Earnings Volatility, Earnings Management, and Equity Value

Alister Hunt
Susan E. Moyer
Terry Shevlin

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Abstract

We test whether the coefficient on earnings (the earnings multiplier) in a regression of price on earnings varies as a function of the volatility of cash flows, volatility of nondiscretionary earnings and volatility of reported earnings. The purpose of the test is to examine whether discretionary earnings smoothing (a particular form of earnings management) increases or decreases the informativeness of earnings, as reflected in the earnings multiplier. Our results are consistent with discretionary earnings smoothing increasing the informativeness of earnings. Alternative explanations for the result are explored.

Corresponding author: Terry Shevlin
Department of Accounting, University of Washington
Box, 353200, Seattle, WA 98195-3200
Phone (206) 543-7223; Fax (206) 685-9392
E-mail: shevlin@u.washington.edu

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Alister Hunt, University of Washington
Susan E. Moyer, Seattle University
Terry Shevlin, University of Washington

ABSTRACT

Using a sample of firm-years from 1983 to 1992, we find that lower earnings volatility is associated with higher market value of equity, even after controlling for operating cash flow volatility. Although these findings are consistent with accrual accounting improving the ability of earnings to measure performance, they do not directly address whether discretionary earnings smoothing raises or lowers earnings' informativeness. We examine whether management discretion reflected in earnings smoothing is associated with equity value.

To address this issue, we partition total accruals into their nondiscretionary and discretionary components and estimate the effects on earnings volatility of these two components. We then test whether stock market participants distinguish between earnings smoothness arising from nondiscretionary accrual accounting practices and smoothness arising from discretionary accruals management. Our results indicate that lower earnings volatility arising from both accrual accounting practices and accruals management is associated with higher market value of equity. Further, these two sources of earnings volatility are valued differently. This evidence is consistent with an information signalling hypothesis in which managers use earnings smoothing to signal their private information about future firm prospects. These results are not consistent with managers opportunistically adjusting earnings to transfer wealth from shareholders to themselves; in an efficient market, opportunistic earnings smoothing will not be positively related to equity value.

The evidence that earnings smoothing is associated with higher equity value could also be interpreted as being consistent with a functional fixation hypothesis in which the stock market is not efficient and mechanically focuses on reported smoothed earnings. Under this hypothesis, managers conceal poor performance by smoothing earnings, opportunistically increasing their wealth. To distinguish between the functional fixation and information signalling hypotheses, we test whether earnings smoothed by operating cash flows, nondiscretionary accruals, or discretionary accruals are associated with smaller subsequent changes in equity risk, greater future leverage growth, more predictable future earnings, and/or larger future changes in equity cash flows. Our results indicate that each source of current earnings smoothness is significantly related to several measures of subsequent firm performance. Thus, we interpret our results as being consistent with the information signalling hypothesis.

Earnings Volatility, Earnings Management, and Equity Value

1. Introduction

Corporate managers have discretion in applying generally accepted accounting principles (GAAP). The purpose of this paper is to examine how stockholders interpret current period earnings which reflect one form of earnings management, intertemporal earnings smoothing.[1] This research question is of fundamental importance since it addresses whether the current level of accounting discretion allowed by GAAP can contribute to earnings informativeness. As noted by Schipper (1989), "research results to date have not shed any light on the issue of whether some change in the amount of managerial discretion might even add to the informativeness of accounting earnings." (p. 91)[2]

It is well documented that earnings are incrementally informative to operating cash flows (see, for example, Bowen, Burgstahler, and Daley 1987, and Dechow 1994). However, as noted by Subramanyan (1996), this result does not address the effect of accounting discretion on the informativeness of earnings. Subramanyan (1996) decomposes total accruals into nondiscretionary and discretionary components (using the Jones (1991) model) and documents, in regressions using annual security returns, that discretionary accruals have both relative and incremental explanatory power to operating cash flows and nondiscretionary accruals.[3] He conjectures that this result is due to managers using discretionary accruals to remove temporary fluctuations in earnings, thus

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[1] For purposes of this paper, we define intertemporal income smoothing as actions by managers which reduce the time-series variability in reported earnings. For a summary of early evidence on intertemporal earnings smoothing, see Ronen and Sadan (1981). For more recent evidence, see Gaver, Gaver, and Austin (1995) and Hunt, Moyer, and Shevlin (1996).

[2] See also Dye and Verrecchia (1995) for a theoretical approach to this issue. They state "... whether expanding discretion in accounting choice is desirable appears to depend on whether the prospects for improved communication of the firm's financial condition are more than offset by the effects of managerial opportunism." (p. 390)

[3] Several recent papers report results consistent with positive pricing of the discretionary component of banks' loan loss provisions. See, for example, Wahlen (1994), Liu and Ryan (1995), and Liu, Ryan, and Wahlen (1995). We also briefly discuss in the concluding section contemporaneous research that focuses on the informativeness of single period earnings management.

smoothing earnings. Although Subramanyan reports results consistent with discretionary accruals smoothing reported earnings, he does not directly examine the effects of discretionary earnings smoothing on the pricing of earnings. We provide direct tests of the pricing effects of earnings smoothing. In addition, we provide a rationale for these pricing effects by presenting a discussion of some theoretical models that predict firms with superior prospects will smooth reported earnings. We refer to this rationale as the informativeness hypothesis.

Our research design regresses the market value of equity on current annual reported earnings, allowing the multiplier on earnings to vary as a function of a) operating cash flow volatility, and b) earnings volatility, decomposed into nondiscretionary and discretionary accrual effects.[4] This regression allows us to assess the effects of discretionary earnings smoothing on the earnings multiplier. We estimate our earnings volatility measures over a five-year period for each firm since we focus on the valuation implications of firms adopting a longer-term earnings management strategy of intertemporal earnings smoothing.

Based on a sample of firm-years from 1982 to 1994, our market value regression results indicate that a reduction in earnings volatility arising from discretionary accruals management is associated with a higher multiplier on current period earnings. This result is inconsistent with the view that earnings smoothing reflects managers opportunistically adjusting earnings to transfer wealth from shareholders to themselves. However, while the higher multiplier is consistent with increased earnings informativeness (Chaney and Lewis 1995, Ronen and Sadan 1981, Watts and Zimmerman 1986), the design reflects a joint test of the informativeness hypothesis and two maintained assumptions: the model(s) partitioning accruals into discretionary and nondiscretionary accruals are well specified and the market is efficient. Further tests indicate that the estimated coefficient

[4] Note that we define both the discretionary and nondiscretionary earnings smoothing measures to be larger when the reduction in earnings volatility due to these effects is relatively large.

on the discretionary earnings smoothing variable is generally significantly larger than that on the nondiscretionary smoothing variable, consistent with the reasonableness of our maintained assumptions. We also conduct several analyses to assess the impact of alternative means of classifying firms into nondiscretionary and discretionary earnings smoothers. Our results are robust across alternative models for partitioning accruals, mitigating concern that the positive coefficient on discretionary earnings smoothing arises from measurement error in those partitions. However, since discretionary and nondiscretionary accruals are inherently unobservable, we can not rule out this alternative with certainty.[5]

To further evaluate the relation between smoothing and earnings informativeness, we regress the earnings volatility measures on future profitability and risk proxies. Observing no associations between earnings smoothing and these variables (or associations not in the predicted direction) lends credence to a market inefficiency, or functional fixation, explanation for our market value regression results. However, the results of these regressions are consistent with managers signaling information about profitability as presented in Chaney and Lewis (1995) and Ronen and Sadan (1981) and, to a lesser extent, with managers signaling information about lower future risk (as proxied by the standard deviation of security returns, but not market model beta).

In the next section, we develop and present our hypotheses. In Section 3, we describe our sample and present descriptive statistics for the regression variables. Empirical estimates of the market value model are presented in Section 4. In section 5, we examine the relation between each source of earnings smoothness and measures of future firm

5 While we use the latest methodology in partitioning total accruals into nondiscretionary and discretionary components, the methodology is not without critics. See for example, Dechow, Sloan, and Sweeney 1995, Hansen 1996, and Guay, Kothari, and Watts 1996. While we concur with these authors that the accruals models likely result in measurement errors in the partitioning, specifically that some nondiscretionary accruals are classified as discretionary (see also Bernard and Skinner 1996), we dispute their conclusions that the models lead to biased results. The authors, especially Dechow et al. and Hansen, arrive at this conclusion based on arguable maintained assumptions, either that smoothing is absent (Dechow et al.) or that all discretionary accruals are the result of opportunism (Hansen specifically excludes information signaling in developing his predictions).

profitability and risk. In the final section of the paper, we summarize and evaluate our findings.

2. Hypothesis Development

In this section we develop and present predictions about the relation between earnings smoothing and the multiplier applied to current period earnings by market participants. To facilitate development, we first present our empirical model.

2.1 Market Value and Earnings Volatility

We assume the market value of equity can be expressed as the present value of expected future dividends (including any liquidation dividends):

$$MVE_t = \sum_{\tau=1}^{\infty} E_t(D_{t+\tau})/(1+r)^{\tau} \tag{1}$$

where MVE_t is the market value of equity at date t, $D_{t+\tau}$ are dividends at date $t+\tau$, r is the discount rate, and $E_t(.)$ is the expected value operator conditioned on date t information.

In this setting, current period earnings are informative (defined as value-relevant) if they help investors predict future dividends and/or the discount rate. A simple model commonly used to assess the informativeness of earnings and other accounting disclosures is:

$$MVE = \beta_0 + \gamma_1 \text{ NI} + \varepsilon \tag{2}$$

where NI denotes net income or earnings.[6]

Since we want to examine the role of earnings smoothing in firm valuation, we model the slope coefficient in (2) as

$$\gamma_1 = \beta_1 + \beta_2 \, \sigma(\text{CFFO}) + \beta_3 \text{ DACCTG} + \beta_4 \text{ DMGMT} \tag{3}$$

where σ(CFFO) equals the standard deviation of cash flow from operations, DACCTG represents the incremental effect on cash flow, and therefore earnings, volatility of nondiscretionary accruals, and DMGMT represents the incremental effect on earnings volatility of discretionary accruals. As detailed later, DACCTG and DMGMT are

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6 See, for example, Barth, Beaver, and Wolfson (1990), Barth, Beaver, and Landsman (1992), and Barth (1994). We omit firm and time subscripts from the variables and the residual term for notational convenience.

dummy variables set to one when the reduction in earnings volatility due to each source is relatively large. Substituting equation (3) into (2) gives

$$\text{MVE} = \beta_0 + \beta_1 \text{ NI} + \beta_2 \text{ NI} \cdot \sigma(\text{CFFO}) + \beta_3 \text{ NI} \cdot \text{DACCTG} + \beta_4 \text{ NI} \cdot \text{DMGMT} + \varepsilon. \quad (4)$$

In this design, the three sources of volatility are viewed as parameters affecting the valuation of current period earnings. We do not examine the effect of *current period* discretionary accruals management on either current earnings or on the volatility of earnings. Rather we examine the effect of earnings smoothing on the earnings multiplier, also known as the earnings response coefficient, ERC, (see Kothari and Zimmerman (1995) for a discussion of the relation between the coefficient on earnings in a returns versus price regression). It is well documented that the ERC varies as a function of persistence, predictability, and risk. It might be argued that our model in (4) is misspecified because these determinants of ERC are not included as control variables. However, we strongly argue that our model is appropriately specified and we deliberately omit these other determinants. Suppose discretionary earnings smoothing removes transitory components from earnings and leads to reported earnings being more persistent. In fact, evidence reported below in Table 6 and in Subramanyan (1996) is consistent with this argument. If we were to include persistence as a 'control' variable, then the very effect we are studying would be controlled away and we would falsely conclude that discretionary smoothing is irrelevant and ignored by the market, when smoothing increases the persistence and informativeness of earnings. Similar arguments apply to predictability and risk. Thus, we do not include these variables as 'control' variables.

Since we are interested in the incremental effects of accrual accounting on earnings volatility, we include cash flow volatility to control for cross-sectional differences in earnings volatility arising from this source.[7] The coefficient β_2 is predicted to be

[7] The variability of operating cash flows is, to some extent, subject to managers' discretionary operating, investing, and financing decisions. We focus on discretionary smoothing which can be achieved through the accrual accounting system and leave for future research an examination of discretionary management of cash flow volatility.

negative, because increased cash flow volatility is either positively associated with priced (that is, nondiversifiable) firm risk or negatively associated with firm longevity. Holding all else equal, as the variability of operating cash flows increases, the probability of bankruptcy increases; cash flow realizations are more likely to be low enough that the going concern assumption is violated. Investors are likely to discount expected cash flows using a shorter horizon and/or a higher discount rate, so that a given level of net income exhibits a lower multiplier (Subramanyam and Wild (1996)). Further, given the extant evidence on the incremental information content of the level of operating cash flow (e.g., see Wilson (1987), Bowen, Burgstahler, and Daley (1987), Bernard and Stober (1989), and Dechow (1994)), it is not unreasonable to predict that the volatility of operating cash flows is likely to be relevant for pricing earnings. We examine an expanded information role for cash flow and accruals measures, where the *variance* of each measure is predicted to provide information relevant to equity valuation.

If, as claimed by the FASB, financial accounting based on the accrual accounting model is intended to help investors "assess the amounts, timing, and uncertainty of prospective net cash flows to the related enterprise" (Statement of Financial Accounting Concepts No.1 Para 37) and the volatility of nondiscretionary accrual net income helps investors make their assessments, then we predict a positive coefficient, β_3, on the DACCTG interaction term.[8]

We now turn to a discussion of theoretical models that provide predictions about the expected signs on the DMGMT interaction term in the empirical model in equation (4). We first discuss models which predict earnings smoothing is associated with an increased multiplier on current period earnings and then discuss a competing prediction.

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8 Black (1993) argues that smoothed earnings should be the goal of accrual accounting (so that earnings better reflects the variability in firm value). Based on his arguments, lower earnings variability arising from accrual accounting is thus predicted to result in a higher multiplier on current period earnings. Further note that Black argues this smoothing should arise from accounting rules "without giving managers or accountants more discretion, and without increasing anyone's opportunities to distort earnings" (p.4). Thus, although Black favors earnings smoothing, he appears to favor smoothing arising from nondiscretionary accruals.

2.2 Earnings Smoothing to Increase Informativeness

Chaney and Lewis (1995) develop a model in which the managers of high quality firms smooth reported earnings to convey their private information. In this setting, earnings smoothing is hypothesized to convey managers' private information.

Chaney and Lewis' model is based on the following assumptions. Managers have private information about their firm type where the expected value of the cash flow distribution is larger for high-type firms. No assumptions are made about the cash flows' variances for either type of firm. Corporate taxes are based in large part on reported income which imposes a cost on over-reporting current period income since it accelerates income taxes.[9] Managers select an income reporting strategy at time 0 that can not be credibly disclosed to investors. Any earnings management is within GAAP. That is, over the life of the firm, reported earnings (before depreciation) must equal cash flow from operations. Management's compensation is linear in expected future firm value and is specified exogenously; otherwise, the compensation function might be endogenously derived to reveal firm type.[10] Finally, firm value is the present value of the firm's expected cash flows.

In the absence of asymmetric information, each firm's optimal reporting strategy is to under-report income in the early period(s) so as to defer corporate taxes. However, with asymmetric information, Chaney and Lewis show that high-type firms report larger income than low-type firms and that high-type firms smooth income whereas low-type firms will not. Chaney and Lewis predict "that the informativeness of earnings increases for firms with smooth earnings." "Smoother income may aid the reader in assessing the future prospects of the firm by enhancing the usefulness of the information conveyed for

[9] Some may object to this assumption. However, although the depreciation accrual differs between financial accounting and tax reporting, many working capital accruals are common to both financial accounting and tax reporting (for example, credit sales, LIFO inventory, etc.). For further discussion, see Hunt, et al. (1996).

[10] This assumption also raises the important point that for earnings smoothing to act as a signaling device, it is necessary to assume that managers do not signal their private information by alternative means (such as through dividend policy, capital structure, accounting method choice such as LIFO vs. FIFO, percentage ownership retained, etc.).

predictive purposes. For example, if a firm has had a history of erratic earnings trends, the reader will be reluctant to rely on an increase in income in the current year, knowing that it may be followed by a blip in the opposite direction in the future." (p.333) Managers of low-type firms do not deviate from their first best reporting strategy of under-reporting income because their compensation would be reduced by the effects of taxation, lowering the value of the firm. That is, the cost of over-reporting current period income in this model arises from increased taxes. High-type firms can bear these higher taxes due to their superior prospects. Managers of high-type firms are motivated to lower information asymmetry to raise expectations of future firm value and, hence, their compensation.

Chaney and Lewis' model is developed in a two-period world with only two types of firms. A separating equilibrium obtains with high quality firms smoothing earnings in the first period. In actuality, firm quality is a continuum, suggesting that market participants observing a single period of smoothing are unlikely to be able to separate firms into higher and lower quality. However, observing a firm smoothing over a number of years likely increases the ability of market participants to infer firm quality, since smoothing over a longer period is more costly for lower quality firms. Thus, we estimate our earnings volatility measures over a multi-year horizon.

Ronen and Sadan (1981) develop a closely related model in which managers smooth earnings to remove transitory items, allowing investors to better predict future earnings and cash flows. False signaling in their model is costly because of auditor, SEC enforcement, and legal litigation actions which arise if managers are found to be falsely signaling.

Managers' private information in the Chaney and Lewis model is the mean of the distribution from which future cash flows are generated. The distribution is assumed stationary and thus smoothing occurs around a stationary mean and not around an upward trend or growth term. By smoothing transitory earnings components, Ronen and Sadan's model is consistent with managers conveying their private information about the persistence and/or growth (trend) in earnings. Empirical implications of these papers, on which we provide evidence below, are that firms classified as smoothing earnings via discretionary accruals are more profitable (e.g., exhibit a higher return on assets) and/or higher growth (e.g., exhibit a larger trend term when earnings are regressed on a time variable) and/or exhibit higher earnings persistence.

Finally, intuition might suggest managers could smooth earnings to convey their private information about the variability of the underlying cash flows and, hence, the riskiness of the firm to equity market investors valuing the firm.[11] However, we are not aware of any papers that derive a formal model of earnings smoothing in this setting. We conjecture no formal models exist for two reasons. First, as long as the managers of the high variability firms do not attempt to overstate the mean (or the trend) of the earnings distribution, they are unlikely to be discovered as falsely smoothing and hence there is not a separating equilibrium. Second, it is necessary to make the somewhat tenuous assumption that the variability of reported earnings is positively associated with risk (the discount rate in equation (1)) that is relevant to pricing in an efficient capital market.[12]

2.3 Earnings Smoothing as Opportunism

Some authors conjecture that earnings management reflects managers opportunistically adjusting earnings to transfer wealth from shareholders to themselves. See, for example, O'Glove (1987), Bernstein (1993), Wang et al. (1993), Ali and Hwang (1994), and Warfield et al. (1995). If this earnings management argument is applied to earnings smoothing, discretionary earnings smoothing reflects managers' attempts to transfer wealth to themselves. In this case, earnings smoothing could be associated with a lower (not higher) multiplier on current period earnings. However, we find this

[11] Below, we discuss a model by Trueman and Titman (1988) in which managers smooth earnings to influence non-equity stakeholders (e.g., debtholders) about the underlying riskiness of cash flows.

[12] Note, however, that Bildersee (1975) reports evidence consistent with earnings volatility being positively correlated with market model beta.

prediction implausible for two reasons. First, the amount of wealth transferred is likely to be small relative to the market value of the firm. Second, in setting up compensation packages, firms likely reduce compensation to reflect the costs of expected opportunism.[13] Such smoothing would then be unrelated to the market value of equity, in that the costs of discretionary earnings management would be offset by reductions in other compensation components and would not be penalized through a lower multiplier on current period earnings.

Discretionary earnings smoothing motivated by managers' opportunism could introduce value-irrelevant noise into the earnings series. Holthausen and Verrecchia (1988) and Choi and Salamon (1989) present models in which perceived noise in earnings is predicted to be negatively related to the earnings multiplier.[14] If stockholders adopt this viewpoint, the earnings multiplier would be lower for firms exhibiting more discretionary earnings smoothing since the smoothed earnings series contains more value-irrelevant noise. On the other hand, the Chaney and Lewis (1995) and Ronen and Sadan (1981) models predict that earnings smoothing reduces noise in earnings, leading to the opposite prediction on the relation between the earnings multiplier and earnings smoothing. Thus the relation between discretionary earnings smoothing and the earnings multiplier is an empirical question.

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[13] For a discussion of expected opportunism, see Watts and Zimmerman (1986). Lambert (1984) and Dye (1988) both develop models in which risk-averse managers are expected to smooth earnings and this expected smoothing is reflected in adjustments to the managers' total compensation package.

[14] Trueman and Titman (1988) develop a model in which managers smooth to reduce the estimate of various firm claimants (customers, workers, suppliers, debtholders) about the volatility of the firm's underlying earnings process, thereby lowering claimants' assessment of the probability of bankruptcy and favorably affecting the terms of trade between the firm and its (non-investor) stakeholders. They assert that by smoothing to influence stakeholders, "smoothing reduces the information content of earnings announcements" (p.128). This assertion appears to be based on an assumption that managers' unobservable smoothing actions introduce noise into the earnings series, lowering its informativeness.

2.4 Maintained Assumptions

As previously noted, we adopt two maintained assumptions to interpret our results. First, we assume the models we use to partition total accruals into nondiscretionary and discretionary components are well-specified. If our accruals partitioning model differs from the model used by investors, we introduce measurement error into the DACCTG and DMGMT terms which could lead to false inferences about the effects of discretionary earnings smoothing on the earnings multiplier. Suppose, for example, nondiscretionary accrual accounting smoothing is informative but that discretionary earnings smoothing simply introduces noise into earnings and that the market ignores the effect of this smoothing. Further suppose as Bernard and Skinner (1996) claim, the models partitioning accruals likely incorrectly labels nondiscretionary accruals as discretionary accruals. Under these assumptions, we could observe a significant positive coefficient on the DMGMT term (that is not greater than the estimated coefficient on the DACCTG term) even though the null hypothesis of no relation between discretionary earnings smoothing and the earnings multiplier is true.

An alternative form of measurement error arises if the accrual partitioning models simply represent random decompositions of total accruals. If random measurement error exists, then the estimated coefficients on both the DACCTG and DMGMT interaction terms will be biased downwards and will not be significantly different from each other.[15] Thus we conduct tests for equality of the coefficients on the two accrual volatility measures. Further, observing an estimated coefficient on the DMGMT term significantly greater than that on the DACCTG term is inconsistent with both forms of measurement error. While we cannot at this stage in the development of the earnings management

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[15] Guay, Kothari and Watts (1996) explore the implications of random decomposition of total accruals in a regression of security returns on operating cash flows, nondiscretionary and discretionary accruals (the design used by Subramanyam 1996). They predict and show via simulations that with random decomposition, the coefficients on the two accrual terms are not significantly different from each other. They also present evidence suggesting that both the Jones and modified Jones model do not randomly partition total accruals.

paradigm rule out measurement error with complete certainty, we do conduct various sensitivity analyses (discussed below) to assess whether measurement error explains any observed relation between discretionary earnings smoothing and the earnings multiplier.

Second, our research design assumes market efficiency. While there is much evidence consistent with this hypothesis, there is some evidence that investors naively react or are functionally fixated on reported earnings (see, for example, Bernard and Thomas 1989, 1990, and Sloan 1996). In our setting, functional fixation predicts equal estimated coefficients on the nondiscretionary and discretionary earnings volatility measures in equation (4), since investors fail to differentiate between the different sources of earnings volatility.[16] Note, however, equality of coefficients is also consistent with a) each source of earnings volatility being equally informative to sophisticated investors, and b) with the accrual models randomly partitioning total accruals into nondiscretionary and discretionary accruals. However, observing significant differences between the coefficients is inconsistent with both functional fixation and random measurement error in the accruals decomposition.

2.5 Summary of Predictions

To summarize this section, we predict the earnings multiplier in equation (4) is negatively associated with cash flow volatility. Since we define DACCTG to be larger when the reduction in earnings volatility due to nondiscretionary accrual accounting effects is larger, we predict the earnings multiplier is positively associated with the accrual accounting interaction term. Our main interest is on the sign of the discretionary earnings management interaction term (β_4 in equation (4)). The coefficient on DMGMT, coded to be larger when the reduction in earnings volatility due to discretionary earnings smoothing is relatively large, is predicted to be positive if market participants believe

[16] Conceptually, β_2, β_3 and β_4 should be tested for equality. However, because differences in coding the three volatility measures lead to scale differences, we can only test for equality of β_3 and β_4 in the main tests. We also conduct tests coding the volatility of cash flow consistent with the other two measures (dichotomizing observations into high and low cash flow volatility) and report tests of equality of all three coefficients.

managers use earnings smoothing to signal their private information. Alternatively, the discretionary earnings smoothing coefficient is predicted to be nonpositive if investors believe earnings smoothing reflects managerial opportunism.

Finally we note the informativeness hypothesis does not require that investors actually partition total accruals into nondiscretionary and discretionary accruals. As long as stock market participants are aware of managers' opportunities and incentives to smooth earnings and expect lower quality firms to bear greater smoothing costs, they can assess firm quality using reported earnings that are expected to have been smoothed. However, if the nondiscretionary and discretionary sources of earnings smoothing have differing value implications, rational market participants are motivated to measure them. If managers' superior information leads stock market participants to regard discretionary accruals smoothing as a more reliable indicator of current or future firm performance than the effects of nondiscretionary accrual accounting on earnings volatility, β_4 will be more positive than β_3. Conversely, if stock market participants extract some or all discretionary accruals from earnings volatility to assess equity value, β_3 will be more positive than β_4.

3. Sample Selection and Variable Measurement

3.1 Sample Selection

We estimate the market value model in equation (4) over the sample period 1982 to 1994 using all Compustat and CRSP firm-years that meet the following criteria. Since we want risk (and the likelihood of failure) to vary across our sample, we include firms that fail after 1982 by using the Compustat Annual Combined Tapes. Estimating the market value model across sample firms assumes homogeneity in the model's functional form. To obtain greater homogeneity, we exclude financial institutions and service firms, which are likely to use accounting methods and accruals adjustments that have different valuation implications, and include only firms with SIC codes from 0 to 5999. We also exclude foreign firms, as their different accrual accounting practices likely have differing value implications. Firms are required to have six years of contiguous annual data to allow estimation of the firm-specific standard deviations. Further, since estimating a standard deviation of net income or operating cash flow requires fiscal years of uniform length, firm-years that include a change of fiscal year-end are excluded from the sample. Because any standard deviation calculation assumes the underlying process is stationary, we also eliminate firms with major structural changes, evidenced by a one-year increase in sales or total assets of more than 50%. Finally, we require stock price and number of shares outstanding three months after fiscal year to estimate the market value of equity. Panel A of Table 1 shows these criteria produce an initial sample of 2,484 firms and 14,461 firm-year observations.

Two additional criteria are imposed to produce a final sample of 2,225 firms and 11,976 firm-year observations. Because the equity valuation model (equation 2) is not well-defined for observations with negative net income and because book value of equity is used to mitigate heteroscedasticity concerns, we exclude firm-years in the market value regressions in which current period net income or the book value of equity are either negative or missing. Hayn (1995) reports that including loss firms in the traditional cross-sectional returns-earnings regressions lowers the estimated earnings response coefficient and explanatory power of the model. Burgstahler and Dichev (1995) show that in market value regressions, the weight attached to earnings for loss firms is effectively zero. While we could allow for loss firms by using dummy variables we believe these firms are worthy of study in their own right and leave these observations for future research. However, we still include firm-years with losses when estimating the standard deviation measures.[17]

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[17] Negative earnings could result from a firm taking a big bath (which might include asset write-offs and restructuring charges). While a big bath is not the issue under study here, they are reflected in the research design as follows. When the bath is reflected in earnings before extraordinary items and discontinued operations (Compustat item 18), resulting in negative earnings in the test year (that is, the year in which the market value regression is estimated), these firm-year observations are omitted. If the bath is taken in any other year of the period used to estimate the standard deviations, then the standard deviations will be higher and the firm will be classified in the nonsmoothing groups. Finally, if the bath

Panel B of Table 1 presents the sample firms and firm-years partitioned by industry. The sample's largest segment consists of manufacturers, the smallest agricultural and civil engineering firms. Panel C of Table 1 provides descriptive statistics for the sample firm-years. Sample firms are relatively large, as would be expected when using Compustat and requiring at least six years of data; however, the sample exhibits substantial variation in size. The panel presents descriptive statistics for the standard deviation of time detrended net income and the standard deviation of time detrended cash flow from operations. A comparison of these two measures indicates total accruals typically reduce the variability of operating cash flows.

3.2 Measurement of Variables

We use the Daily CRSP files (listed and NASDAQ) to develop a measure of the market value of equity on the last trading day of the third month following the fiscal year-end. Market value is measured as the number of shares outstanding multiplied by the closing share price on that day. This measurement date matches the SEC deadline for filing the annual report, so that market value is more likely to capture the valuation effects of data contained in the report.

An important part of our research design requires the partitioning of total accruals into nondiscretionary and discretionary accruals. We use the Dechow et al. (1995) modification of the Jones model:[18]

$$TAC_{it} = b_0 + b_1 (\Delta Revenue_{it} - \Delta AccRec_{it}) + b_2 PPE_{it} + v_{it} \tag{5}$$

where TAC denotes total accruals (= net income less cash flow from operations), PPE denotes gross property plant and equipment, AccRec denotes accounts receivable, and Δ denotes the first difference operator. Consistent with Jones and Dechow et al., all variables are deflated by lagged total assets to control for heteroscedasticity. Net income

occurs in a year prior to the estimation period and the bath enabled the firm to smooth earnings in subsequent periods the firm likely will be classified correctly as smoothing earnings.

[18] To assess whether our results are sensitive to the use of the modified Jones model, we also repeat all tests using the Jones model. Our inferences are unchanged.

is measured before extraordinary items (Compustat item #18). Cash flow from operations is estimated as income before extraordinary items reduced by the increase in noncash current assets and increased by the sum of equity method losses (income), losses (gains) on productive assets' sales, depreciation and amortization, deferred tax expense, other funds from operations, and the increase in current liabilities (excluding the current portion of long-term debt).

We initially estimate the accruals model in equation (5) cross-sectionally within two-digit SIC. (See DeFond and Jiambalvo (1994) and Subramanyan (1996) for discussions of cross-sectional estimation of this model.) We also estimate the accruals model in time-series for each sample firm. While time-series estimation requires an assumption of stationarity, cross-sectional estimation requires an assumption of homogeneity.

Table 2 presents summary statistics for the accruals model (equation 5). Panel A contains the results for the cross-sectional estimations and panel B the results of the firm-specific time-series estimations. We require a minimum of six observations for cross-sectional estimation resulting in 772 separate model estimates over the period 1975 to 1994. The minimum number of observations is 6, the median is 39 and the 95th percentile contains 208 observations. On average, the model has relatively high explanatory power. However, a small subset exhibit negative adjusted R squareds. The mean and median estimated coefficients on property, plant, and equipment are negative, indicating that accruals, which are decreased by depreciation expense, generally decline as property, plant, and equipment increases. The mean and median estimated coefficients on the adjusted change in sales are positive, indicating that accruals generally increase with larger adjusted sales increases.

Panel B of Table 2 presents summary statistics for the time-series estimates of the accruals model. To generate relatively more reliable estimates of the accrual model parameters, we use ten years of data for each firm. Requiring ten years of contiguous data reduces the sample size to 5,726 firm-year observations over the 1986-1994 sample period. Again the accruals model exhibits relatively high explanatory power, although some firms exhibit negative adjusted R squareds. The distributions exhibit more dispersion than the cross-sectional distributions.

The (undeflated) fitted value from the accruals model is the proxy for the nondiscretionary accrual, and nondiscretionary net income (NDNI) is estimated as the sum of cash flow from operations (CFFO) plus the nondiscretionary accrual proxy (NDAP). That is, NDNI = CFFO+NDAP. We estimate the standard deviation of the net income and cash flow from operations over a five-year window up to and including the test period t.[19] The five-year estimation period is "rolled forward" each test year. Finally for each variable we estimate the standard deviation using the residuals from a regression of each on a time variable. Alternatively stated, the standard deviations are estimated as the variation around a time trend consistent with the notion of managers smoothing around an upward trending income series.[20]

The effect on operating cash flow volatility of using nondiscretionary accrual accounting practices is measured as the ratio of the standard deviation of nondiscretionary net income to the standard deviation of operating cash flows. We use a dummy variable approach to construct the accrual accounting term, DACCTG, (and the accruals management term, DMGMT below) to mitigate any measurement error in nondiscretionary accruals. The DACCTG term is designed to be larger when nondiscretionary accruals likely lead to a decline in operating cash flow (and hence earnings) volatility. Specifically, DACCTG is defined as

$$DACCTG = 1 \text{ if } \sigma(NDNI)/\sigma(CFFO) < \text{industry median ratio, 0 otherwise.}$$

Reported income and nondiscretionary income differ by the amount of discretionary accruals. The effect on earnings volatility of discretionary accruals management is

[19] Consistent with market participants using publicly available data when estimating the cross-sectional model, we use the nondiscretionary accruals proxy for this model from years t-5 to t-1 to estimate the standard deviation of nondiscretionary net income.

[20] Note that estimating the standard deviations deflating by contemporaneous total assets (instead of detrending) gives virtually identical distributions.

measured as the ratio of the standard deviation of net income to the standard deviation of nondiscretionary net income. Again we transform this ratio into a dummy variable, DMGMT, which is designed to be larger when the extent of discretionary accruals management to smooth earnings is relatively large:

$$DMGMT = 1 \text{ if } \sigma(NI)/\ \sigma(NDNI) < \text{industry median ratio, 0 otherwise.}$$

The dummy variables are formed relative to the median ratio of each sample firms' single digit industry.[21] Use of an industry median allows for differences across industries in how well the accruals model partitions total accruals into nondiscretionary and discretionary accruals. To further mitigate concerns with errors in partitioning accruals, all observations for which the accruals model adjusted R squared is negative (indicating the accruals model has no ability to partition) are omitted in forming the dummy variables and in the market value regressions. This screening rule, which reduces the sample from 11,976 to 11,647 firm-year observations, is intended to remove observations in which our estimates of nondiscretionary accruals are likely to contain large measurement errors.

Finally, each of the variables in the market value regressions (equation (4)) is deflated by the book value of equity (BVE, #60) to correct for heteroscedasticity, since the magnitude of the error term varies with firm size. Inspection of the distribution of the scaled variables indicates positive skewness and some extreme observations. Thus we exclude firm-years having at least one regression variable in the market value regression model that is more than three standard deviations above the pooled sample median. This further reduces the sample to 11,517 firm-year observations.[22]

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[21] The industry median ratio is based on pooling across sample years to avoid problems with small sample sizes. This assumes that the distributions are relatively stationary across time. Inspections of the annual medians indicates that this is a reasonable assumption. Further, to assess whether our results are sensitive to the use of industry medians to partition firm-years into volatility groups, we reestimate the market value models a) partitioning firms into smoothers and nonsmoothers using the medians of the annual pooled (across industries) distributions of the standard deviation ratios and b) using the continuous ratios. The findings are qualitatively similar, although the t-statistics on all variables are slightly reduced when using the continuous ratios, a result which is likely attributable to estimation error in the nondiscretionary accruals models.

[22] Using SAS diagnostics to identify and remove outliers leads to inferences similar to those based on the results reported in Table 5.

3.3 Descriptive Statistics on Sample Partitioned by Earnings Volatility

Table 3 reports descriptive statistics on both the pooled and industry distributions of the standard deviations and of the ratio of the standard deviations. Also reported are descriptive statistics for firm-year observations classified by DACCTG and DMGMT.

Panel A (B) reports the industry medians based on the cross-sectional (firm-specific time-series) estimates of the accrual model in equation (5). Under both estimation approaches, the ratio of σ(NDNI)/σ(CFFO) is approximately unity for all industries indicating that, across each industry, accrual accounting does not on average reduce the volatility in reported earnings. For all industries, the reduction in earnings volatility arises largely from discretionary earnings management as indicated by the ratio of σ(NI)/ σ(NDNI).[23] These results are consistent with the pooled results reported by Subramanyan (1996, Table 2) but this is not surprising, since both studies generate their samples from Compustat and use a similar model to partition total accruals.

Panel C of Table 3 reports and compares the means of selected financial variables for firms classified by the DACCTG dummy variable (using the industry medians in Panel A to form the dummy variable). Firms in which accrual accounting reduces their cash flow volatility by more than their industry median (DACCTG=1) are not significantly different in size than the remaining firms but do exhibit a significantly higher return on assets and lower leverage (long-term debt to total assets) ratio. Panel D of Table 3 presents a similar comparison for firms classified by the DMGMT dummy variable. While the market value of equity is not significantly different between the two groups, firms classified as

[23] We also calculated the correlation between each volatility ratio across the different accruals estimation approaches. First, comparing the ratios derived from cross-sectional estimation vs time-series estimation of the Dechow et al. accruals model, we find that both ratios are significantly positively correlated. The accounting ratio, σ(NDNI)/σ(CFFO), reports a correlation coefficient of .28, whereas the management ratio, σ(NI)/σ(NDNI), reports a correlation of .69. The Jones model reports correlations of .25 and .68 for the accounting and management ratios, respectively. Second, within cross-sectional estimation, the correlation across the Dechow et al. and Jones model in the accounting (management) ratio is .97 (.97). Third, within time-series estimation, the correlation across the Dechow et al. and Jones model in the accounting (management) ratio is .88 (.95). Thus, within an estimation approach (cross-sectional or time-series), the ratios are very highly correlated across the Dechow et al. and Jones accruals models. The ratios are less highly correlated within each model when estimated cross-sectionally vs. time-series.

discretionary earnings smoothers (DMGMT=1) are significantly smaller (using book measures of size), more profitable (higher ROA), exhibit lower leverage and market model betas, and have a smaller mean earnings time trend than the remaining firms. That the smoothing firms are more profitable provides evidence consistent with the earnings smoothing models presented earlier (in particular, Chaney and Lewis 1995) although their smaller earnings trend is inconsistent with managers signaling private information about a higher earnings growth rate.

Panel A of Table 4 presents the pooled cross-sectional distribution statistics of each of the regression variables while panel B of Table 4 provides a correlation matrix of the pooled regression variables. The magnitudes of the correlations are relatively large, which is not surprising given that net income is a multiplicative term in each of the independent variables.

4. Empirical Results

We report two sets of results for each specification of the market value model. In the first set, each model is estimated pooling all firm-year observations with t-statistics based on White's (1980) heteroscedastic-consistent covariance matrix. Barth and Kallapur (1995) and Kothari and Zimmerman (1995) report that even for weighted least squares estimates of a simple market value model (as in equation (2)), the estimated standard errors of the coefficients severely understate the true standard errors. Both studies suggest that White's heteroscedastic-consistent standard errors be used to calculate t-statistics.[24]

[24] Further supporting our use of White's covariance matrix, we find that White's specification test rejects the null hypothesis of homoscedastic errors in each market value regression. As an additional check of the robustness of the results, we also estimate (but do not report) the pooled market value regressions using per share figures and White's t-test to assess statistical significance. The results are qualitatively similar to those reported using the levels of market value and earnings with weighted least squares estimation. Barth and Kallapur (1996) also suggest that, instead of deflating, the scale variable be added as an independent variable with White’s t-statistics used to test significance. When we estimated our market value regressions using this approach, the significance of the test variables is very similar to those reported in Table 5 with the result that our inferences are unchanged across the two specifications.

Second, we report the mean of the regression coefficients from thirteen annual (1982-1994) cross-sectional regressions. For these annual regressions, the t-statistics are calculated after correcting for first-order serial correlation in the annual coefficients. As in Abarbanell and Bernard (1995), the correction requires multiplying the standard error by the factor

$$\left(\frac{(1+\phi)}{(1-\phi)}+\frac{2\phi(1-\phi^{T})}{10(1-\phi)^{2}}\right)^{1/2}$$

where ϕ equals the first-order autocorrelation estimated from the series of T=13 estimated annual coefficients. For each model, the t-statistic for the annual results is systematically smaller than the t-statistic for the pooled results because the former statistic is calculated using only thirteen annual coefficients instead of all 11,517 firm-year observations.

4.1 Benchmark Market Value Regressions

Panel A of Table 5 presents weighted least squares estimates of market value regressed on net income (i.e., equation (2)). These estimates provide a benchmark for later estimates of the market value model when net income is conditioned on earnings volatility. The pooled estimate and the mean annual estimate of the slope coefficient, γ_1, are both highly significant. Their magnitudes are comparable to those presented in similar regressions by Barth, Beaver, and Landsman (1992).

Panel B presents weighted least squares estimates of market value regressed on net income and net income conditioned on the standard deviation of net income. As the standard deviation of detrended net income declines, earnings smoothness increases. The estimated coefficient on the interaction term is significantly negative. Further, for the pooled regression, the estimated coefficients imply that, when income is held constant at its mean of 12.9 cents per dollar of book value, a one standard deviation increase in earnings volatility from its mean of 0.028 (from Table 1, Panel C) to 0.071 decreases the predicted market value of equity per dollar of book value of equity from $3.06 to $2.92, a 5% decrease. To help calibrate these effects, consider that when volatility is held constant, a one standard deviation increase in income per dollar of book value from its mean of 12.9 cents to 21.3 cents increases the market value of equity per dollar of book value by $1.08, a 40% increase. Although the level of earnings is economically more important, we find less volatile earnings streams are associated with larger multipliers on current period earnings.

Panel C presents weighted least squares estimates of market value regressed on net income, and net income interacted with the standard deviations of both net income and operating cash flows. The results indicate that, incremental to operating cash flow volatility, lower earnings volatility is associated with a higher multiplier on current period earnings. These findings are consistent with accrual accounting improving the ability of earnings to measure value-relevant performance. Thus, this study extends the literature examining the relation between equity value, cash flows, and earnings to include the volatility of each series.

The above tests examine the net effect of discretionary and nondiscretionary accruals on earnings volatility and, thus, do not directly assess whether discretionary earnings smoothing raises or lowers the earnings multiplier. We now turn to these tests.

4.2 Market Value Regressions Including the Volatility Effects of Nondiscretionary and Discretionary Accruals

Panels D and E of Table 5 present weighted least squares estimates of equation (4), where the market value of equity is regressed on net income and net income interacted with the three sources of earnings volatility. The accounting and management terms in panel D (E) are based on cross-sectional industry (time-series firm-specific) estimates of the equation (5) accruals model. Consistent with the benchmark regression results, the coefficient on net income, β_1, is significantly positive in both the pooled regressions and in the annual estimations. The coefficient on net income interacted with operating cash flow volatility, β_2, is significantly negative in both the pooled regressions and in the annual estimations. The accrual accounting term, β_3, captures when nondiscretionary accrual accounting practices lead to relatively greater reductions in nondiscretionary net income volatility over the volatility estimation period. The coefficient is significantly positive except for the pooled estimation in Panel D. These results are consistent with the prediction that smoothing induced by nondiscretionary accrual accounting practices increases the informativeness of earnings.

The discretionary accruals management term indicates firm-years where managers' discretionary accruals result in relatively lower earnings volatility over the volatility estimation period. The estimated coefficient is significantly positive for both pooled and annual estimations in both panels. The estimated coefficient for the pooled regression in Panel D (E) implies firms with accruals management ratios below their industry median have, holding earnings constant at the sample mean, a market value of equity per dollar of book value that is 5% (8%) higher than firms which are above the median.[25] This evidence is not consistent with assertions that discretionary earnings smoothing represents either opportunistic attempts to raise managerial compensation or noise that must be removed to obtain meaningful earnings measures.

For the pooled estimations, we also test whether the coefficients on the accrual accounting and discretionary accruals management variables differ from each other. Differing coefficients would be consistent with market participants partitioning earnings smoothness into its discretionary and nondiscretionary components to infer differing information about equity value. An F-test (based on the weighted least squares covariance matrix estimate) is significant in both Panels D and E, with the estimated coefficient on the discretionary accruals variable being significantly more positive. However, a chi-squared test (based on White's covariance matrix estimate) is only marginally significant in panel D. Thus there is some weak support that market

[25] Using the pooled regression estimates from Panel D and means of the regression variables from Table 4, Panel A, the mean market value for the firms with DMGMT = 0 is 1.621 + 13.03*0.129 - 22.003*0.129*0.029 = 3.22. For DMGMT = 1 firms, the market value increases by 1.224*0.129 = 0.158, or 0.158/3.22 = .049 or 5%. A similar calculation can be performed for Panel E, showing the market value increases 8% for earnings smoothers.

participants appear to place more emphasis on discretionary accruals' effects on earnings volatility in pricing earnings. Coefficient inequality is inconsistent with functional fixation by market participants and with the accrual models randomly partitioning total accruals into nondiscretionary and discretionary components (i.e., random measurement error). Further, since the discretionary earnings smoothing term exhibits a larger coefficient, we believe it is unlikely the results are due to measurement error in the accruals model of the form that misclassifies some nondiscretionary accruals as discretionary accruals.

4.3 Sensitivity Analyses

We conduct several sensitivity analyses but do not table the results to conserve space. We examine the robustness of the results to a) coding the volatility of cash flows as a dummy variable, b) omitting firms with negative income trend terms, and c) estimation of the market value model within industry groups.

As pointed out earlier, the coding of the two accrual volatility measures as dummy variables precludes a test of the equality of the coefficients on the three volatility measures (β_2=β_3=β_4). To provide such a test, we reestimate the regressions in panel D and E classifying firm-year observations into high and low cash flow volatility relative to their industry median (the same procedure used to form the DACCTG and DMGMT variables). Both an F test and chi-square test (based on White's covariance matrix) reject the null hypothesis of equality of the three coefficients. In both regressions, the coefficient on the cash flow volatility interaction term is significantly larger. This result is inconsistent with a functional fixation explanation and lends credence to the informativeness hypothesis for the market value regression results in Table 5.

The conventional notion of earnings smoothing is smoothing around an upward trend (see, for example, Worthy 1984). However, some firm-year observations exhibit a negative time trend when net income is regressed on time over the prior five years. It is unlikely that managers attempt to smooth earnings around a downward trend. To test the robustness of the results we exclude these firm-year observations. The results are virtually identical to those reported in Table 5, Panels D and E, which include these observations. The volatility results are also unchanged when we add an additional interaction term to the market value regressions to allow the earnings multiplier to vary as a function of the trend term.

Finally, we assess the sensitivity of our results to the assumption that the market value model is homogenous across industry groups. The pooled sample is partitioned into the five major industries reported in Table 1. For each industry group, we then reestimate each pooled regression in Table 5. For the food products and the manufacturing industries, the results are similar to those reported for the pooled sample. For the mining, agricultural, and construction industries (SIC = 1), earnings volatility is not incrementally informative to operating cash flow volatility and the coefficient estimated for the discretionary accruals management variable is not significant. Although these results are not consistent with earnings smoothing increasing earnings informativeness, we can not rule out an alternative hypothesis that the nondiscretionary accruals models are poorly specified for these industries. For the transportation and the wholesale/retail industries, earnings volatility is not generally incrementally informative to operating cash flow volatility and neither the accrual accounting variable nor the discretionary accruals management variable exhibits a significant positive coefficient. Taken together, the results for the industry estimations indicate that the pooled sample results are driven primarily by the manufacturing and the food products industries, which comprise the largest proportion of our sample.

5. Discretionary Earnings Smoothing and Future Firm Profitability and Risk

In this section, we examine whether discretionary earnings smoothing is related to variables measuring future firm profitability and risk. Observing predicted relations between the discretionary earnings smoothing measure, DMGMT, and these future variables would indicate our earlier finding, that the earnings multiplier is positively related to discretionary earnings smoothing, is more consistent with the informativeness hypothesis than a functional fixation explanation.

Drawing from Chaney and Lewis (1995) and Ronen and Sadan (1981), we examine the level of future earnings, measured as cumulative net income over the succeeding five years to average out the effects of any continued earnings smoothing over this subsequent period. We estimate the following regression model:

$$\sum_{t=+1}^{+5} NI_t/TA = \gamma_0 + \gamma_1 NI_t + \gamma_2 NI_t \cdot \sigma(CFFO) + \gamma_3 NI_t \; DACCTG + \gamma_4 \; NI_t \cdot DMGMT + \varepsilon \qquad (6)$$

where the dependent variable is the cumulative five-year sum (t+1 to t+5) of earnings, deflated by total assets in period t for cross-sectional aggregation. Consistent with the specification of the market value model, we include net income and the three volatility measures as interaction terms. The coefficient on current period earnings, γ_1, provides an estimate of the persistence of earnings.[26] Cash flow volatility and the nondiscretionary accruals term, DACCTG, are included to control for any relations between future profitability and these two volatility measures. If persistence in earnings is higher for firms that have smoothed earnings via discretionary accruals, then the coefficient on the DMGMT interaction term, γ_4, is predicted to be positive.[27]

Regression 1 in Table 6 reports that the level of future earnings is significantly positively associated with the level of current earnings. Further, the magnitude of the coefficient is also significantly greater than 5, reflecting growth.[28] The significant negative coefficient on cash flow volatility interacted with current earnings indicates that

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[26] If earnings follow a random walk, the magnitude of the coefficient on current earnings is expected to be five (the number of years in the sum). If earnings follow a random walk with positive drift, the coefficient is expected to be greater than five. See Hansen (1996) for further discussion of this issue.

[27] Subramanyan (1996) reports that annual net income exhibits higher first-order autocorrelations than both operating cash flows and nondiscretionary net income and concludes that discretionary accruals leads to greater persistence in earnings. We provide a more direct test of that assertion.

[28] Table 6 shows predicted signs for the cash flow volatility and the nondiscretionary accruals term under the arguable assumption that the predictions for the discretionary earnings smoothing term are also relevant for the two other volatility measures. Note also that consistent with the market value regressions, an observation is omitted if any variable in the regression is more than three standard deviations from its pooled mean. Significance tests in equation (6) are based on White's covariance matrix to further mitigate concerns with heteroscedasticity.

the higher is cash flow volatility, the less persistent is current earnings. Both the DACCTG and DMGMT interaction terms exhibit significant positive coefficients, indicating that the firms in which nondiscretionary accruals result in earnings smoothing and firms classified as discretionary earnings smoothing exhibit significantly higher persistence in earnings. Further, the coefficient on the DMGMT term is significantly greater than that on the DACCTG term. We interpret these regression results to be consistent with the Chaney and Lewis and Ronen and Sadan models: managers of high quality firms smooth earnings via discretionary accruals to convey information about superior profitability to market participants. The results are not consistent with either functional fixation or measurement error in the accruals model. Under these two alternative explanations for our market value results, the two coefficients would be equal.

Regression 2 in Table 6 reports results using cumulative future operating cash flows. The coefficients on the three volatility interaction terms continue to be significant in their predicted directions. However, the coefficients on the DACCTG and DMGMT interaction terms are not significantly different using both an F test based on the usual covariance matrix estimate and a chi-squared test using White's covariance matrix estimate.[29]

Although as discussed in section 2, there are no theoretical models directly linking earnings volatility to price-relevant nondiversifiable risk, we also examine the association between discretionary earnings smoothing and proxies for future firm risk. We estimate the following regression model:

$$\text{Risk}_{t+5} = \gamma_0 + \gamma_1 \text{ Risk}_t + \gamma_2\, \sigma(\text{CFFO}) + \gamma_3 \text{ DACCTG} + \gamma_4 \text{ DMGMT} + \varepsilon \qquad (7)$$

where Risk_{t+5} denotes the dependent variable as proxied by either market model beta or the standard deviation of security returns estimated using monthly return data over the five years t+1 to t+5 and Risk_t denotes the risk proxy estimated over the five years t-4 to

[29] We do not examine the ability of current income and the three volatility measures to explain future dividends. Dividends over a finite period are a somewhat arbitrary measure of firm performance (consider, e.g., Microsoft Corporation).

t=0. In equation (7) we are examining the conjecture that discretionary earnings smoothing conveys managers' private information about future firm risk (the discount rate in equation (1)). We are not examining the effect of earnings volatility on the use of current period earnings to forecast future earnings. Thus, unlike in equation (6), the volatility measures are not entered as interaction terms in the regression model.

Regression results are reported in panel B of Table 6. Future beta is significantly positively associated with cash flow volatility after controlling for the current level of beta. However, although the coefficient on DMGMT is negative as predicted, neither DACCTG nor DMGMT exhibit significant negative coefficients.[30]

When risk is proxied by the standard deviation of security returns, both cash flow volatility and DMGMT are significantly associated with risk in the predicted direction. That is, lower cash flow volatility and discretionary earnings smoothing are both associated with lower future security return volatility. Further, an F test indicates that the coefficient on DMGMT is significantly different from that on DACCTG. To the extent the standard deviation of security returns is a reasonable proxy for risk, an arguable point, it appears as though discretionary earnings smoothing is associated with lower future risk.[31]

Overall, the results of the above regressions are consistent with managers signaling information about profitability as presented in models by Chaney and Lewis (1995) and Ronen and Sadan (1981). The results are less consistent with managers signaling information about lower future risk. Thus, we infer that the market value regression

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[30] Note that it is important in these regressions to include the current risk measure as an explanatory variable. When current risk measures are excluded, all three volatility measures are significant in their predicted directions. This result occurs because all three earnings volatility measures are significantly associated with contemporaneous measures of the risk proxies and omission of the contemporaneous risk proxy results in correlated omitted variable bias in the remaining variables.

[31] An alternative risk proxy is to examine realized future security returns as a proxy for expected returns. How one interprets these results depends on your assumption about market efficiency and since the analyses in this section are attempting to differentiate between rational pricing and functional fixation (i.e., market inefficiency) there is some circularity in looking at future returns. If we assume market efficiency, then any association between future raw returns and the volatility measures (in the direction of lower volatility, lower future returns) implies a risk interpretation. However, because this result cannot rule out functional fixation, we do not examine future returns.

results reported in Table 5, in which lower earnings volatility arising from discretionary accruals management is associated with a higher multiplier on current period earnings, are more consistent with discretionary accruals smoothing increasing the informativeness of earnings than with functional fixation in an inefficient capital market. However, as previously noted, we can not unambiguously rule out measurement error in partitioning accruals as an alternative explanation for the observed results.

6. Summary and Implications

This study examines the relations among earnings volatility, earnings management, and equity value. Our findings indicate that for a given earnings level, smoother earnings are associated with a higher market value of equity. This result holds after controlling for the underlying volatility of operating cash flows, indicating that earnings volatility is incrementally informative to cash flow volatility. The relation between earnings volatility and market value appears to differ for the nondiscretionary and discretionary accrual components of earnings volatility. Discretionary earnings smoothing appears to have a larger positive impact on the relation between equity value and earnings than does earnings smoothing arising from nondiscretionary accruals. Additional tests indicate that lower earnings volatility induced by discretionary accruals management is associated with higher earnings persistence and with lower future standard deviation of security returns. We interpret these additional results to rule out functional fixation as an explanation for the observed higher multiplier on earnings arising from discretionary earnings smoothing.

Thus, this study provides additional evidence about the informativeness of operating cash flows and accruals. We propose and find an information role for these measures where their *volatility* is relevant in assessing equity value. This role differs from, but is not inconsistent with, previous studies' findings that the levels of operating cash flows and accruals (i.e., the first moments of the distributions) are value-relevant.

More importantly, our paper and results add to the emerging literature on stock market participants' interpretations of discretionary accrual adjustments. We contribute evidence to the debate about whether the earnings discretion available to managers lowers the informativeness of earnings, a widely held belief among practitioners. Most prior evidence on this issue is indirect and the results are mixed. Ali and Hwang (1994) report that the incremental information content of earnings, relative to operating cash flows, decreases with the level of managerial ownership. Warfield et al. (1995) report a higher earnings response coefficient as managerial ownership increases. Lower managerial ownership is assumed to capture stronger incentives to adjust earnings opportunistically. Wang et al. (1993) report that the earnings response coefficient is smaller when earnings contain a large change in total accruals. In all three studies, the authors interpret their results as evidence that accrual adjustments lower the informativeness of earnings, consistent with the opportunistic earnings management hypothesis, although they do not directly test this interpretation.

On the other hand, more direct tests of the informativeness of discretionary accruals are more consistent with the informativeness hypothesis. Collins and DeAngelo (1990) report that accruals adjustments raise, rather than lower, the informativeness of earnings released during proxy contests. As previously discussed, Subramanyam (1996) reports that estimated discretionary accruals are incrementally informative to operating cash flows and nondiscretionary accruals. The authors of these latter two papers argue, similarly to us, that accruals management is an efficient means of signaling managers' private information about future prospects. Our paper adds to these studies by examining the valuation implications of the long-term strategy of smoothing earnings, rather than examining the valuation implications of contemporaneous accrual adjustments. Because we use earnings variability and its underlying components as conditioning variables in a market value model, we avoid the difficulty of developing a measure of expected (and hence unexpected) accrual adjustments, which is a limitation of these earlier return studies. That our results are generally consistent with Collins and DeAngelo (1990) and

Subramanyan (1996) using a different design offers encouraging support for the information signaling role of discretionary accruals management.

Our tests provide evidence which supports the argument that, *on average*, allowing managers to exercise discretion in financial reporting raises, rather than lowers, the informativeness of earnings. An important implication of this argument is that by constraining managers' accounting choices to achieve the goal of comparability, accounting regulators, such as the FASB and the SEC, could actually lower the informativeness of accrual accounting numbers. However, since our results are across a large sample and examine only one form of accruals management, earnings smoothing, we acknowledge that some firms are likely to abuse the discretion allowed under GAAP. In addition, as with all earnings management studies, our results are subject to concerns about errors in measuring nondiscretionary and discretionary accruals (Bernard and Skinner 1996). Further, our results indicate only that the current average level of discretion raises the informativeness of earnings; it does not directly assess the question of whether allowing more or less discretion would raise or lower the informativeness of earnings. Given the importance of this issue to accounting regulators, auditors, and financial statement users, our understanding of when permitting accounting discretion is desirable could be advanced further through studies adopting different research designs.

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Table 1
Description of Sample

Panel A: Sample selection criteria

	Firms	Firm-years
1. Number of U.S. industrial firms on the 1995 Compustat Annual Combined Tapes in SIC codes 0-5999 with at least 6 continuous years of data up to and including any year of the test period 1982-1994 and with market value of equity data on CRSP	2,484	14,461
2. After deleting firms with negative or missing book value of equity in the test year	2,459	14,239
3. After deleting firms with negative or missing net income in the test year	2,225	11,976

Panel B: Sample by 2-digit SIC industry

		Firms		Firm-Years	
	Industry	Number	Percent	Number	Percent
1-19	Agric., mining and const.	103	4.6	385	3.2
20-29	Food and kindred products	510	22.9	3,078	25.7
30-39	Manufacturing	949	42.7	4,530	37.8
40-49	Transportation	304	13.7	2,287	19.1
50-59	Wholesale and retail	359	16.1	1,696	14.2
	Total	2,225	100.0	11,976	100.0

Panel C: Descriptive statistics on sample firm-years (n = 11,976; levels in $000,000's)[a)]

	Mean	Std. Dev'n.	Median	Minimum	Maximum
Market value of equity	1,323.47	4,364.55	188.34	0.251	93,235.83
Total assets	1,649.01	5,206.30	239.01	0.751	188,200.00
Sales	1,677.96	5,627.59	312.48	0.000	135,696.00
Book value of equity	657.68	2,042.59	116.29	0.140	42,832.00
Net income	95.16	317.08	13.34	0.001	6,582.00
σ(NI)	0.028	0.043	0.019	0.001	1.534
σ(CFFO)	0.055	0.055	0.043	0.003	2.366

a) Definitions of variables:
σ(NI) = standard deviation of time detrended net income before extraordinary items.
σ(CFFO) = standard deviation of time detrended cash flow from operations (CFFO).
Each standard deviation is calculated over the five-year period ending with the test year.

Table 2

Summary Statistics for Weighted Least Squares Estimates of Nondiscretionary Accruals Models[a)]

$$TAC_{it} = b_0 + b_1 (\Delta Revenue_{it} - \Delta AccRec_{it}) + b_2\, PPE_{it} + v_{it} \qquad (5)$$

Panel A. Annual Industry Cross-Sectional Estimation (N=772)[b)]

			Percentile				
Indep't. Var.	Mean	Std. Dev'n.	0.05	0.25	0.50	0.75	0.95
Intercept	-0.178	1.557	-1.796	-0.355	-0.076	0.105	1.309
ΔREV-ΔREC	0.069	0.211	-0.237	-0.007	0.068	0.152	0.317
PPE	-0.113	0.088	-0.248	-0.152	-0.111	-0.067	0.007
Adjusted R^2	0.341	0.273	-0.048	0.139	0.314	0.536	0.816
Nobs	58.66	59.41	7.0	17.0	39.0	71.0	208.0

Panel B. Firm-Specific Time-Series Estimation (N=5,726)[c)]

			Percentile				
Indep't. Var.	Mean	Std. Dev'n.	0.05	0.25	0.50	0.75	0.95
Intercept	-13.039	433.993	-227.289	-11.971	-0.308	8.969	192.881
ΔREV-ΔREC	0.045	0.272	-0.422	-0.079	0.055	0.189	0.433
PPE	-0.062	0.889	-0.659	-0.204	-0.079	0.033	0.671
Adjusted R^2	0.511	0.337	-0.094	0.255	0.560	0.814	0.954

a) Definitions of independent variables, where the dependent variable is total accruals and all variables are weighted by lagged total assets.
ΔREV = the change in revenues from year t-1 to t;
PPE = property, plant and equipment;
ΔREC = the change in accounts receivable from year t-1 to t; and
CFFO = cash flow from operations for year t.

b) The cross-sectional model is estimated using a minimum of six observations annually within two-digit SIC codes over 1975 to 1994.

c) The time-series model is estimated using ten annual observations for each sample observation.

Table 3

Descriptive Statistics Accruals Model Partitions[a)]

Panel A: Medians of Volatility Measures by Industry: Cross-Sectional Industry Estimation of Accruals Model

SIC	N	σ(CFFO)	σ(NDNI)	σ(NI)	Acctg	Mgmt
1	319	.039	.044	.020	1.117	0.480
2	2,995	.027	.028	.011	1.002	0.395
3	4,410	.038	.039	.017	1.026	0.413
4	2,275	.014	.014	.004	1.002	0.300
5	1,518	.031	.031	.008	0.984	0.291
Pooled	11,517	.029	.029	.011	1.011	0.369

Panel B: Medians of Volatility Measures by Industry: Time-Series Firm-Specific Estimation of Accruals Model

SIC	N	σ(CFFO)	σ(NDNI)	σ(NI)	Acctg	Mgmt
1	129	.039	.036	.019	0.960	0.509
2	1,327	.025	.024	.011	0.999	0.487
3	1,670	.033	.034	.015	0.999	0.453
4	1,280	.013	.012	.004	0.970	0.364
5	619	.027	.026	.008	0.964	0.321
Pooled	5,025	.025	.024	.010	0.984	0.424

Panel C: Means of Selected Variables for Sample Partitioned by DACCTG

	DACCTG=1	DACCTG=0	P value
N	5,760	5,757	
Market value of equity (MVE)	1,307.44	1,369.32	.27
Total assets (TA)	1,619.51	1,766.22	.14
Sales	1,661.19	1,743.13	.44
Book value of equity	663.10	686.85	.54
Net income (NI)	96.64	98.29	.78
ROA (=NI/TA)	.065	.061	.01
NI time trend	5.53	4.80	.40
Leverage (=LTD/TA)	.171	.176	.03
Beta	.845	.837	.37

Table 3 (cont.)

Descriptive Statistics Accruals Model Partitions[a)]

Panel D: Means of Selected Variables for Sample Partitioned by DMGMT

	DMGMT=1	DMGMT=0	P value
N	5,760	5,757	
Market value of equity (MVE)	1,333.86	1,369.88	.66
Total Assets (TA)	1,504.16	1,881.63	.01
Sales	1,573.60	1,830.77	.02
Book value of equity	604.64	745.33	.01
Net income (NI)	94.01	100.92	.25
ROA (=NI/TA)	.065	.061	.01
NI time trend	4.25	6.09	.04
Leverage (=LTD/TA)	.170	.178	.01
Beta	.814	.868	.01

a) Definition of variables:

Acctg = σ(NDNI)/σ(CFFO).

Mgmt = σ(NI)/σ(NDNI).

DACCTG = accrual accounting smoothing dummy variable = 1 if Acctg ratio < industry median acctg ratio, 0 otherwise.

DMGMT = management (i.e., discretionary) smoothing dummy variable = 1 if Mgmt ratio < industry median mgmt ratio, 0 otherwise.

NDNI = Nondiscretionary net income = operating cash flows plus nondiscretionary accruals (estimated using the Dechow, Sloan, and Sweeney (1995) accrual model).

DACCTG and DMGMT partitions in Panels C and D based on industry cross-sectional estimation of the accruals model parameters.

NI time trend is the estimated slope coefficient from a regression of net income on time over the preceding five years.

LTD = long-term debt.

Beta = estimated using market model with equally weighted market index over 60 months up to and including the test year.

Dollar variables in millions.

P values based on t test of difference in means (two-tailed).

Table 4

Descriptive Statistics on Regression Variables[a)]

(n = 11,517 firm-year observations)

Panel A: Cross-sectional distribution statistics

Variable	Mean	Std. Dev'n.	Median	.05	.95
MVE	1.836	1.369	1.477	0.644	4.136
NI	0.129	0.084	0.124	0.022	0.243
NI·σ(NI)	0.002	0.006	0.001	0.000	0.007
NI·σ(CFFO)	0.005	0.008	0.003	0.001	0.014
NI·DACCTG	0.066	0.087	0.000	0.000	0.204
NI·DMGMT	0.066	0.084	0.000	0.000	0.200

Panel B: Correlation matrix

	NI	NI·σ(NI)	NI·σ(CFFO)	NI·DACCTG	NI·DMGMT
MVE	0.619	0.253	0.280	0.267	0.301
NI		0.476	0.541	0.465	0.410
NI·σ(NI)			0.681	0.245	-0.118
NI·σ(CFFO)				0.398	0.203
NI·DACCTG					0.074

a) Definition of variables:
MVE = market value of equity/book value of equity;
NI = net income before extraordinary items/book value of equity;
DACCTG = accrual accounting smoothing dummy variable = 1 if σ(NDNI)/σ(CFFO) < industry median ratio, 0 otherwise; and
DMGMT = management (i.e., discretionary) smoothing dummy variable = 1 if σ(NI)/σ(NDNI) < industry median ratio, 0 otherwise.
NDNI = Nondiscretionary net income = operating cash flows plus nondiscretionary accruals (based on the industry cross-sectional parameter estimates of the Dechow, Sloan, and Sweeney (1995) accrual model).
Other variables are defined as in Table 1.

Table 5

Weighted Least Squares Estimates of Market Value of Equity Regressed on Net Income and Net Income Conditioned on Various Volatility Measures (n = 11,517 observations)[a)]

Panel A. Market Value Regressed on Net Income

	β_0	γ_1 NI	Adjusted R^2
Predicted sign	?	+	
Pooled estimate	1.062	12.887	0.764
White's t-statistic	3.76	56.26	
Mean of 13 annual (1982-1994) estimations	0.876	13.084	0.785
t-statistic[b)]	1.50	11.57	

Panel B. Market Value Regressed on Net Income and Net Income Conditioned by the Standard Deviation of Net Income

	β_0	$\beta_1 \cdot$NI	$\beta_2 \cdot \mathrm{NI} \cdot \sigma(\mathrm{NI})$	Adjusted R^2
Predicted sign	?	+	-	
Pooled estimate	1.421	13.421	-25.360	0.768
White's t-statistic	4.63	83.62	-3.83	
Mean of 13 annual estimations	1.318	13.789	-30.581	0.791
t-statistic[b)]	3.34	7.93	-4.42	

Panel C. Market Value Regressed on Net Income and Net Income Conditioned by the Standard Deviation of Net Income and the Standard Deviation of Cash Flow from Operations

	β_0	$\beta_1 \cdot$NI	$\beta_2 \cdot \mathrm{NI} \cdot \sigma(\mathrm{NI})$	$\beta_3 \cdot \mathrm{NI} \cdot \sigma(\mathrm{CFFO})$	Adjusted R^2
Predicted sign	?	+	-	-	
Pooled estimate	1.664	13.799	-13.859	-15.805	0.769
White's t-statistic	5.45	71.76	-1.71	-3.43	
Mean of 13 annual (1982-1994) estimations	1.463	14.137	-20.443	-13.476	0.793
t-statistic[b)]	4.18	6.44	-5.37	-1.16	

Table 5 (cont.)

Weighted Least Squares Estimates of Market Value of Equity Regressed on Net Income and Net Income Conditioned on Various Volatility Measures (n = 11,517 observations)[a)]

Panel D. DACCTG and DMGMT Interactive Terms Based on Cross-sectional Industry Estimates of the Accruals Model Parameters

	β_0	β_1·NI	β_2·NI·σ(CFFO)	β_3·NI·DACCTG	β_4·NI·DMGMT
Predicted sign	?	+	-	+	+
Pooled estimate	1.621	13.030	-22.003	0.260	1.224
White's t-statistic	5.37	26.67	-5.82	0.63	3.14

Adjusted R^2 = 0.770

$\beta_3 = \beta_4$: F-statistic = 28.90; Chi-squared statistic = 2.91

	β_0	β_1·NI	β_2·NI·σ(CFFO)	β_3·NI·DACCTG	β_4·NI·DMGMT
Mean of 13 annual (1982-1994) estimations	1.425	13.260	-23.440	0.609	1.192
t-statistic[b)]	3.88	10.34	-2.40	2.51	4.51

Mean Adjusted R^2 = 0.795

Panel E. DACCTG and DMGMT Interactive Terms Based on Time-Series Firm-Specific Estimates of the Accruals Model Parameters (N = 5,025)

	β_0	β_1·NI	β_2·NI·σ(CFFO)	β_3·NI·DACCTG	β_4·NI·DMGMT
Predicted sign	?	+	-	+	+
Pooled estimate	0.103	14.271	-26.467	0.559	1.123
White's t-statistic	0.24	59.46	-5.05	2.23	4.52

Adjusted R^2 = 0.836

$\beta_3 = \beta_4$: F-statistic = 5.05; Chi-squared statistic = 1.71

	β_0	β_1·NI	β_2·NI·σ(CFFO)	β_3·NI·DACCTG	β_4·NI·DMGMT
Mean of 9 annual (1986-1994) estimations	-0.076	14.314	-22.667	0.666	0.981
t-statistic[b)]	-0.23	13.29	-4.06	2.87	3.93

Mean Adjusted R^2 = 0.848

a) Variables are defined as in Table 4. All variables, including the intercept, are weighted by the book value of equity.

b) The t-statistic is calculated after correcting for first-order serial correlation in the annual coefficients. As in Abarbanell and Bernard (1995), the correction requires multiplying the standard error by the factor:

$$\left(\frac{(1+\phi)}{(1-\phi)}+\frac{2\phi(1-\phi^{T})}{10(1-\phi)^{2}}\right)^{\frac{1}{2}}$$

where ϕ equals the first-order autocorrelation estimated from the series of T=13 (9) annual coefficients in panels A-D (E).

Table 6

Measures of Future Profitability and Risk Regressed on Net Income and Net Income Conditioned on Three Volatility Measures[a)]

Panel A: Measures of Future Profitability

	γ_0	$\gamma_1 \cdot$NI	$\gamma_2 \cdot$NI$\cdot\sigma$(CFFO)	$\gamma_3 \cdot$NI$\cdot$DACCTG	$\gamma_4 \cdot$NI$\cdot$DMGMT
Predicted sign	?	+	-	+	+
1. Cumulative Future Earnings					
Pooled estimate	-0.255	5.320	-17.385	0.267	0.618
White's t-statistic	-1.12	48.84	-7.10	2.64	6.12

Adjusted R^2 = 0.719 N = 5,945

$\gamma_3 = \gamma_4$: F-statistic = 9.68; Chi-squared statistic = 8.45

	γ_0	$\gamma_1 \cdot$NI	$\gamma_2 \cdot$NI$\cdot\sigma$(CFFO)	$\gamma_3 \cdot$NI$\cdot$DACCTG	$\gamma_4 \cdot$NI$\cdot$DMGMT
2. Cumulative Future Operating Cash Flows					
Pooled estimate	0.545	9.749	-42.909	0.369	0.255
White's t-statistic	1.80	69.69	-14.40	2.75	1.89

Adjusted R^2 = 0.793 N = 5,037

$\gamma_3 = \gamma_4$: F-statistic = 0.46; Chi-squared statistic = 0.47

Panel B: Proxies for Future Firm Risk

	γ_0	$\gamma_1 \cdot$Risk	$\gamma_2 \cdot \sigma$(CFFO)	$\gamma_3 \cdot$DACCTG	$\gamma_4 \cdot$DMGMT
Predicted sign	?	+	+	-	-
3. Future Market Model Beta					
Regression estimate	0.315	0.530	0.482	0.002	-0.005
OLS t-statistic	22.71	42.11	3.47	0.17	-0.49

Adjusted R^2 = 0.214 N = 7,127

$\gamma_3 = \gamma_4$: F-statistic = 0.26

	γ_0	$\gamma_1 \cdot$Risk	$\gamma_2 \cdot \sigma$(CFFO)	$\gamma_3 \cdot$DACCTG	$\gamma_4 \cdot$DMGMT
4. Future Standard Deviation of Security Returns					
Regression estimate	0.042	0.468	0.106	-0.000	-0.002
OLS t-statistic	35.60	41.85	10.52	-0.47	-3.53

Adjusted R^2 = 0.252 N = 7,528

$\gamma_3 = \gamma_4$: F-statistic = 5.70

a) Cumulative future earnings is the sum of earnings over years t+1 to t+5 where t=0 is the year in which the observation is included in market value regression estimation. The cumulative sum is deflated by total assets at year end t=0. Cumulative future operating cash flows is calculated similarly.
Future market model beta and standard deviation of security returns are estimated using a minimum (maximum) of 24 (60) monthly returns over years t+1 to t+5. Market model beta is estimated using the equal-weighted market index. Contemporaneous market model beta and standard deviation of returns (included as independent variables) are estimated over years t-4 to t=0.
Other variables are defined in notes to Table 4.