric persistence in cash flows is also likely to be observed empirically.

[5] Throughout the paper we use the terminology gain and loss years. This labelling is not intended to indicate accounting gains and losses based on the sign of reported earnings but rather economic gains and losses, i.e. good news and bad news respectively. Both our terminology and the proxies we employ for economic gains and losses follow Ball and Shivakumar (2006).

[6] Year-by-year cross-sectional regressions ignore time-series variation in explanatory variables and therefore they are not equivalent to pooled panel data estimation techniques (Cochrane 2005).

asymmetries in forecasting.[7] This finding is contrary to the earnings fixation hypothesis which predicts that accruals are over-weighted and cash flows are under-weighted by the market.

Overall, while the evidence we report does not necessarily rule out the mispricing of accruals, it is inconsistent with earnings fixation as the cause of the accrual anomaly. If the accrual anomaly does reflect mispricing then the nature of the market irrationality appears to be rooted in the processing of accruals information in gain years. On the other hand, if the accrual anomaly reflects un-modeled risk differences related to accruals, our results suggest that any accrual-related risk premium is significant when firms have experienced good news.

The remainder of the paper is organized as follows. In section 2 we discuss our research design and extensions to the Mishkin test. We also discuss the alternative econometric techniques for the estimation of the MT. In section 3 we describe the sample and the data selection procedure. In section 4 we report the empirical results and finally, in section 5 we offer our concluding remarks.

2. Research Design

2.1 Expectations under timely loss recognition

Sloan (1996) tests the rationality of investor expectations with respect to accruals and cash flows using the MT and assuming the following forecasting and pricing equations:

$$EARN_{t+1} = \alpha_0 + \alpha_1 ACC_t + \alpha_2 CF_t + v_{t+1} \quad (1)$$

$$ARET_{t+1} = \beta(EARN_{t+1} - \alpha_0^* - \alpha_1^* ACC_t - \alpha_2^* CF_t) + \varepsilon_{t+1} \quad (2)$$

where EARN is earnings, ARET is abnormal returns, ACC is accruals and CF is cash flows. Equation (1) assumes that future earnings are linearly related to current period accruals and cash flows. Equation (2) relates abnormal returns to the earnings surprise defined using the earnings expectation model in equation (1). Rationality in forecasting earnings is tested by examining whether the restrictions $\alpha_1^* = \alpha_1$ and $\alpha_2^* = \alpha_2$ hold.

Prior research shows that as a result of conditional accounting conservatism the persistence of earnings and accruals depends on whether firms experience good news or bad news about future cash flows in the reporting period. We incorporate this insight into the forecasting and pricing equations of the MT, using the four proxy variables for economic gains and losses suggested by Ball and Shivakumar (2006). For each proxy we first estimate the following system of piecewise linear equations:

[7] A Stata ado file for two-way clustering in the MT is available from the authors on request.

$$EARN_{t+1} = \alpha_0 + \alpha_{01}D_t + \alpha_1 ACC_t + \alpha_2 CF_t + \alpha_3 ACC_t \,.\, D_t + \alpha_4 CF_t \,.\, D_t + v_{t+1} \quad (3)$$

$$ARET_{t+1} = \beta(EARN_{t+1} - \alpha_0^{*} - \alpha_{01}^{*}D_t - \alpha_1^{*}ACC_t - \alpha_2^{*}CF_t - \alpha_3^{*}ACC_t \,.\, D_t - \alpha_4^{*}CF_t \,.\, D_t) + \varepsilon_{t+1} \quad (4)$$

where D is a (0,1) dummy variable taking the value of 1 if the economic news proxy is negative. Using equation (3), we test for asymmetry in the persistence of accruals and cash flows by examining whether $\alpha_3 = 0$ and $\alpha_4 = 0$. Based on Basu (1997) we expect that accruals are less persistent in loss years relative to gain years, i.e. $\alpha_3 < 0$. Consistent with Sloan (1996) we expect that accruals are less persistent than cash flows in both gain years and loss years, i.e. $\alpha_1 < \alpha_2$ and $(\alpha_1 + \alpha_3) < (\alpha_2 + \alpha_4)$.

Under the assumption that the pricing of accrual and cash flow surprises is identical and equal to β, rationality in forecasting earnings requires that the estimates α_1^{*}, α_2^{*}, $(\alpha_1^{*} + \alpha_3^{*})$ and $(\alpha_2^{*} + \alpha_4^{*})$ do not differ significantly from α_1, α_2, $(\alpha_1 + \alpha_3)$ and $(\alpha_2 + \alpha_4)$ respectively. If investors fixate on earnings and if the relative persistence of accruals versus cash flows is lower in loss states, then we should find that the mispricing of accruals is higher in loss states relative to gain states. This prediction is consistent with Shi and Zhang (2012), who find that the effectiveness of the accrual strategy increases in the differential persistence of accruals relative to cash flows.[8]

Note that the forecasting equation (3) can be expanded further to include additional variables (see Kraft et al. 2007). In this paper, we intentionally use only ACC and CF as predictor variables in order to maintain comparability with the majority of papers using the MT (including Sloan (1996)) and to be able to reconcile our results with the accrual-based hedge portfolio returns. In the likelihood of omitted variables, the MT remains a valid test of market efficiency which can be applied in different states of the economy, although one cannot draw clear inferences about the source of any inefficiency (Sloan 1996; Kraft et al. 2007).

2.2 Differential pricing of accrual and cash flow surprises

The earnings fixation hypothesis supported by Shi and Zhang (2012) and others suggests that the market does not discriminate among earnings components in valuation. Consistent with this hypothesis, tests of rationality based on equations (1) and (2) or based on equations (3) and (4) assume that the pricing of accrual and cash flow surprises is identical and is captured by the pricing parameter β. If however accruals and cash flows attract different valuation weights, the coefficients on accrual and cash flow surprises will differ and the proposed explanation of naïve fixation will no longer be supported.

[8] Shi and Zhang (2012) measure the persistence of accruals relative to cash flows at the firm-level, using time-series regressions. On the contrary, we identify firms experiencing bad news and having relatively lower accrual persistence in the cross-section.

We modify the MT by allowing the pricing of accrual and cash flow surprises to vary. This provides a direct test of the earnings fixation hypothesis conditional on separate forecasting models for each earnings component. We estimate the system of equations (5), (6) and (7):

$$ACC_{t+1} = \gamma_0 + \gamma_1 ACC_t + \gamma_2 CF_t + v_{1,t+1} \quad (5)$$

$$CF_{t+1} = \delta_0 + \delta_1 ACC_t + \delta_2 CF_t + v_{2,t+1} \quad (6)$$

$$ARET_{t+1} = \beta_1(ACC_{t+1} - \gamma_0^* - \gamma_1^* ACC_t - \gamma_2^* CF_t) + \beta_2(CF_{t+1} - \delta_0^* - \delta_1^* ACC_t - \delta_2^* CF_t) + \varepsilon_{t+1} \quad (7)$$

Equation (5) is the accrual forecasting equation and equation (6) is the cash flow forecasting equation. In equation (7) the parameter β_1 (β_2) captures the pricing of the accrual (cash flow) surprise. Rationality in forecasting accruals requires that $\gamma_1^* = \gamma_1$ and $\gamma_2^* = \gamma_2$. Similarly rationality in forecasting cash flows requires that $\delta_1^* = \delta_1$ and $\delta_2^* = \delta_2$. These restrictions are testable only if the relevant parameters are identified. If identification is not possible, only linear combinations of the rationality conditions are testable. In the case of equations (5)-(7), we are able to test the following linear combinations of the rationality conditions:

(i) $\beta_1\gamma_1^* + \beta_2\delta_1^* = \beta_1\gamma_1 + \beta_2\delta_1$, which holds if investors rationally price accruals (i.e. $\gamma_1^* = \gamma_1$ and $\delta_1^* = \delta_1$); and

(ii) $\beta_1\gamma_2^* + \beta_2\delta_2^* = \beta_1\gamma_2 + \beta_2\delta_2$, which holds if investors rationally price cash flows (i.e. $\gamma_2^* = \gamma_2$ and $\delta_2^* = \delta_2$).

In our empirical tests we re-write equation (7) as follows:

$$ARET_{t+1} = \beta_1 ACC_{t+1} + \beta_2 CF_{t+1} - (\kappa_0^* - \kappa_1^* ACC_t - \kappa_2^* CF_t) + \varepsilon_{t+1}. \quad (8)$$

where $\kappa_0^* = \beta_1\gamma_0^* + \beta_2\delta_0^*$, $\kappa_1^* = \beta_1\gamma_1^* + \beta_2\delta_1^*$ and $\kappa_2^* = \beta_1\gamma_2^* + \beta_2\delta_2^*$. We then test whether the rationality conditions $\kappa_1^* = \beta_1\gamma_1 + \beta_2\delta_1$ for accruals and $\kappa_2^* = \beta_1\gamma_2 + \beta_2\delta_2$ for cash flows hold. Failure to reject these conditions is consistent with market rationality in the pricing of accruals and cash flows respectively.[9]

Although the system (5)-(7) provides a framework for testing the earnings fixation hypothesis, it ignores the asymmetric persistence of accruals arising from conditional conservatism. Therefore, the final MT specification we test combines the asymmetric persistence of earnings components with the differential pricing of the surprises to the components. We estimate equations (9)-(11):

[9] Testing for efficiency using these restrictions is equivalent to running a single step OLS regression of $ARET_{t+1}$ on ACC_t and CF_t, as explained in Abel and Mishkin (1983) and Kraft et al. (2007). In the linear reduced form of system (1)-(2), the coefficients on ACC_t and CF_t are equal to $\beta(\alpha_1 - \alpha_1^*)$ and $\beta(\alpha_2 - \alpha_2^*)$ respectively. In the linear reduced form of system (3)-(5), the coefficients on ACC_t and CF_t are equal to $\beta_1(\gamma_1 - \gamma_1^*) + \beta_2(\delta_1 - \delta_1^*)$ and $\beta_1(\gamma_2 - \gamma_2^*) + \beta_2(\delta_2 - \delta_2^*)$ respectively. Therefore, an OLS test cannot distinguish between market efficiency and a variable being valuation irrelevant, i.e. $\beta = 0$, or β_1, $\beta_2 = 0$. In contrast the MT, by distinguishing between forecasting parameters and response coefficients, discriminates between market efficiency and valuation irrelevance.

$$ACC_{t+1} = \gamma_0 + \gamma_{01}D_t + \gamma_1 ACC_t + \gamma_2 CF_t + \gamma_3 ACC_t \,.\, D_t + \gamma_4 CF_t \,.\, D_t + v_{1,t+1} \quad (9)$$

$$CF_{t+1} = \delta_0 + \delta_{01}D_t + \delta_1 ACC_t + \delta_2 CF_t + \delta_3 ACC_t \,.\, D_t + \delta_4 CF_t \,.\, D_t + v_{2,t+1} \quad (10)$$

$$ARET_{t+1} = \beta_1(ACC_{t+1} - \gamma_0^* - \gamma_{01}^*D_t - \gamma_1^*ACC_t - \gamma_2^*CF_t - \gamma_3^*ACC_t \,.\, D_t - \gamma_4^*CF_t \,.\, D_t)$$
$$+ \beta_2(CF_{t+1} - \delta_0^* - \delta_{01}^*D_t - \delta_1^*ACC_t - \delta_2^*CF_t - \delta_3^*ACC_t \,.\, D_t - \delta_4^*CF_t \,.\, D_t) + \varepsilon_{t+1} \quad (11)$$

Based on equation (9), we test the hypothesis of asymmetry in the relation between future accruals and current earnings components by testing whether $\gamma_3 = 0$ and $\gamma_4 = 0$. Conservative accounting results in higher mean reversion of accruals in loss years relative to gain years. Hence, we predict that $\gamma_3 < 0$. We also test the hypothesis of asymmetry in the relation between future cash flows and current earnings components in equation (10) by testing whether $\delta_3 = 0$ and $\delta_4 = 0$. Similar to Ball and Shivakumar (2006), we predict that the incremental coefficient on cash flows during loss years will be negative ($\delta_3 < 0$) because accruals in loss years incorporate capitalized multi-period cash flow effects.

In gain years, rationality in forecasting accruals requires that $\gamma_1^* = \gamma_1$ and $\gamma_2^* = \gamma_2$, and rationality in forecasting cash flows requires that $\delta_1^* = \delta_1$ and $\delta_2^* = \delta_2$. In loss years, rationality in forecasting accruals requires that $\gamma_1^* + \gamma_3^* = \gamma_1 + \gamma_3$ and $\gamma_2^* + \gamma_4^* = \gamma_2 + \gamma_4$, and rationality in forecasting cash flows requires that $\delta_1^* + \delta_3^* = \delta_1 + \delta_3$ and $\delta_2^* + \delta_4^* = \delta_2 + \delta_4$. Again these restrictions cannot be tested because the system is under-identified. However, we can test linear combinations of the rationality conditions. In the case of gain years the relevant conditions are identical to (i) and (ii) above. In the case of loss years the analogous efficiency conditions are:

(iii) $\beta_1(\gamma_1^* + \gamma_3^*) + \beta_2(\delta_1^* + \delta_3^*) = \beta_1(\gamma_1 + \gamma_3) + \beta_2(\delta_1 + \delta_3)$, which holds if investors rationally price accruals in loss years; and

(iv) $\beta_1(\gamma_2^* + \gamma_4^*) + \beta_2(\delta_2^* + \delta_4^*) = \beta_1(\gamma_2 + \gamma_4) + \beta_2(\delta_2 + \delta_4)$, which holds if investors rationally price cash flows in loss years.

In our empirical tests we re-write equation (11) as follows:

$$ARET_{t+1} = \beta_1 ACC_{t+1} + \beta_2 CF_{t+1} - (\kappa_0^* - \kappa_{01}^*D_t - \kappa_1^*ACC_t - \kappa_2^*CF_t$$
$$- \kappa_3^*ACC_t \,.\, D_t - \kappa_4^*CF_t \,.\, D_t) + \varepsilon_{t+1} \quad (12)$$

where $\kappa_0^* = \beta_1\gamma_0^* + \beta_2\delta_0^*$, $\kappa_{01}^* = \beta_1\gamma_{01}^* + \beta_2\delta_0^*$, $\kappa_1^* = \beta_1\gamma_1^* + \beta_2\delta_1^*$, $\kappa_2^* = \beta_1\gamma_2^* + \beta_2\delta_2^*$, $\kappa_3^* = \beta_1\gamma_3^* + \beta_2\delta_3^*$ and $\kappa_4^* = \beta_1\gamma_4^* + \beta_2\delta_4^*$. We then test the rationality conditions pertaining to the gain states as before, namely $\kappa_1^* = \beta_1\gamma_1 + \beta_2\delta_1$ for accruals and $\kappa_2^* = \beta_1\gamma_2 + \beta_2\delta_2$ for cash flows; and the additional rationality conditions relating to the loss years, namely $\kappa_1^* + \kappa_3^* = \beta_1(\gamma_1 + \gamma_3) + \beta_2(\delta_1 + \delta_3)$ for accruals and $\kappa_2^* + \kappa_4^* = \beta_1(\gamma_2 + \gamma_4) + \beta_2(\delta_2 + \delta_4)$ for cash flows. Failure to reject all these restrictions will be consistent with rationality in pricing the asymmetric persistence of accruals and cash flows. However, if rationality is rejected, a detailed analysis of these conditions should reveal the possible sources of any apparent mispricing by identifying the earnings components and the states of the world under which mispricing is found.

2.3 Loss proxies

We employ the four proxies for fiscal-year gains and losses proposed by Ball and Shivakumar (2006), including three book proxies based on the signs of cash flows (CF), the change in cash flows (ΔCF) and industry-adjusted cash flows (INDCF); and a market proxy based on the sign of abnormal returns (ARET).[10] Each proxy has conceptual advantages and disadvantages, which are discussed in detail by Ball and Shivakumar (2006). However, among the four proxies, market returns are more likely to measure the news reflected in contemporaneous accruals with error. Market values reflect unbooked items, including internally generated intangible assets and growth options, which can confound loss events that trigger accruals. More importantly, since our research is focused on potential market mispricing of accruals, there is a logical inconsistency in using returns as a loss proxy. If our null hypothesis of market efficiency is rejected, then any inferences that use returns to identify the source of possible mispricing can be misleading. Therefore the discussion of our results focuses more on the three book proxies, although results based on the market proxy are also included for comparison with Ball and Shivakumar (2006).

2.4 Estimation and standard errors

Petersen (2009) and Cameron et al. (2010) show that in the presence of within-cluster correlation of the regression residuals or the independent variable, the default OLS variance estimate is inflated by a factor of $\tau \approx 1 + \rho_x \rho_u (N - 1)$, where ρ_x is the within-cluster correlation of the independent variable x, ρ_u is the within-cluster correlation of the regression residuals u and N is the average size of clusters. Recently, a number of studies in the accounting literature have recognized that both classical OLS and White (1980) standard errors may yield unreliable test statistics when residuals are cross-sectionally or serially correlated, and this motivates our analysis in the accrual anomaly setting.

The majority of papers using the MT to examine investor rationality rely on the default standard errors, based on the standard OLS variance estimator in each system equation. A small number of papers (Hirshleifer et al. 2004; Kraft et al. 2007) estimate the joint procedure of the MT using the Fama-MacBeth (1973) approach, which controls for the cross-sectional correlation in the residuals but it ignores the time-series variation of the explanatory variables. Cameron et al. (2010) and Thompson (2011)

[10] Following Sloan (1996) we use size-adjusted returns as our measure of abnormal returns (ARET). Results are qualitatively the same when the market loss proxy is based on raw returns, or market-adjusted returns as in Ball and Shivakumar (2006).

propose a variance estimator for panel data that is robust to simultaneous correlation along two dimensions, as follows:

$$V_{firm\&time} = V_{firm} + V_{time} - V_{white} \tag{13}$$

where $V_{firm\&time}$ is the variance estimator that clusters by both firm and time, V_{firm} is the variance estimator that clusters by firm, V_{time} is the variance estimator that clusters by time and V_{White} is the White variance estimator that is robust to heteroskedasticity. We show that this estimator can be applied to the MT and can significantly affect market efficiency inferences.

We follow the prior literature in estimating the different specifications of the MT by using non-linear least squares[11] and we test the cross-equation restrictions using Wald tests. We modify test statistics and standard errors using cluster-robust standard errors, in line with the recommendations of Petersen (2009) and Gow et al. (2010). When estimating the MT, we draw inferences for market efficiency based on two-way clustered standard errors and cluster-robust Wald statistics.[12] To our knowledge this is the first paper to estimate MT test statistics based on cluster-robust standard errors appropriate for our panel data setting.

3. Sample Selection and Data

We obtain accounting and stock return data from the 2013 CRSP/Compustat merged database. Our sample includes all NYSE, AMEX and NASDAQ firms with available data, without restrictions on fiscal year-ends. In supplementary tests we examine December fiscal year-end firms only. Our test period includes the years 1989-2011, when cash flow statement data are available under SFAS 95.[13] In tests where we use the change in cash flow as a loss proxy, we additionally require cash flow data to be available in 1988. Consistent with previous research we exclude financial firms (SIC codes between 6000 and 6999) because accruals are substantially different in nature for these firms.[14]

We estimate size-adjusted buy and hold abnormal returns (ARET) as the difference between the annual buy and hold stock return and the annual buy and hold return on the CRSP size-matched portfolio.[15] When a firm's size assignment is not available in CRSP, we use the value-weighted CRSP

[11] In Stata this estimation is implemented using the *nlsur* command.
[12] Details are available on request.
[13] Hribar and Collins (2002) suggest that accruals estimates based on cash flow data are more reliable than estimates obtained using the balance sheet approach.
[14] We use the historical *SICH* code from Compustat and the current *SIC* code when *SICH* is missing.
[15] The exact files used for obtaining size portfolio returns are from the Wharton Research Data Service (WRDS) and are crsp.ermport2 for NYSE/AMEX firms and crsp.ermport3 for NASDAQ firms, as in Kraft et al. (2006).

market portfolio in computing abnormal returns. Returns are computed for the twelve month period starting four months after fiscal year-end, to ensure that all accounting variables are publicly available.

When a firm delists, we use the delisting return in the delisting month and assume a return equal to the firm's size-matched portfolio for the remainder of the year. If a delisting is due to liquidation (delisting codes 500 or between 520 and 584) and the delisting return is missing, the delisting return is set to -30% for NYSE/AMEX firms (Shumway 1997) and -55% for NASDAQ firms (Shumway and Warther 1999). To mitigate the possibility of selection bias discussed in Kraft et al. (2006), we set returns to zero in any month they are missing.[16]

Following Hribar and Collins (2002), we compute accruals as ACC ≡ EARN – CF[17], where EARN is earnings before extraordinary items taken from the cash flow statement (*IBC*)[18] and CF is operating cash flows (*OANCF*) minus extraordinary items and discontinued operations (*XIDOC*). We deflate all accounting variables by average total assets. To mitigate the effects of outliers, we delete observations in the extreme top and bottom percentiles of the distributions of deflated EARN, CF and ACC in each year. Our final sample consists of 80,803 firm-year observations for 10,201 firms. Table 1 contains descriptive and correlation statistics for our main variables and Table 2 contains detailed definitions and correlation statistics of the loss proxies.

4. Results

4.1 Correcting standard errors for within-cluster correlation

In Panel A of Table 3, we replicate the MT as it has been applied in prior research on the accrual anomaly (equations (1) and (2)), using our sample. Results are reported under six estimation approaches in order to show the relative importance of year and firm clustering effects when testing market efficiency with respect to accruals and cash flows. Consistent with Sloan (1996), column 1 shows evidence that accruals are less persistent than cash flows (α_1 - α_2 = - 0.356) but stock prices fail to reflect this differential persistence. In particular, accruals appear to be over-weighted ($\alpha_1^* > \alpha_1$) and cash flows under-weighted ($\alpha_2^* < \alpha_2$), rejecting market efficiency. These findings are consistent with investors fixating on earnings and failing to anticipate the lower persistence of accruals relative to cash flows. Inferences remain the same when we correct standard errors for heteroskedasticity (column 2), for year fixed

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[16] If the returns of a firm are missing for the whole 12-month period, the firm is excluded from the sample.
[17] Our accrual definition is deliberately restricted to the non-cash component of earnings, given our focus on earnings fixation and the effects of conditional conservatism on accrual persistence.
[18] Compustat item labels (*XFP* names) for accounting variables are in parentheses.

effects[19] (column 3) and for serial correlation in the residuals (column 4). However, when we cluster the standard errors by year (column 5) and by both firm and year (column 6), standard errors increase significantly and the rational pricing of cash flows is no longer rejected. Accruals remain mispriced at the five percent level, but the results no longer support the earnings fixation hypothesis because this requires both accruals and cash flows to be mispriced.[20]

Although clustering the standard errors by firm and year results in reliable inferences (Petersen 2009), it is still possible that our test statistics are overstated when different fiscal year-end firms are included in the sample. Since returns are measured four months after the fiscal year-end, annual return windows overlap for firms with different fiscal year-ends, resulting in "imperfect" time clustering. More importantly, given that returns are measured at different points in time, investors cannot exploit the information in these results using a trading strategy. For this reason, we repeat our tests for the sub-sample of December fiscal year-end firms, for which the return interval starts at the beginning of May. The December year-end sub-sample consists of 48,662 observations.

In Panel B of Table 3 we report results from estimating the symmetric two-equation MT (equations (1) and (2)) for December year-end firms. Similar to our previous results, columns 1-4 show evidence that accruals are over-weighted ($\alpha_1^* > \alpha_1$) and cash flows are under-weighted ($\alpha_2^* < \alpha_2$), rejecting market efficiency. However, when we cluster the standard errors by year (column 5) and by both firm and year (column 6), both accruals and cash flows appear rationally priced.[21]

Overall, the results in Table 3 demonstrate that correcting for the cross-sectional dependence of the residuals in the MT can change inferences concerning market efficiency. In particular, if standard errors are not clustered by time the MT t-statistics are biased upwards to the point that market efficiency with respect to cash flows is incorrectly rejected in the full sample. Clustering standard errors by firm in addition to year does not change inferences, consistent with the argument that firm effects are likely to be negligible when returns are the dependent variable (Petersen 2009).

[19] We capture unobserved fixed time effects by demeaning all variables within each year.

[20] Un-tabulated results show that the average persistence parameter λ_1 on current earnings in the regression $EARN_{t+1} = \lambda_0 + \lambda_1 EARN_t + u_{t+1}$ is 0.773, indicating that α_1 (= 0.525) < λ_1 < α_2 (= 0.880). Fixation on earnings implies that the pricing coefficient on both accruals (α_1^*) and cash flows (α_2^*) should be equal to 0.773, hence overweighting accruals and underweighting cash flows.

[21] Un-tabulated results document that the lack of significance for the accrual mispricing for December fiscal year-end firms is largely attributable to a decrease in the estimated mispricing of accruals (α_1^* - α_1) from 0.187 in Panel A to 0.148 in Panel B, rather than an increase in the standard errors for December fiscal year-end firms.

4.2 *Incorporating timely loss recognition*

We now turn to the question of whether incorporating asymmetric persistence in the MT affects inferences and possible explanations concerning the accrual anomaly. In particular, we examine whether investors anticipate the lower persistence of accruals in loss years arising from timely loss recognition. In Table 4 we report estimates of the two-equation MT after allowing for asymmetry in the persistence of accruals and cash flows conditional on loss and gain states (equations (3) and (4)). We employ economic loss proxies as defined in Table 2, based on the signs of CF, ΔCF, INDCF and ARET and we provide results based on all four proxies. However, because returns are more likely to misclassify good/bad news accruals if the information reflected in accruals is mispriced, we focus our discussion on results pertaining to the book proxies rather than ARET. To conserve space, we report results based on two-way clustered standard errors and year fixed effects, in light of the results reported in Table 3 indicating the sensitivity of inferences to the estimation of standard errors. Furthermore, we report results only for the full sample, but we also discuss our results based on December year-end firms.

The results in Table 4 provide strong evidence of asymmetry in the persistence of accruals. The persistence of accruals in gain states (α_1) averages approximately 0.56 across loss proxies. For every loss proxy, the incremental coefficient α_3 on ACC during loss years is significantly negative and economically substantial (e.g. up to one-fifth of the coefficient on accruals in non-loss years when INDCF < 0 is used as the loss proxy). This evidence is consistent with the transitory nature of accruals in loss years predicted under timely loss recognition. Similar to accruals, cash flows also display asymmetric persistence. For every loss proxy, cash flows in loss years are more persistent than cash flows in gain years, i.e. $\alpha_4 > 0$. This differential persistence is statistically significant at the five percent level under three proxies.

To provide an indication of the differential persistence between accruals and cash flows in different states, we compare statistically the persistence coefficients on the two earnings components in Table 4. For every loss proxy, accruals are less persistent than cash flows in both good news states ($\alpha_1 - \alpha_2 < 0$) and bad news states ($(\alpha_1 + \alpha_3) - (\alpha_2 + \alpha_4) < 0$). The persistence of accruals relative to cash flows declines when moving from the gain state to the loss state ($\alpha_3 - \alpha_4 < 0$ in all cases). This is relevant for testing the earnings fixation hypothesis. If earnings fixation explains the accrual mispricing, as argued by Shi and Zhang (2012), we would expect evidence of greater mispricing in loss years, when the differential persistence between accruals and cash flows is higher. Additionally if investors fixate on earnings, cash flows should also be mispriced, with the mispricing being higher in loss years.

The results provide evidence contradicting the earnings fixation hypothesis. When CF and INDCF are used as loss proxies, investors seem to at least partly understand the lower persistence of accruals in loss years ($\alpha_3^* < 0$). In all cases except for the ARET proxy, we fail to reject efficiency in the pricing of accruals in loss years at the five percent significance level.[22] In contrast, we do reject efficiency in the pricing of accruals in gain years, when differences in the persistence between accruals and cash flows are less pronounced. The difference in the magnitude of accrual mispricing between loss and gain years ($\alpha_3^* - \alpha_3$) is negative, contrary to the earnings fixation hypothesis. Only when the loss proxy is based on ARET do the results provide evidence of more significant accrual mispricing in loss years, consistent with Jiang (2007). However, even here the results fail to support the earnings fixation hypothesis because the accrual anomaly is significant in loss years only – there is no evidence that accruals are mispriced in gain years even though the persistence of accruals and cash flows differs.

Un-tabulated results for the December fiscal year-end firms continue to confirm the transitory nature of accruals in loss years. For every loss proxy other than CF the incremental coefficient α_3 on ACC during loss years is significantly negative and economically significant. Under all loss proxies, the persistence of accruals relative to cash flows declines in moving from the gain state to the loss state ($\alpha_3 - \alpha_4 < 0$ in all cases). Similar to the results in Table 4, under the CF, ΔCF and INDCF loss proxies, we reject the efficiency in pricing of accruals only in gain years, when differences in the persistence between accruals and cash flows are less pronounced. Again, only when the loss proxy is based on $ARET_t$ do the results provide evidence of significant accrual mispricing in loss years. These findings confirm our previous results and fail to support the earnings fixation hypothesis.

Overall, when examining the results for the four loss proxies, we fail to find a case where the predictions of the earnings fixation hypothesis are supported. In other words, in no case is there evidence of both significant accrual mispricing in gain years and mispricing being greater in loss years. Our results demonstrate that the explanation of the accrual anomaly is more complex than naïve earnings fixation.[23]

4.3 Incorporating differential pricing of accrual and cash flow surprises

We now modify the MT to allow the pricing of accrual and cash flow surprises to differ, providing a more direct test of the earnings fixation hypothesis. At this stage, we assume that the forecasting equations for accruals and cash flows are symmetric. In Table 5, we report results from estimating the three-equation MT (equations (5), (6) and (7)) for the full sample only, but we discuss results also for the December fiscal year-end sample. To allow for comparability with the results in Table 3, we report estimates under the six estimation approaches.

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[22] Under two loss proxies, the efficient pricing of accruals in loss years is rejected at the ten percent level.

[23] The results in Table 4 are qualitatively the same across the loss proxies when we repeat our tests on a constant sample of 70,759 observations including all fiscal year end firms and on a constant sample of 42,587 including December fiscal year-end firms only. Results are available on request.

In the three-equation MT specification, γ_1 and γ_2 are the forecasting parameters on ACC_t and CF_t respectively when we forecast ACC_{t+1}, while δ_1 and δ_2 are the forecasting parameters on ACC_t and CF_t respectively when we forecast CF_{t+1}. The forecasting equations results show that accruals and cash flows are both incrementally useful in predicting future accruals and future cash flows. Accrual forecasts are more sensitive to current period accruals than to current period cash flows ($\gamma_1 > \gamma_2$), although accruals display a relatively high level of mean reversion (γ_1 is approximately 0.3). In contrast, cash flow forecasts are more sensitive to current period cash flows than to current period accruals and the mean reversion of cash flows is relatively low (δ_2 is approximately 0.76).[24] Accruals significantly predict future cash flows ($\delta_1 = 0.225$), consistent with the role of accruals in reflecting revisions in cash flow expectations. Overall, these results confirm that accruals and cash flows have different persistence properties and they capture different information for predicting each other. Under these circumstances it is likely that rational stock market participants would value accruals and cash flows differently and that surprises in the two earnings components would also be priced differently.

The pricing equation results in Table 5 confirm this prediction. After the inclusion of year fixed effects the response coefficient on ACC (β_1) is 1.058 while the CF response coefficient is 1.435 (columns 3-6), indicating that CF surprises are valued higher than ACC surprises. Under all approaches to estimating standard errors, the difference between the pricing parameters $\beta_1 - \beta_2$ is highly statistically significant. This result indicates that investors distinguish between news relating to accruals and news relating to cash flows, contrary to the earnings fixation hypothesis. Un-tabulated results from estimating the three-equation MT for December fiscal year-end firms are qualitatively the same.

Although under this MT specification we can identify the forecasting parameters on ACC (γ_1 and δ_1) and CF (γ_2 and δ_2), the corresponding pricing parameters (γ_1^* and δ_1^*) and (γ_2^* and δ_2^*) are under-identified. For this reason, we test market efficiency by testing whether linear combinations of the rational forecasting coefficients equal linear combinations of the corresponding pricing coefficients, as described in Section 2.1. Similar to the results reported in Panel A of Table 3, the market efficiency tests in Table 5 demonstrate that after clustering the standard errors by year, or by firm and year, we no longer reject the rational pricing of cash flows. Results continue to indicate that accruals are mispriced, although market efficiency is only rejected at the five percent level. However, un-tabulated results for the December fiscal year-end sample show that after clustering the standard errors by year, or by firm and year, both accruals and cash flows are rationally priced, consistent with the results of Panel B in Table 3.

[24] Untabulated F-tests show that γ_1 is significantly different from γ_2 and δ_1 is significantly different from δ_2.

Overall, the results in Table 5 provide further evidence on whether the earnings fixation hypothesis can explain the accrual anomaly. In particular, our findings indicate that once differential pricing of accruals and cash flows is introduced, the earnings fixation hypothesis is not supported. Furthermore, clustering the standard errors by year in the modified three-equation MT significantly affects market efficiency inferences and the results no longer reject the rational pricing of cash flows.

4.4 Incorporating timely loss recognition with earnings components

We now examine the effects of allowing for the differential pricing of accrual and cash flow surprises when persistence is asymmetric. Table 6 show results obtained by estimating the three-equation MT (equations (9), (10) and (12)) using the full sample only. Because the results for the December fiscal year-end sample are qualitatively similar, our discussion focuses only on the full sample.

The forecasting equation results in Table 6 indicate that accruals and cash flows contain complementary information for forecasting the earnings components. Focusing first on the accrual forecasting equation, consistent with predictions based on timely loss recognition we find that in loss years accruals have considerably lower persistence than in gain years. For every loss proxy, the incremental coefficient γ_3 on ACC_t during loss years is significantly negative and economically important. For example, when CF is used as the loss proxy the change in accrual persistence in loss years is about one-third of the coefficient on accruals in gain years. While we do not have theoretical predictions concerning the incremental forecasting role of cash flows in predicting accruals, Table 6 also shows that cash flows are informative for future accruals ($\gamma_2 > 0$). However, there is no systematic evidence that the forecasting role of cash flows for accruals is asymmetric (γ_4 is insignificant in two out of four cases).

Turning to the cash flow forecasting equation, cash flows display high levels of persistence across all loss proxies (δ_2 is between 0.65 and 0.78 across the different proxies). Moreover, it appears that in loss years cash flow persistence tends to be higher than in gain years (δ_4 is significantly positive under two loss proxies). Further, as expected, accruals are a significant predictor for future cash flows (δ_1 is positive in all cases). However, in our sample there is only weak evidence of a significant incremental forecasting role of accruals for future cash flows in loss years (δ_3 is significantly negative in only one case).

In summary, the forecasting results of Table 6 suggest that the cash flow information complements accruals in forecasting both future accruals and future cash flows, and that asymmetry in accrual persistence is an important feature of the dynamics of accruals. The dynamics linking accruals and cash flows suggest that the pricing of the two earnings components is complex and depends on the differential persistence and forecasting relevance of the two components.

The pricing equation results confirm the findings in Table 5 that investors respond differently to accrual and cash flow surprises. Specifically, for every loss proxy, the accrual response coefficient is significantly lower than the cash flow response coefficient ($\beta_1 < \beta_2$), again indicating that investors are able to differentiate between accruals and cash flows. Inferences regarding the rational pricing of accruals and cash flows in gain and loss years are identical to those drawn from the asymmetric two-equation MT and fail to support a higher accrual mispricing in loss years, when the relative mean reversion of accruals is higher. In contrast, accrual mispricing appears to be driven by gain years. Again, this finding challenges the earnings fixation hypothesis explanation for the accrual anomaly.[25]

4.5 Portfolio analysis

In this subsection, we use portfolio analysis to test the robustness and the potential usefulness of our MT results. In particular, we test whether the returns to the accrual strategy are more pronounced in states of the world where accruals are found to be mispriced using the MT. Based on our results in Tables 5 and 6, we expect that, on average, the hedge portfolio returns on the accrual strategy will be significantly greater in years of economic gains relative to years of economic losses, when book-based measures are used as gain/loss proxies. Alternatively, when the gain/loss proxy is based on returns, our MT results suggest that the hedge portfolio returns on the accrual strategy will be more pronounced in years of economic losses.

To estimate the hedge portfolio returns we first classify our sample firms into deciles based on their accruals in each year and calculate yearly average one-year-ahead returns for each decile. We then compute averages of the decile returns over our sample period, for the full sample, and for gain and loss years separately.[26] We also compute the hedge portfolio return, i.e. the return to a portfolio with a long position in the lowest accrual decile and a short position in the highest accrual decile. In order to test a realistic accrual strategy, we restrict the sample to December fiscal year-end firms, similar to Sloan (1996) and Lev and Nissim (2006). To avoid the look-ahead bias inherent in the MT, we implement the strategy on a larger sample of 56,156 observations, where we require current period accruals to be

[25] The results in Table 6 are qualitatively the same across the loss proxies when we repeat our tests on a constant sample of 70,759 observations including all fiscal year end firms and on a constant sample of 42,587 including December fiscal year-end firms only. Results are available on request.

[26] Due to the high correlations between accruals and the gain/loss proxies, we choose to classify stocks into portfolios *before* conditioning on gain and losses. Although this approach results in unequal number of stocks across deciles in each year, the portfolios that we obtain are sufficiently large for the purposes of statistical testing (Maximum = 286, Minimum = 23 and Mean = 118). Our results remain qualitatively the same if we classify firms into portfolios after conditioning on gains/losses.

available, but not one-year-ahead earnings.[27] The sample is then allowed to vary depending on the availability of each gain/loss proxy.

The results are reported in Table 7. The first ten columns present the average returns for each accrual decile and the column "Hedge" shows the hedge portfolio return that is long in the lowest accrual decile and short in the highest accrual decile. The results show that the average return to the accrual strategy over our sample period is 3.9% but insignificant (p-value = 0.296), as in Shi and Zhang (2012). This finding is consistent with the decline in the accrual anomaly the recent years (Green et al. 2011). When we examine the hedge portfolio return for gain years only, the return rises to 10.4% (p-value = 0.021) under the CF proxy, to 6.8% (p-value = 0.103) under the ΔCF proxy and to 11.2% (p-value = 0.007) under the INDCF proxy. Contrary to the results in the MT, a strategy based on accruals in loss years identified using ARET yields a hedge return of 5.3% (p-value = 0.199). Un-tabulated results show that when we require future earnings, accruals and cash flows to be non-missing (as in the MT), the same strategy gives a marginally significant hedge return of 8.3% (p-value = 0.056). This difference in hedge returns demonstrates the importance of validating results obtained from the MT on a sample where survival is not required. Overall, our results suggest that the returns to the accrual anomaly increase in magnitude and significance for firms that are in good states, i.e. when CF_t, ΔCF_t or $INDCF_t$ are positive. These findings validate the usefulness of the MT in providing insights into the sources of market inefficiencies and provide evidence of significant positive hedge returns that might be exploitable by investors interested in trading on the accruals anomaly.

5. Conclusion

In this paper, we demonstrate that the test developed by Mishkin (1983) to examine the efficient pricing of accruals and cash flows can be more informative when it allows for the differential pricing of accrual and cash flow surprises; and when it allows for the effects of timely loss recognition on the persistence of accruals and cash flows. We also show that inferences from the MT when applied to panel data are sensitive to the treatment of correlation in residuals within years. The additional insights derived from the enhanced MT shed new light on the channels through which the apparent mispricing of accruals occurs.

We document a series of results indicating that the earnings fixation hypothesis is unlikely to explain the accrual anomaly. First, the pricing of accrual surprises is significantly lower than the pricing of cash flow surprises. This finding is consistent with the lower persistence of accruals and suggests that investors

[27] Additionally, we do not delete extreme observations in this sample.

rationally distinguish between the accrual and the cash flow component of earnings, contradicting the earnings fixation hypothesis. Second, when allowance is made for the timely recognition of economic losses relative to gains we find evidence that accruals (cash flows) in loss years are less (more) persistent than accruals in gain years. As a result, the differential persistence of accruals relative to cash flows in loss years becomes the highest. Yet the mispricing of accruals is concentrated in gain years, contrary to predictions of the earnings fixation hypothesis.

Finally, we demonstrate that the application of the MT in accounting is sensitive to the cross-sectional correlation of the residuals. While the default OLS standard errors in the MT reject the rational pricing of both accruals and cash flows, when we cluster the standard errors in the MT either by year, or by firm and year, the results no longer reject rational expectations with respect to cash flows.

While our results reject the fixation hypothesis as an explanation for the accrual anomaly, they do not explain why future returns are related to accruals in years of economic gains. Further research is necessary to distinguish between mispricing and risk explanations for the return predictability of accruals conditional on economic gains. Another interesting direction for future research would be to incorporate broader definitions of accruals in our testing framework, including operating, investing and financing components, which in aggregate have been shown to predict future returns more strongly (Richardson et al. 2005).

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Table 1: Descriptive Statistics

Panel A: Distribution of the main variables

	Mean	St.dev	25%	Median	75%
$EARN_{t+1}$	-0.034	0.200	-0.054	0.028	0.071
ACC_{t+1}	-0.072	0.121	-0.108	-0.054	-0.013
CF_{t+1}	0.038	0.162	-0.001	0.070	0.127
$EARN_t$	-0.024	0.189	-0.043	0.031	0.074
ACC_t	-0.062	0.113	-0.103	-0.051	-0.008
CF_t	0.038	0.163	-0.003	0.070	0.128
RET_{t+1}	0.144	0.836	-0.279	0.021	0.349
$ARET_{t+1}$	-0.006	0.790	-0.383	-0.100	0.189

Panel B: Correlations

	$EARN_{t+1}$	ACC_{t+1}	CF_{t+1}	$EARN_t$	ACC_t	CF_t	RET_{t+1}	$ARET_{t+1}$
$EARN_{t+1}$	1	0.590	0.796	0.732	0.230	0.691	0.133	0.142
ACC_{t+1}	0.405	1	-0.019	0.286	0.272	0.144	0.085	0.088
CF_{t+1}	0.673	-0.264	1	0.692	0.080	0.748	0.101	0.110
$EARN_t$	0.715	0.242	0.546	1	0.515	0.805	-0.013	0.000
ACC_t	0.165	0.311	-0.056	0.374	1	-0.094	-0.047	-0.038
CF_t	0.587	0.010	0.636	0.661	-0.310	1	0.018	0.026
RET_{t+1}	0.293	0.096	0.245	0.089	-0.029	0.137	1	0.947
$ARET_{t+1}$	0.309	0.095	0.256	0.102	-0.022	0.143	0.855	1

The table is based on the original sample of 80,803 firm-year observations for the period 1989-2011. Panel A reports the distribution of the main variables and Panel B reports Pearson (above diagonal) and Spearman (below diagonal) correlation statistics. The variables are defined as follows: EARN is income before extraordinary items and discontinued operations deflated by average total assets, CF is operating cash flow obtained from the cash flow statement minus extraordinary items and discontinued operations deflated by average total assets, ACC is accruals defined as EARN minus CF, ARET is the difference between a firm's annual buy and hold return over a 12-month period beginning four months after the firms' fiscal-year-end and the buy and hold return of the CRSP size-matched portfolio for the same 12-month period.

Table 2: Proxies for Gains and Losses

Panel A: Proxy definitions

Gain/Loss Proxy	Definition
Sign of the level of cash flows	$D_t = 1$ if $CF_t < 0$, 0 otherwise where CF_t = Cash flows in year t
Sign of change in cash flows	$D_t = 1$ if $\Delta CF_t < 0$, 0 otherwise where $\Delta CF_t = CF_t - CF_{t-1}$
Industry-adjusted cash flows	$D_t = 1$ if $INDCF_t < 0$, 0 otherwise where $INDCF_t = CF_t$ – median CF_t in the three-digit SIC industry
Abnormal returns	$D_t = 1$ if $ARET_t < 0$, 0 otherwise where $ARET_t$ = size-adjusted returns in year t

Panel B: Correlations for gain and loss proxies

	CF_t	ΔCF_t	$INDCF_t$	$ARET_t$
CF_t	1	0.328	0.917	0.091
ΔCF_t	0.352	1	0.345	0.117
$INDCF_t$	0.867	0.346	1	0.097
$ARET_t$	0.234	0.136	0.212	1

The table is based on the original sample of 80,803 firm-year observations for the period 1989-2011. Panel A provides the definitions of the four loss proxies and Panel B reports Pearson (above diagonal) and Spearman (below diagonal) correlation statistics of the proxies. The proxy variables are based on the following underlying variables: CF is operating cash flow obtained from the cash flow statement minus extraordinary items and discontinued operations deflated by average total assets, ARET is the difference between a firm's annual buy and hold return over a 12-month period beginning four months after the firms' fiscal-year-end and the buy and hold return of the CRSP size-matched portfolio for the same 12-month period.

Table 3: The two-equation MT: Linear forecasting models

$EARN_{t+1} = \alpha_0 + \alpha_1 ACC_t + \alpha_2 CF_t + v_{t+1}$

$ARET_{t+1} = \beta(EARN_{t+1} - \alpha_0^* - \alpha_1^* ACC_t - \alpha_2^* CF_t) + \varepsilon_{t+1}$

Panel A: All fiscal year-end firms

	1	2	3	4	5	6
Forecasting equation						
α_0	-0.035	-0.035	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	N/A	N/A	N/A	N/A
α_1	0.529	0.529	0.525	0.525	0.525	0.525
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
α_2	0.885	0.885	0.880	0.880	0.880	0.880
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$\alpha_1 - \alpha_2$	-0.356	-0.356	-0.355	-0.355	-0.355	-0.355
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pricing equation						
α^*_0	-0.014	-0.014	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	N/A	N/A	N/A	N/A
α^*_1	0.733	0.733	0.711	0.711	0.711	0.711
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
α^*_2	0.794	0.794	0.793	0.793	0.793	0.793
	(0.000)	(0.000)	(0.000)	(0.000)	0.000	(0.000)
β	1.223	1.223	1.224	1.224	1.224	1.224
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market efficiency restrictions						
ACC	0.205	0.205	0.187	0.187	0.187	0.187
$\alpha_1^* - \alpha_1$	(0.000)	(0.000)	(0.000)	(0.000)	(0.038)	(0.037)
CF	-0.091	-0.091	-0.087	-0.087	-0.087	-0.087
$\alpha_2^* - \alpha_2$	(0.000)	(0.000)	(0.000)	(0.000)	(0.330)	(0.329)
Standard errors	Standard	White	White	By firm	By year	Two way
Year demeaning	No	No	Yes	Yes	Yes	Yes

Table 3: The two-equation MT: Linear forecasting models (cont.…)

Panel B: December fiscal year-end firms

	1	2	3	4	5	6
Forecasting equation						
α_0	-0.037	-0.037	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	N/A	N/A	N/A	N/A
α_1	0.523	0.523	0.517	0.517	0.517	0.517
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
α_2	0.895	0.895	0.888	0.888	0.888	0.888
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$\alpha_1 - \alpha_2$	-0.372	-0.372	-0.372	-0.372	-0.372	-0.372
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pricing equation						
α^*_0	-0.017	-0.017	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	N/A	N/A	N/A	N/A
α^*_1	0.696	0.696	0.665	0.665	0.665	0.665
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
α^*_2	0.812	0.812	0.809	0.809	0.809	0.809
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
β	1.163	1.163	1.152	1.152	1.152	1.152
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market efficiency restrictions						
ACC	0.173	0.173	0.148	0.148	0.148	0.148
$\alpha_1^* - \alpha_1$	(0.000)	(0.000)	(0.000)	(0.000)	(0.125)	(0.124)
CF	-0.083	-0.083	-0.080	-0.080	-0.080	-0.080
$\alpha_2^* - \alpha_2$	(0.000)	(0.006)	(0.006)	(0.006)	(0.481)	(0.480)
Standard errors	Standard	White	White	By firm	By year	Two way
Year demeaning	No	No	Yes	Yes	Yes	Yes

The table reports results from the two-equation MT for the time period 1989-2011. Panel A refers to all fiscal year-end firms (80,803 observations) and Panel B refers to December fiscal year-end firms (48,662 observations). The sample in each panel remains the same for each specification. The variables are defined as follows: EARN is income before extraordinary items and discontinued operations deflated by average total assets, CF is operating cash flow obtained from the cash flow statement minus extraordinary items and discontinued operations deflated by average total assets, ACC is accruals defined as EARN minus CF, ARET is the difference between a firm's annual buy and hold return over a 12-month period beginning four months after the firms' fiscal-year-end and the buy and hold return of the CRSP size-matched portfolio for the same 12-month period. P-values are reported in parentheses. In columns 3-6, p-values for the intercepts are not applicable, because by year demeaning results in zero intercepts by construction.

Table 4: The two-equation MT: Piece-wise linear forecasting models, all fiscal year-end firms

$EARN_{t+1} = \alpha_0 + \alpha_{01}D_t + \alpha_1 ACC_t + \alpha_2 CF_t + \alpha_3\, ACC_t \,.\, D_t + \alpha_4\, CF_t \,.\, D_t + v_{t+1}$

$ARET_{t+1} = \beta(EARN_{t+1} - \alpha_0^* - \alpha_{01}^* D_t - \alpha_1^* ACC_t - \alpha_2^* CF_t - \alpha_3^* ACC_t \,.\, D_t - \alpha_4^* CF_t \,.\, D_t) + \varepsilon_{t+1}$

Loss proxy	CF_t<0	ΔCF_t<0	$INDCF_t$<0	$ARET_t$<0
Forecasting equation				
α_1	0.543	0.541	0.591	0.562
	(0.000)	(0.000)	(0.000)	(0.000)
α_2	0.721	0.896	0.779	0.850
	(0.000)	(0.000)	(0.000)	(0.000)
α_3	-0.077	-0.038	-0.121	-0.072
	(0.017)	(0.005)	(0.000)	(0.000)
α_4	0.173	0.022	0.141	0.023
	(0.000)	(0038)	(0.000)	(0.086)
Differential persistence				
$\alpha_1 - \alpha_2$	-0.178	-0.355	-0.189	-0.288
	(0.000)	(0.000)	(0.000)	(0.000)
$\alpha_1 + \alpha_3 - (\alpha_2 + \alpha_4)$	-0.428	-0.415	-0.451	-0.382
	(0.000)	(0.000)	(0.000)	(0.000)
$\alpha_3 - \alpha_4$	-0.250	-0.060	-0.262	-0.094
	(0.000)	(0.000)	(0.000)	(0.000)
Pricing equation				
α_1^*	0.875	0.770	0.868	0.613
	(0.000)	(0.000)	(0.000)	(0.000)
α_2^*	0.783	0.769	0.849	0.715
	(0.000)	(0.000)	(0.000)	(0.000)
α_3^*	-0.321	-0.072	-0.251	0.101
	(0.010)	(0.189)	(0.000)	(0.243)
α_4^*	0.118	0.152	0.002	0.089
	(0.375)	(0.037)	(0.979)	(0.188)
β	1.221	1.305	1.228	1.243
	(0.000)	(0.000)	(0.000)	(0.000)

Table 4 (cont….)

Market efficiency restrictions				
ACC| gain	0.331	0.229	0.278	0.052
$\alpha_1^* - \alpha_1$	(0.022)	(0.005)	(0.010)	(0.536)
ACC| loss	0.087	0.195	0.148	0.224
$\alpha_1^* + \alpha_3^* - (\alpha_1 + \alpha_3)$	(0.175)	(0.072)	(0.072)	(0.013)
CF| gain	0.062	-0.128	0.069	-0.134
$(\alpha_2^* - \alpha_2)$	(0.623)	(0.071)	(0.435)	(0.043)
CF| loss	0.006	0.003	-0.070	-0.068
$\alpha_2^* + \alpha_4^* - (\alpha_2 + \alpha_4)$	(0.946)	(0.981)	(0.487)	(0.500)
Incremental ACC and CF mispricing				
ACC	-0.244	-0.034	-0.130	0.173
$\alpha_3^* - \alpha_3$	(0.070)	(0.548)	(0.047)	(0.049)
CF	-0.055	0.130	-0.140	0.066
$\alpha_4^* - \alpha_4$	(0.702)	(0.074)	(0.033)	(0.366)
N(full sample)	80,803	71,233	80,287	80,782
N(loss)	20,646	35,807	39,007	48,180

The table reports results from the two-equation MT that incorporates conditional conservatism. The MT is estimated for all fiscal year-end firms in the time period 1989-2011 (80,803 observations). The variables are defined as follows: EARN is income before extraordinary items and discontinued operations deflated by average total assets, CF is operating cash flow obtained from the cash flow statement minus extraordinary items and discontinued operations deflated by average total assets, ACC is accruals defined as EARN minus CF, ARET is the difference between a firm's annual buy and hold return over a 12-month period beginning four months after the firms' fiscal-year-end and the buy and hold return of the CRSP size-matched portfolio for the same 12-month period. D is a dummy variable that takes the value of 1 for economic losses and zero otherwise. The proxies for economic losses are negative values of either CF, ΔCF (change in CF), INDCF (industry-adjusted CF) and ARET. Standard errors are clustered by firm-year after by year demeaning of the variables. P-values are reported in parentheses.

Table 5: The three-equation MT: Linear forecasting models, all fiscal year-end firms

$ACC_{t+1} = \gamma_0 + \gamma_1 ACC_t + \gamma_2 CF_t + \nu_{1,t+1}$

$CF_{t+1} = \delta_0 + \delta_1 ACC_t + \delta_2 CF_t + \nu_{2,t+1}$

$ARET_{t+1} = \beta_1 ACC_{t+1} + \beta_2 CF_{t+1} - (\kappa_0^* - \kappa_1^* ACC_t - \kappa_2^* CF_t) + \varepsilon_{t+1}$

	1	2	3	4	5	6
Forecasting equations						
γ_0	-0.058	-0.058	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	N/A	N/A	N/A	N/A
γ_1	0.310	0.310	0.300	0.300	0.300	0.300
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
γ_2	0.127	0.127	0.123	0.123	0.123	0.123
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
δ_0	0.023	0.023	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	N/A	N/A	N/A	N/A
δ_1	0.218	0.218	0.225	0.225	0.225	0.225
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
δ_2	0.758	0.758	0.757	0.757	0.757	0.757
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pricing equation						
κ_0^*	-0.002	-0.002	0.000	0.000	0.000	0.000
	(0.580)	(0.603)	N/A	N/A	N/A	N/A
κ_1^*	0.892	0.892	0.868	0.868	0.868	0.868
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
κ_2^*	1.118	1.118	1.110	1.110	1.110	1.110
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
β_1	1.051	1.051	1.058	1.058	1.058	1.058
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
β_2	1.446	1.446	1.435	1.435	1.435	1.435
	(0.000)	(0.000)	0.000	0.000	0.000	0.000
$\beta_1 - \beta_2$	-0.395	-0.395	-0.377	-0.377	-0.377	-0.377
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market efficiency restrictions						
ACC	0.251	0.251	0.228	0.228	0.228	0.228
$\kappa_1^* - (\gamma_1\beta_1 + \delta_1\beta_2)$	(0.000)	0.000	(0.000)	(0.000)	(0.044)	(0.044)
CF	-0.112	-0.112	-0.107	-0.107	-0.107	-0.107
$\kappa_2^* - (\gamma_2\beta_1 + \delta_2\beta_2)$	(0.000)	(0.000)	(0.000)	(0.000)	(0.320)	(0.319)
Standard errors	Standard	White	White	By firm	By year	Two way
Year demeaning	No	No	Yes	Yes	Yes	Yes

The table reports results from the three-equation MT, estimated for all fiscal year-end firms in the time period 1989-2011 (80,803 observations). The sample in each panel remains the same for each specification. The variables are defined as follows: EARN is income before extraordinary items and discontinued operations deflated by average total assets, CF is operating cash flow obtained from the cash flow statement minus extraordinary items and discontinued operations deflated by average total assets, ACC is accruals defined as EARN minus CF, ARET is the difference between a firm's annual buy and hold return over a 12-month period beginning four months after the firms' fiscal-year-end and the buy and hold return of the CRSP size-matched portfolio for the same 12-month period. P-values are reported in parentheses. In columns 3-6, p-values for the intercepts are not applicable, because by year demeaning results in zero intercepts by construction.

Table 6: The three-equation MT: Piece-wise linear forecasting models, all fiscal year-end firms

$ACC_{t+1} = \gamma_0 + \gamma_{01}D_t + \gamma_1 ACC_t + \gamma_2 CF_t + \gamma_3 ACC_t \,.\, D_t + \gamma_4 CF_t \,.\, D_t + v_{1,t+1}$

$CF_{t+1} = \delta_0 + \delta_{01}D_t + \delta_1 ACC_t + \delta_2 CF_t + \delta_3 ACC_t \,.\, D_t + \delta_4 CF_t \,.\, D_t + v_{2,t+1}$

$ARET_{t+1} = \beta_1 ACC_{t+1} + \beta_2 CF_{t+1} - (\kappa_0^* - \kappa_{01}^* D_t - \kappa_1^* ACC_t - \kappa_2^* CF_t - \kappa_3^* ACC_t \,.\, D_t - \kappa_4^* CF_t \,.\, D_t) + \varepsilon_{t+1}$

Loss proxy	CF_t<0	ΔCF_t<0	$INDCF_t$<0	$ARET_t$<0
Forecasting equations				
γ_1	0.363	0.337	0.360	0.332
	(0.000)	(0.000)	(0.000)	(0.000)
γ_2	0.074	0.116	0.051	0.087
	(0.000)	(0.000)	(0.014)	(0.000)
γ_3	-0.121	-0.040	-0.092	-0.062
	(0.000)	(0.001)	(0.000)	(0.000)
γ_4	0.026	0.004	0.071	0.037
	(0.190)	(0.734)	(0.000)	(0.004)
δ_1	0.180	0.204	0.231	0.229
	(0.000)	(0.000)	(0.000)	(0.000)
δ_2	0.647	0.780	0.728	0.763
	(0.000)	(0.000)	(0.000)	(0.000)
δ_3	0.044	0.002	-0.029	-0.009
	(0.023)	(0.869)	(0.051)	(0.596)
δ_4	0.148	0.018	0.071	-0.014
	(0.000)	(0.087)	(0.000)	(0.333)
Pricing equation				
κ_1^*	1.045	0.993	1.055	0.755
	(0.000)	(0.000)	(0.000)	(0.000)
κ_2^*	1.083	1.166	1.194	1.035
	(0.000)	(0.000)	(0.000)	(0.000)
κ_3^*	-0.362	-0.086	-0.299	0.134
	(0.020)	(0.223)	(0.001)	(0.231)
κ_4^*	0.172	0.202	0.005	0.102
	(0.287)	(0.049)	(0.941)	(0.240)
β_1	1.051	1.130	1.055	1.076
	(0.000)	(0.000)	(0.000)	(0.000)
β_2	1.437	1.540	1.449	1.454
	(0.000)	(0.000)	(0.000)	(0.000)
$\beta_1 - \beta_2$	-0.386	-0.410	-0.394	-0.378
	(0.000)	(0.000)	(0.000)	(0.000)

Table 6 (cont….)

Market efficiency restrictions				
ACC| gain	0.404	0.298	0.341	0.064
$\kappa_1^* - (\gamma_1\beta_1 + \delta_1\beta_2)$	(0.027)	(0.008)	(0.015)	(0.533)
ACC| loss	0.106	0.254	0.181	0.279
$\kappa_1^*+\kappa_3^*-[(\gamma_1+\gamma_3)\beta_1+(\delta_1+\delta_3)\beta_2]$	(0.177)	(0.080)	(0.078)	(0.019)
CF| gain	0.076	-0.167	0.085	-0.167
$\kappa_2^* - (\gamma_2\beta_1+\delta_2\beta_2)$	(0.625)	(0.063)	(0.442)	(0.038)
CF| loss	0.008	0.004	-0.086	-0.085
$\kappa_2^*+\kappa_4^*-[(\gamma_2+\gamma_4)\beta_1+(\delta_2+\delta_4)\beta_2]$	(0.946)	(0.981)	(0.480)	(0.493)
Incremental ACC and CF mispricing				
ACC	-0.298	-0.044	-0.160	0.215
$\kappa_3^* - (\gamma_3\beta_1+\delta_3\beta_2)$	(0.079)	(0.549)	(0.057)	(0.064)
CF	-0.068	0.170	-0.171	0.082
$\kappa_4^* - (\gamma_4\beta_1+\delta_4\beta_2)$	(0.701)	(0.087)	(0.031)	(0.375)
N(full sample)	80,803	71,233	80,287	80,782
N(loss)	20,646	35,807	39,007	48,180

The table reports results from the three-equation MT that incorporates conditional conservatism. The MT is estimated for all fiscal year-end firms in the time period 1989-2011 (80,803 observations). The variables are defined as follows: EARN is income before extraordinary items and discontinued operations deflated by average total assets, CF is operating cash flow obtained from the cash flow statement minus extraordinary items and discontinued operations deflated by average total assets, ACC is accruals defined as EARN minus CF deflated by average total assets, ARET is the difference between a firm's annual buy and hold return over a 12-month period beginning four months after the firms' fiscal-year-end and the buy and hold return of the CRSP size-matched portfolio for the same 12-month period. D is a dummy variable that takes the value of 1 for economic losses and zero otherwise. The proxies for economic losses are negative values of either CF, ΔCF (change in CF), INDCF (industry-adjusted CF) and ARET. Standard errors are clustered by firm-year after by year demeaning of the variables. P-values are reported in parentheses.

Table 7: Portfolio tests based on December fiscal year end firms

	Ranking on ACC										
	Lowest	2	3	4	5	6	7	8	9	Highest	Hedge
Full sample	-0.031	0.021	0.023	0.007	0.011	-0.004	0.003	-0.006	-0.020	-0.070	0.039
n=56,156	(0.425)	(0.571)	(0.378)	(0.613)	(0.329)	(0.669)	(0.829)	(0.646)	(0.209)	(0.017)	(0.296)
$CF_t < 0$	Lowest	2	3	4	5	6	7	8	9	Highest	Hedge
Gain	0.058	0.053	0.048	0.027	0.023	0.006	0.014	-0.010	-0.013	-0.046	0.104
n = 40,066	(0.142)	(0.105)	(0.054)	(0.029)	(0.072)	(0.679)	(0.201)	(0.508)	(0.372)	(0.041)	(0.021)
Loss	-0.133	-0.052	-0.045	-0.108	-0.054	-0.050	-0.060	0.012	-0.028	-0.067	-0.066
n = 16,090	(0.007)	(0.402)	(0.444)	(0.019)	(0.156)	(0.301)	(0.224)	(0.781)	(0.435)	(0.096)	(0.187)
$\Delta CF_t < 0$	Lowest	2	3	4	5	6	7	8	9	Highest	Hedge
Gain	-0.006	0.034	0.038	0.011	0.014	-0.012	0.001	-0.036	-0.018	-0.075	0.068
n = 26,379	(0.849)	(0.278)	(0.093)	(0.430)	(0.248)	(0.279)	(0.927)	(0.077)	(0.424)	(0.048)	(0.103)
Loss	-0.052	0.001	0.020	0.014	0.016	0.008	0.010	0.015	-0.016	-0.054	0.002
n = 26,470	(0.304)	(0.985)	(0.602)	(0.511)	(0.297)	(0.569)	(0.513)	(0.386)	(0.320)	(0.046)	(0.958)
$INDCF_t < 0$	Lowest	2	3	4	5	6	7	8	9	Highest	Hedge
Gain	0.062	0.054	0.031	0.025	0.017	0.013	0.027	-0.015	-0.009	-0.050	0.112
n = 28,516	(0.051)	(0.091)	(0.031)	(0.025)	(0.214)	(0.299)	(0.107)	(0.362)	(0.609)	(0.024)	(0.007)
Loss	-0.093	-0.025	0.005	-0.031	0.000	-0.026	-0.020	0.000	-0.027	-0.069	-0.025
n = 27,386	(0.072)	(0.642)	(0.927)	(0.280)	(0.997)	(0.218)	(0.266)	(0.979)	(0.144)	(0.053)	(0.593)
$ARET_t < 0$	Lowest	2	3	4	5	6	7	8	9	Highest	Hedge
Gain	-0.035	-0.006	0.022	0.019	0.001	-0.002	0.012	0.011	0.009	-0.041	0.006
n = 22,481	(0.344)	(0.742)	(0.471)	(0.245)	(0.931)	(0.860)	(0.461)	(0.593)	(0.587)	(0.115)	(0.879)
Loss	-0.037	0.025	0.020	-0.002	0.015	-0.007	-0.003	-0.016	-0.038	-0.090	0.053
n = 33,653	(0.403)	(0.631)	(0.635)	(0.921)	(0.352)	(0.705)	(0.876)	(0.447)	(0.093)	(0.037)	(0.199)

The table shows returns for 10 portfolios formed based on accruals for a sample of 56,156 observations over the period 1989 - 2011. It also shows returns for accrual portfolios in gain and loss years separately under different gain/loss proxies. *Hedge* is the return to the hedge portfolio with a long position in the lowest accrual portfolio and a short position in the highest accrual portfolio. The proxies for economic losses/gains are negative/positive values of either CF, ΔCF (change in CF), INDCF (industry-adjusted CF) and ARET. P-values are reported in parentheses.