Financial Reporting Quality and Idiosyncratic Return Volatility over the Last Four Decades

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September 2008

Abstract:

Campbell, Lettau, Malkiel and Xu (2001) show that stock returns of individual firms have become more volatile in the U.S. since 1960. We hypothesize and find that deteriorating earnings quality is associated with higher idiosyncratic return volatility over the period 1962-2001. These results are robust to controlling for (i) inter-temporal changes in the disclosure of value-relevant earnings information, sophistication of investors and for the possibility that earnings quality can be informative about future cash flows; (ii) stock return performance, cash flow operating performance, cash flow variability, growth, leverage and firm size; and (iii) accounting for new listings, high-technology firms and firm-years with losses, mergers and acquisitions and financial distress.

This is a preprint version of the article. The final version may be found at < http://dx.doi.org/10.1016/j.jacceco.2010.06.001 >.

*Corresponding Author. We acknowledge helpful comments from an anonymous referee, Tom Lys (editor), Bill Baber, Anne Beatty, Sanjeev Bhojraj, Michael Brandt, Uday Chandra, Dan Collins, Jennifer Francis, Jon Garfinkel, Cam Harvey, Christopher Jones, Irene Kim, Ryan LaFond, Mark Nelson, Per Olsson, Darren Roulstone, Terry Shevlin, Siew Hong Teoh and workshop participants at Cornell University, George Washington University, Ohio State University, University of Iowa, University of Kentucky and the 2005 American Accounting Association Conference. We also acknowledge financial support from the University of Washington Business School and Fuqua School of Business, Duke University.

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1. Introduction

Campbell, Lettau, Malkiel and Xu (2001) document an intriguing result – the level of average stock return volatility has increased considerably from 1962 to 1997 in the U.S. Furthermore, most of this increase is attributable to idiosyncratic stock return volatility as opposed to the volatility of the stock market index. In a similar vein, Morck, Yeung and Yu (2000) find that the ratio of idiosyncratic risk to systematic risk has surged over time in the U.S. This upward trend in idiosyncratic volatility has important implications for (i) portfolio diversification; (ii) arbitrageurs, who require substitutes for mispriced stocks with lower idiosyncratic risk; and (iii) the pricing of employee stock options and managerial compensation policies.

In this paper, we explore whether deteriorating financial reporting quality, proxied by accrual-based measures of earnings quality, is associated with the increase in idiosyncratic volatility over the last four decades.[1] Kothari (2000) points to rising stock return volatility around the globe and wonders whether transparency in financial statement information is related to these trends in stock return volatility. Several practitioner accounting bodies, most notably 'the Jenkins Committee,' contend that the traditional financial statements have lost their usefulness due to the transition of the U.S. economy from a manufacturing to a high-technology, intangible and information-

[1] There is neither an agreed upon meaning of the terms "financial reporting quality" and "earnings quality" nor a generally accepted approach to measure them. We assume poor earnings quality or poor financial reporting quality is consistent with financial statements that are not transparent. Pownall and Schipper (1999) define transparency as an accounting or disclosure system that "reveals the events, transactions, judgments and estimates underlying the financial statements and their implications." Our proxies (Dechow-Dichev earnings quality measure and absolute abnormal accruals discussed in more detail in Section 3) are intended to capture such transparency of financial reporting numbers.

intensive service oriented economy. Our paper provides evidence consistent with this conjecture.

Recent accounting research that examines the trends in informativeness of accounting numbers has reported mixed findings. Brown, Lo and Lys (1999) and Lev and Zarowin (1999) argue that the relevance of financial statements for stock market participants has declined over time while Collins, Maydew and Weiss (1997), Francis and Schipper (1999) and Landsman and Maydew (2002) conclude that the informativeness of financial statements has either stayed constant or increased over time. These studies generally examine time trends in the cross-sectional association between firms' stock returns (or stock prices) and summary accounting measures such as earnings and book values. In contrast, we focus on different market based measures (the variance of stock returns) and financial reporting quality variables (earnings quality) and find that deterioration in financial reporting quality is related to rising idiosyncratic volatility over the last 40 years.

In particular, we investigate whether the upward trend in idiosyncratic volatility is related to earnings quality operationalized in two ways: the extent to which accounting accruals map into operating cash flows as in Dechow and Dichev (2002) (DD), and the absolute value of abnormal accruals (|ABACC|). The earnings quality measures we consider are based on two distinct but related measurement approaches. The first, the DD measure, is based on Dechow and Dichev (2002) who argue that better the mapping of accounting accruals into past, current and future annual operating cash flows, greater the earnings quality. DD captures the extent to which accruals do not map into cash flows and hence, represents an inverse measure of earnings quality. The |ABACC| measure is based on the Jones' (1991) model of the normal component of accruals. This approach assumes that accruals are determined by fundamental shifts in operating activities of the firm such as revenues and fixed assets and any deviations from such fundamentals are due to managerial manipulation. Therefore, we consider the absolute value of abnormal accruals as an inverse measure of earnings quality, because greater deviations from the accrual model reflect greater earnings management.

Using data from 1962 to 2001, we document a noticeable decline in earnings quality (based on increasing DD and |ABACC| over time). To examine whether financial reporting quality is related to idiosyncratic return volatility we conduct two sets of analyses. First, we verify that, in the cross-section, earnings quality explains differences in firm specific idiosyncratic volatility. Second, and more pertinent, we investigate whether the time series trend in return volatility is associated with time trends in earnings quality. We conduct a time-series analysis because identifying a cross-sectional association between idiosyncratic volatility and financial reporting quality does not automatically imply a time-series relation between these constructs.

Consistent with theory that worsening earnings quality causes noisier earnings (e.g., Diamond and Verrecchia 1991; Leuz and Verrecchia 2000; Easley and O'Hara 2004 and O'Hara 2003), results from time-series and cross-sectional regressions indicate a strong association between rising idiosyncratic return volatility and falling earnings quality. These results obtain after controlling for several potential confounds. First, idiosyncratic volatility could have increased over time because firms have voluntarily increased disclosure of earnings-related information, for example, via conference calls or via the release of pro-forma earnings (see Francis, Schipper and Vincent 2002, Collins, Li and Xie 2006). Second, an increase in idiosyncratic volatility could reflect greater trading by unsophisticated traders in the capital market through the advent of electronic trading. Third, worsening earnings quality over time could potentially be informative about firms' deteriorating future cash flows (see Watts and Zimmerman 1976 and Subramanyam 1996). Four, the relation between worsening earnings quality and rising idiosyncratic volatility could merely reflect the effects of other omitted variables such as stock return performance, operating performance, cash flow variability, book-to-market ratio, leverage and firm size.

Although we control for a wide variety of potentially omitted firm characteristics, endogeneity is always a concern in studies such as ours. We attempt to address endogeneity concerns by conduct a "changes" analysis and we confirm that firms with the largest decrease (increase) in earnings quality also experience the largest increase (decrease) in idiosyncratic return volatility. Next, we investigate institutional factors and trends in financial reporting practices that might contribute to the time-series association between financial reporting quality and idiosyncratic volatility. We find that the temporal link between idiosyncratic volatility and the two information quality proxies persists even after (i) recognizing the spurt in new listings in the 1980s documented by Fama and French (2004); (ii) controlling for technology-intensive firms where new business models may decrease the quality of accounting information; (iii) identifying firm-years with negative earnings as the increasing incidence of negative earnings may have contributed to the decline in earnings quality over the last several decades (Collins, Pincus and Xie 1999); and (iv) controlling for mergers and acquisitions activity and financial distress.

In supplementary analyses, we document that decreases in earnings quality are associated with higher return volatility via increased dispersion in analysts' forecasts. The intuition is that if earnings quality falls, we would expect analysts to place less weight on the common earnings signal and to place greater weight on other – possibly idiosyncratic – private information about future firms' prospects that analysts acquire. This, in turn, impacts return volatility if different investors follow different analysts. We also find that increasing volatility of returns around earnings announcements is associated with falling earnings quality, after accounting for potential increases in the disclosure of earnings-related information around earnings announcements, the signaling role of earnings quality for future cash flows and changing sophistication of investors over time.

We make two important contributions to extant finance and accounting literatures. First, we document that earnings quality (based on Dechow Dichev measures and abnormal accruals) has systematically fallen over the last 40 years. Although we do not claim that falling earnings quality and rising idiosyncratic volatility are necessarily causally related to one another, this provocative temporal association appears, on the surface, to be consistent with practitioner complaints that financial reports have become more opaque and less relevant over time. Second, we are among the first to empirically identify the role of deteriorating earnings quality as an important factor associated with the temporal increase in idiosyncratic volatility documented by Campbell et al. (2001). In that sense, we integrate the literature in finance related to time trends in idiosyncratic volatility with the literature in accounting related to time trends in the informativeness of accounting numbers for market participants.

The remainder of the paper proceeds as follows. Section 2 discusses related research and develops the hypothesized relation between financial reporting quality with idiosyncratic volatility. Section 3 discusses the empirical measures for earnings quality (both DD and |ABACC| measures). Section 4 reports the sample selection process, measurement of key variables and descriptive statistics. Section 5 features the results of the cross-sectional and time-series regressions linking idiosyncratic volatility with earnings quality. In Section 6, we consider several institutional and accounting factors to help explain the time-series trends in idiosyncratic risk and earnings quality. We present our conclusions in Section 7.

2. Related Research and Hypothesis

2.1 Stock return volatility

Campbell et al. (2001) find that the volatility of the stock market has remained relatively constant over the period 1962 to 1997. However, idiosyncratic volatility has increased substantially over this time period to a point where idiosyncratic volatility is the largest component of firm-specific return volatility. Campbell et al. (2001) suggest a number of possible explanations for this phenomenon including increasing leverage, higher incidence of spin-offs of conglomerates, firms issuing stocks earlier in their life-cycles and increase in option-based compensation. We are aware of three papers that explore some of these conjectures. Xu and Malkiel (2003) investigate whether shocks to institutional sentiment explain the idiosyncratic volatility of stock returns. They find that the proportion of institutional ownership is correlated with volatility. Wei and Zhang (2004) find that variation in firm performance over time is related to the inter-temporal variation in idiosyncratic volatility. Irvine and Pontiff (2005) attribute the Wei and

Zhang (2004) result to fundamental cash flow shocks on account of rising economy-wide competition. Following Kothari (2000) and O'Hara (2003) we identify deteriorating financial reporting quality as another explanation for the upward trend in idiosyncratic volatility.[2]

2.2 Financial reporting quality and idiosyncratic volatility

Improving disclosures and the quality of financial reporting mitigate information asymmetries about a firm's performance and reduces the volatility of stock prices (Diamond and Verrecchia, 1991; Healy, Hutton and Palepu, 1999). An increase in stock return volatility is likely to increase the information asymmetric component of the cost of capital (Leuz and Verrecchia (2000), Froot, Perold and Stein (1992)).[3]

In the finance literature, Easley and O'Hara (2004) and O'Hara (2003) posit that a firm's accounting treatment of earnings and its disclosure policy — its financial reporting quality — can influence the firm's information environment (information risk) and consequently, its idiosyncratic volatility and the cost of capital. Francis, LaFond, Olsson and Schipper (2005) and Aboody, Hughes and Liu (2004) use accounting earnings

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[2] Morck, Yeung and Yu (2000) and Jin and Myers (2004) document a cross-sectional association between lower stock market synchronicity, measured as the R^2 of the regression of firm stock returns on the returns to a market index, and higher transparency of financial reporting across countries. Our paper differs from these papers on two important dimensions. First, these papers assume that publicly available accounting information is unambiguous and completely precise. Instead we argue that publicly available measures of earnings quality are noisy. Second, these studies are designed to exploit institutional differences across countries in property rights and quality of government to explain international differences in market synchronicity. Our objective is to explore intra-U.S. patterns in idiosyncratic volatility and financial reporting, keeping the quality of the government and the property rights environment in that country constant.

[3] Note that the broader question of whether idiosyncratic volatility is priced by the stock market is controversial. For example, Goyal and Santa-Clara (2003) argue that idiosyncratic volatility is associated with returns to the market index while Bali, Cakici, Yan and Zhang (2005) show that the Goyal and Santa-Clara (2003) result is specific to certain time periods and is attributable only to small stocks. Even if idiosyncratic risk were not priced in stock returns, we believe that documenting a link between deteriorating financial reporting quality and increasing stock return volatility is valuable. This is because increasing stock return volatility has important implications for arbitrage opportunities, portfolio diversification and stock option pricing.

quality as a proxy for information risk and demonstrate that earnings quality is related to expected returns. However, neither paper examines the cross-sectional or time-series relation between the quality of accounting information and idiosyncratic volatility.

Leuz and Verrecchia (2000) examine the consequences of improved disclosure quality on a firm's bid-ask spreads, trading volume and stock-return volatility in the context of German firms that switched from German GAAP to U.S. GAAP or IAS. They hypothesize that German firms switch to an arguably better financial reporting regime, commit to increased disclosure and hence experience a reduction in the asymmetric information component of the cost of capital. The authors find that bid-ask spreads decline and trading volume improves when German firms switch to an international reporting regime.

Pastor and Veronesi (2003) posit that significant uncertainty about a firm's average profitability influences stock return volatility. To the extent that financial reporting quality is poor, uncertainty about a firm's future profitability is likely to be high. Thus, the Pastor and Veronesi (2003) model is also consistent with the hypothesis that poor information quality is associated with increased idiosyncratic volatility.[4]

Note that the above-cited papers argue primarily for a positive association between poor financial reporting quality and idiosyncratic volatility in the *cross-section of firms*. Our focus, however, is on the time-series trends in the two constructs. *A priori*, it is conceivable that despite the existence of a cross-sectional relation, there may be no

[4] Both Pastor and Veronesi (2003) and Wei and Zhang (2004) find that idiosyncratic volatility is related to volatility of accounting return on equity. However, these papers do not distinguish between sources of increased uncertainty about a firm's profitability, viz., volatility of cash flow stream as opposed to information about future cash flow volatility arising from the quality of accounting information. Our paper identifies earnings quality as an important determinant of idiosyncratic volatility after controlling for a firm's underlying cash flow or earnings volatility.

time-series association between idiosyncratic volatility and deteriorating financial reporting quality. Nevertheless, we test for a cross-sectional association to i) ensure the existence of a systematic relation between the two variables and ii) guard against the charge that we have documented an association between two variables that merely happen to have increasing time trends.

2.3 Why should lower earnings quality result in higher stock return volatility?

Our primary premise is that a decline in earnings quality over time is associated with higher idiosyncratic stock return volatility. Our empirical test of this premise will involve documenting a positive inter-temporal association between stock return volatility and poor earnings quality. However, documenting such an association is potentially insufficient to validate our claim because changes in idiosyncratic volatility can result from three confounding factors: (i) changes in the firms' disclosure of earnings related information over time; (ii) changes in the sophistication of investors over time; and (iii) changes in the signaling role of earnings quality for firms' future cash flows. We consider each of these explanations in greater detail below.

2.3.1 Changes in earnings related information over time

Francis, Schipper and Vincent (2002) conduct an analysis of disclosures (summary income statements with separate disclosure of transitory earnings components, summary balance sheet and cash flow statement information) released as part of the earnings announcements and find the temporal increase in return volatility surrounding earnings announcements is positively associated with these concurrent disclosures. Collins, Li and Xie (2006) find that a temporal increase in firms reporting of Street (non-GAAP) earnings that leave out items such as restructuring charges, asset impairments, one-time charges related to mergers and acquisitions, goodwill amortization and R&D expenses. Moreover, Collins et al. (2006) find that Street earnings surprises are significantly positively associated with trading volume around earnings announcements. These papers suggest that increased disclosure of earnings-related information could have contributed to the temporal increase in the return volatility as opposed to poor earnings quality.

2.3.2 Changes in the sophistication of investors over time

Harris (2003) argues that “transitory volatility is due to trading activity by uninformed traders.” Hence, an alternative explanation for increase in idiosyncratic volatility over time is a rise in the proportion of “noise traders” in the market, especially after the advent of on-line trading. Moreover, Lee (1992) documents that small traders (arguably uninformed) tend to be net buyers around earnings related events. Hedge funds are also alleged to trade on the earnings surprises without regard for the “fundamentals” of the stock (Graham, Harvey and Rajgopal 2005).

2.3.3 Earnings quality as a signal of future cash flows

Our claim is that an increase in earnings management reduces the precision of the earnings signal and is thus related to increased idiosyncratic return volatility. However, one could counter-argue that earnings management, if detectable by investors, could also provide additional information to investors (see Watts and Zimmerman 1976). For example, Subramanyam (1996) finds that the discretionary accruals have positive value implications in that it is positively related to contemporaneous returns and predicts future profitability and dividend changes. He concludes that managerial discretion improves the informativeness of earnings.

2.4 Empirical design to address these confounds

We attempt to account for the three confounding factors enumerated above in our research design. In particular, we control for inter-temporal variation in earnings related disclosures via the introduction of an interaction of a time-trend and (i) the absolute value of analyst forecast revisions made during the year ($|FREV_A|$); and (ii) the absolute value of contemporaneous annual buy and hold return (|RET|). We control for the inter-temporal variation of the sophistication of investors using interaction between the time trend and two proxies for investor sophistication: (i) analyst coverage (NANAL); and (ii) the proportion of stock ownership held by institutional investors (INST).

To account for the possibility that the positive association between idiosyncratic return volatility and poor earnings quality could be attributable to increased informativeness of earnings quality for future cash flows, we include an interaction of the time-trend and the next year's cash flows (CFO_{t+1}) as a proxy for the information contained in earnings quality about future cash flows. Thus, after controlling for all the potential confounds discussed above, if we observe a positive association between rising idiosyncratic return volatility and falling earnings quality, we can make a stronger claim that the rising idiosyncratic risk over time is more likely attributable to noisier earnings due to increasing earnings management.

3. Proxies for financial reporting quality

We consider two measures of earnings quality as proxies for financial reporting quality. The first measure, labeled DD, is derived from Dechow and Dichev (2002) and Francis et al. (2005). The second measure of earnings quality is the magnitude of abnormal accruals, labeled |ABACC| (used in several prior studies such as Warfield et al. 1995, Bowen et al. 2004). These measures are described in greater detail below.

3.1 Earnings quality measure based on Dechow and Dichev (2002)

Our first measure of earnings quality, DD, is based on an approach proposed by Dechow and Dichev (2002) and Francis et al. (2005). The underlying premise of this approach is that earnings quality is primarily determined by the quality of accruals as earnings are composed of the sum of operating cash flows and accruals. The intuition is that accounting accruals either anticipate future operating cash flows or reflect current cash flows or reversals of past cash flows. Measurement error in determining accruals could potentially distort the ability of accruals to anticipate future cash flows or to reflect past and current cash flows. Such measurement error could be the result of unintentional errors arising from business uncertainty and management lapses, or due to intentional estimation errors arising from managerial incentives to manipulate earnings.

The principal idea behind Dechow and Dichev (2002) is to determine the extent of this measurement error in the mapping of accruals and cash flows. The variance of this measurement error can be viewed as an inverse measure of earnings quality. Dechow and Dichev (2002) model the relation between accruals and cash flows as follows (all variables including the intercept are scaled by average assets):

$$TCA_{it} = \phi_0 + \phi_1 CFO_{it-1} + \phi_2 CFO_{it} + \phi_3 CFO_{it+1} + v_{it} \qquad (1)$$

where *TCA* is total current accruals calculated as $\Delta CA - \Delta CL - \Delta Cash + \Delta STDEBT$, ΔCA is change in current assets (Compustat # 4), ΔCL is change in current liabilities (Compustat # 5), $\Delta Cash$ is change in cash (Compustat # 1), $\Delta STDEBT$ is change in debt in current liabilities (Compustat # 34). *CFO* is cash flow from operations computed as

IBEX –TCA+DEPN, where *IBEX* is net income before extra-ordinary items (Compustat # 18), *DEPN* is depreciation and amortization expense (Compustat # 14). Subscripts *i* and *t* are firm and time subscripts respectively.

Under equation (1) higher accrual quality implies that accruals capture most of the variation in current, past and future cash flows and as a consequence the firm-specific residual, ν_{it}, forms the basis of the earnings quality proxy used in the study. Specifically, the earnings quality (DD_{it}) metric is defined as the standard deviation of firm *i*'s residuals, calculated over years t-4 through t i.e., $DD_{it} = \sigma(\nu_{it-4,t})$. We treat larger standard deviations of residuals as an indication of poor accruals and earnings quality.

Francis et al. (2005) and McNichols (2002) suggest that the earnings quality measure derived from (1) can be improved by controlling for two important determinants of accruals, viz., growth in revenues and the level of property, plant and equipment (see also Jones (1991)). So, we augment equation (1) as follows:

$$TCA_{it} = \phi_0 + \phi_1 CFO_{it-1} + \phi_2 CFO_{it} + \phi_3 CFO_{it+1} + \phi_4 \Delta REV_{it} + \phi_5 PPE_{it} + \nu_{it} \qquad \text{(1a)}$$

where *ΔREV* is change in revenues (Compustat # 12), *PPE* is gross value of property, plant and equipment (Compustat # 7). We estimate equation (1a) for every firm-year in each of Fama and French's (1997) 49 industry groups where we can find at least 20 firms in year *t*.[5]

3.2 Abnormal accruals (|ABACC|)

As an alternative measure of earnings quality, we consider the absolute value of the firm's abnormal accruals. This measure relies on the idea that changes in a firm's accruals are primarily determined by changes in firm fundamentals particularly, changes

[5] Consistent with Francis et al. (2005), we winsorize the extreme values of the distribution of the dependent and the independent variables to the 1 and 99 percentiles.

in revenues and changes in property, plant and equipment. If a firm's accruals deviate significantly from the level determined by changes in firm fundamentals then such deviations are deemed abnormal and such abnormal accruals are assumed to reduce the quality of accruals and hence, earnings quality.

To determine abnormal accruals, we apply Jones' (1991) model, and estimate the following regression for each of Fama and French's (1997) 49 industry groups with at least 20 firms in year t (all variables including the intercept are scaled by average assets).

$$TA_{it} = \delta_0 + \delta_1 \Delta REV_{i,t} + \delta_2 PPE_{it} + \eta_{it} \quad (2)$$

where *TA* = firm i's total accruals, computed as *TCA-DEPN*.[6] The other terms have been defined before. The industry-and year-specific parameter estimates obtained from equation (2) are used to estimate firm-specific normal accruals (as a percent of average total assets):

$$NA_{i,t} = \hat{\delta}_0 + \hat{\delta}_1 \Delta REV_{i,t} + \hat{\delta}_2 PPE_{it} \quad (2a)$$

where *NA* refers to "normal" accruals. We calculate abnormal accruals, ABACC, in year t as TA_{it} - NA_{it} and treat the absolute value of ABACC as our second proxy for earnings quality. We interpret higher (lower) values of |ABACC| as measures of lower (higher) earnings quality.

An advantage of |ABACC| over DD is that |ABACC| can be computed for annual intervals (and even shorter intervals such as quarters as discussed in section 5.4) whereas DD can be computed only over a five-year moving average window.

[6] Research by Kothari, Leone and Wasley (2005) suggest that adjusting for firm performance is important when determining abnormal levels of accruals. In sensitivity analysis (unreported) we estimate equation (2) after controlling for firm performance proxied by return on assets and use the resultant abnormal accruals in all our empirical tests and find that the inferences are unchanged.

4. Sample, variable measurement and descriptive statistics

4.1 Sample

We use two samples for conducting the data analyses in this paper: (i) the Dechow-Dichev (DD) sample; and (ii) the abnormal accruals (|ABACC)| sample. The DD sample and the |ABACC| sample spans the time-period 1962-2001 and is created from the intersection of stock return volatility data from the CRSP database, which includes firms from NYSE, AMEX and NASDAQ, and accounting data from COMPUSTAT. Analyst forecast revisions and errors are obtained from IBES database. Eliminating firms with missing data to calculate both stock return volatility and the DD measure leaves a sample of 95,270 observations. The |ABACC| sample, due to fewer variable requirements in estimating abnormal accruals, is slightly larger than the DD sample and consists of 103,589 observations.

4.2 Measurement of variables

We compute two measures of stock return volatility: VAR^{raw} and VAR^{Rmadj}. VAR^{raw} refers to the average monthly variance of raw returns for firm *i* in year *t*. Monthly variance of raw returns is computed as the sample variance of daily raw returns within a month, multiplied by the number of trading days in the month. VAR^{Rmadj} refers to the average monthly variance of market-adjusted returns, where we measure market-adjusted returns as the excess of daily stock return for firm *i* over the daily return on the value-weighted market portfolio. Consistent with prior work (e.g., Campbell et al. 2001) we use returns from the in-sample value-weighted market portfolio, as opposed to the value-weighted index provided in the CRSP dataset. However, our inferences are unchanged if we use the CRSP value-weighted index.

Consistent with Campbell et al. (2001), we adopt a simple market-adjustment procedure where value-weighted market returns are subtracted from the firm's returns. We do not attempt to adjust for market return based on the firm's CAPM beta (or even more sophisticated adjustments based on the SMB and HML loadings proposed by Fama and French 1993) because such adjustments for daily returns tend to be unstable over time. Moreover, results in Xu and Malkiel (2003) suggest that adjusting for Fama and French (1993) factors has virtually no effect on the time-series trends in idiosyncratic return volatility. Results in the forthcoming tables are based on VAR^{Rmadj}. However, we have re-estimated all regressions with VAR^{Raw} and find no change in the reported inferences.

In analyzing the relation between idiosyncratic stock return volatility and reporting quality, we control for several variables that are posited to influence idiosyncratic return volatility in the cross-section.

Cash flow volatility:

Vuolteenaho (2002) shows that firm level stock returns are a function of both expected return news and unexpected cash flow news. In other words, idiosyncratic return volatility is related to the variance of cash flows. Hence, we control for the conditional variance in cash flow news via the variance of cash flows (VCFO).[7] We measure VCFO for each firm-year as the variance of annual operating cash flows scaled by total assets over the trailing five year window for that firm. The relation between VCFO and stock return volatility is expected to be positive.

Operating performance:

[7] Our inferences are unaltered if we use the variance of earnings (scaled by assets or book value of equity) instead of variance of cash flows.

Hanlon, Rajgopal and Shevlin (2004) find that operating performance, defined either as earnings or operating cash flows scaled by total assets, is negatively associated with stock return volatility in the cross-section. Therefore, we introduce CFO, computed as cash flows scaled by average total assets, as a control variable.[8]

Stock return performance:

Duffie (1995), among others, observes that stock return performance is negatively related to return volatility. We define firm stock returns (RET) as annual buy-and-hold returns.

Size:

Pastor and Veronesi (2003) show that small firms experience higher return volatility. Hence, we control for firm size, where SIZE is the natural logarithm of market capitalization. Market values are determined three months after the end of fiscal year to ensure that stock prices reflect all available financial accounting information for that fiscal year.

Book-to-market:

We expect a negative relation between book-to-market and idiosyncratic return volatility because firms with greater growth opportunities are likely to be experience greater stock return volatility. We measure book-to-market as the ratio of book value of equity, defined as total assets (Compustat # 6) minus total liabilities (Compustat #181), divided by the market value of equity.[9]

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[8] Our inferences are unchanged if we use accounting return on assets (ROA) or accounting return on equity (ROE) instead. Callen and Segal (2004) extend Voulteenaho's (2002) variance decomposition framework to document that in addition to cash flow news, information about accruals explain return volatility. In untabulated results, we control for accrual volatility in all our empirical specifications and find that none of our inferences change.

Leverage:

Levered firms are more likely to experience financial distress suggesting a positive association between stock-return volatility and financial leverage in the cross-section. We define financial leverage (LEV) as the ratio of long-term debt (Compustat #9 + Compustat #34) to book value of total assets (Compustat #6).

4.3 Descriptive statistics

Table 1 presents summary information for the key variables used in the study. Results indicate that the average monthly idiosyncratic volatility, based on either raw or market adjusted returns, is about 4%. The average firm has a market capitalization of $75 million (untabulated), a book-to-market ratio of about 0.99, significant operating cash flows as a percentage of total assets (5%) and financial leverage of 24% of total assets.[10]

In order to examine time-trends in return volatility and proxies for financial reporting quality, we divide the entire sample period into ten four-year sub-periods. Panel A of Table 2 presents average idiosyncratic return volatility and earnings quality (both DD and |ABACC| measures) across the various sub-periods. Consistent with prior research, we find that idiosyncratic volatility has grown by a factor of six over the last four decades, from 1.13% in the 1962-1965 time window to about 7.22% in the 1998-2001 window.[11] The last two decades, in particular, have witnessed a big increase in idiosyncratic return volatility. The DD measure of earnings quality measure has tripled

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[9] We do not use common equity (COMPUSTAT#60) as our measure of book equity because this data item contains many missing values until 1966 (see Collins, Maydew and Weiss 1997).

[10] To control for potential outliers, we winsorize the financial statement variables in the extreme 1% of the respective distributions. We do not winsorize idiosyncratic volatility to stay consistent with Campbell et el. (2001). However, in untabulated analyses, we verified that idiosyncratic volatility, when winsorized at the 1% and 99% levels, yields inferences similar to those tabulated in the paper.

[11] The trend is very similar when we consider variance of raw returns.

over the last four decades rising from 2.01 in the 1962-1965 time frame to 5.96 in the 1998-2001 time-window. The |ABACC| measure of earnings quality has increased from 4.45 in the 1962-1965 window to 6.84 in the 1998-2001 window. This implies a significant decline in earnings quality as higher DD and |ABACC| signify poorer earnings quality. However, the rate of the increase in DD and |ABACC| over time is more evenly distributed over time.

To provide a visual representation of the data in Table 2, we present the time-series trends in idiosyncratic volatility, DD and |ABACC| in Figure 1. Consistent with prior work, idiosyncratic volatility has been on the rise. More important, the upward trend in both earnings quality measures points to a time-series relation between idiosyncratic volatility and proxies for reporting quality. For a more rigorous analysis of the underlying relation between return volatility and reporting quality we conduct several empirical tests detailed below.

5. Empirical tests of the relation between idiosyncratic volatility and financial reporting quality

5.1 Cross-sectional tests

We begin with a set of cross-sectional regressions of idiosyncratic volatility on two proxies of reporting quality, DD, |ABACC| after incorporating the control variables discussed in section 2.4 and 4.2. Although the primary focus of the paper is the time-series association between idiosyncratic volatility and financial reporting quality, it is useful and important to demonstrate the existence of cross-sectional relation between idiosyncratic return volatility. At the outset, we estimate a simple regression that relates return volatility with earnings quality:

$$VAR_{it} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \zeta_{it} \qquad (3)$$

We use the label "EQ" to imply that either the DD or the |ABACC| measure applies to the argument. Note that EQ is lagged by one year relative to VAR to avoid picking up mere contemporaneous associations between idiosyncratic volatility and proxies for reporting quality. We estimate equation (3) as a pooled cross-sectional and time-series regression, for the two earnings quality measures separately. To control for auto-correlation in error terms we use the Generalized Method of Moments Procedure that incorporates the Newey and West (1987) auto-correlation correction.

Results of estimating equation (3) using DD (|ABACC|) measure are presented in Panel B(C) of Table 2. Results in panel B indicate that the coefficient on DD is positive and statistically significant across all sub-periods. This suggests that poor earnings quality is associated with greater firm-level return volatility. When we substitute |ABACC| in place of DD in panel C, our inferences are unchanged. Thus, lower earnings quality is associated with higher idiosyncratic return volatility in the cross-section across various sub-periods. Results are unchanged when we estimate a modified version of equation (3) that includes the control variables identified in section 2.4 and 4.2.

5.2 Pooled cross-section and time-series tests

The results presented in section 5.1 demonstrate the existence of a cross-sectional association between idiosyncratic volatility and proxies for financial reporting quality. In this section we assess (i) whether idiosyncratic return volatility has increased over time; and (ii) whether such an increase is associated with decreases in reporting quality. For this, we employ a dataset of pooled cross-sectional and time-series observations.

We begin with the result that idiosyncratic volatility has increased over time, represented by a positive β_1 in equation (4) below:

$$VAR_{it} = \beta_0 + \beta_1 TIME_{i,t} + \varepsilon_{it} \tag{4}$$

where TIME is a time trend variable that takes on values from 1 to 40 for each of the years 1962 to 2001 in the sample. The key hypothesis in the paper is that the link between idiosyncratic volatility and time is associated with proxies for reporting quality:

$$\beta_1 = \omega_0 + \omega_1 EQ_{i,t-1} + \psi_{it} \tag{5}$$

Substituting (5) into (4) yields the following model specification applied to a dataset consisting of pooled cross-sectional time-series observations:

$$VAR_{it} = \lambda_0 + \lambda_1 TIME_{i,t} + \lambda_2 TIME_{i,t} * EQ_{i,t-1} + \varepsilon_{it} \tag{6}$$

We augment equation (6) with controls for potential omitted variables that might affect the temporal link between time and idiosyncratic risk and estimate the following specification:

$$\begin{aligned} VAR_{it} = {} & \lambda_0 + \lambda_1 TIME_{i,t} + \lambda_2 TIME_{i,t} * EQ_{i,t-1} + \lambda_3 TIME_{i,t} * \left|FREV_A\right|_{i,t-1} \\ & + \lambda_4 TIME_{i,t} * \left|RET\right|_{i,t-1} + \lambda_5 TIME_{i,t} * NANAL_{i,t-1} + \lambda_6 TIME_{i,t} * INST_{i,t-1} \\ & + \lambda_7 TIME_{i,t} * CFO_{i,t+1} + \lambda_8 TIME_{i,t} * CFO_{i,t-1} + \lambda_9 TIME_{i,t} * VCFO_{i,t-1} + \lambda_{10} EQ_{i,t-1} \\ & + \lambda_{11} \left|FREV_A\right|_{i,t-1} + \lambda_{12} \left|RET\right|_{i,t-1} + \lambda_{13} NANAL_{i,t-1} + \lambda_{14} INST_{i,t-1} + \lambda_{15} CFO_{i,t+1} \\ & + \lambda_{16} CFO_{i,t-1} + \lambda_{17} VCFO_{i,t-1} + \lambda_{18} BM_{i,t-1} + \lambda_{19} SIZE_{t-1} + \lambda_{20} LEV_{i,t-1} + \lambda_{21} RET_{i,t} + \varepsilon_{it} \end{aligned} \tag{7}$$

As before, we estimate equation (7) using the GMM procedure with Newey and West (1987) correction for autocorrelation for three lags.

Consistent with prior research, we predict a positive coefficient on TIME. We interact time with eight variables in (7): EQ, $|FREV_A|$, $|RET|$, NANAL, INST, CFO_{t+1},

CFO_{t-1} and VCFO.[12] If deterioration in earnings quality explains the increasing trend in idiosyncratic volatility, we expect a positive coefficient on TIME*EQ after controlling for the other interaction terms with TIME. As discussed in section 2.4, the interactions of TIME with $|FREV_A|$ and |RET| control for the hypothesis that increasing disclosure of earnings news potentially accounts for the positive coefficient of TIME*EQ. The interactions of TIME with NANAL and INST control for the possibility that the positive coefficient on TIME*EQ is attributable to changing investor sophistication over time. We interact TIME with CFO_{t+1} to address the possibility that deteriorating earnings quality is potentially informative about future cash flows. The interactions of TIME with CFO and VCFO consider the possibility that time-trends in cash flow performance and variability of cash flows are potential competing explanations for increases in return volatility. We also include main effects for EQ, $|FREV_A|$, |RET|, NANAL, INST, CFO_{t+1}, CFO_{t-1} and VCFO to control for cross-sectional differences in these variables over the sample period.[13]

Results related to the estimation of equation (7) are presented in Table 3. In the discussion of results that follow we focus on the DD measure (column 1) as the results for the |ABACC| measure (column 2) are similar. As expected, the coefficient on TIME*DD reported in column (1) is positive (coefficient = 0.018) and significant (t = 10.01) suggesting that part of the temporal increase in idiosyncratic volatility is associated with deterioration in earnings quality. Consistent with conjectures that

[12] For firms and periods prior to 1978 for which analyst forecast revisions are unavailable, we code forecast revisions as zero. If anything, this treatment would bias against finding a positive coefficient for the variable of interest (TIME*EQ) because as the absolute value of FREV would be higher in the post 1978 period than the pre 1978 period.

[13] Our inferences are unaffected if we do not include the main effects. Further, in an untabulated sensitivity check, we include TIME interaction terms for SIZE, BM and LEV and find that our inferences are unaltered even after including those additional interaction terms.

increased disclosure of earnings news is associated with higher return volatility, we find a positive and significant coefficient on TIME*|RET| (coefficient = 0.065, t-statistic = 3.69). However, changes in analyst coverage and institutional owners over time do not appear to be associated with rising idiosyncratic volatility. Consistent with Wei and Zhang (2004) we find that poor performance is associated with an increase in idiosyncratic risk as the coefficients on TIME*CFO_{t-1} and on TIME*CFO_{t+1} are negative. Note that controlling for the potential impact of worsening earnings quality on future cash flows via TIME*CFO_{t+1} does not affect the positive coefficient on TIME*EQ.

5.3 Firm fixed effects analysis

Readers may be concerned that inferences about the association between time-trends of information quality and return volatility in section 5.2 are based on a pooled-cross-section and time-series regression where multiple annual observations for the same firm are used. While the Newey and West (1987) autocorrelation correction mitigates such concerns, we examine the robustness of our results by estimating a fixed-effects version of equation (7) where every firm in the sample and every year in the sample is assigned a dummy variable. Results (unreported) from the fixed-effects model, however, suggest that the positive coefficients on TIME*DD and TIME*|ABACC| are robust.

5.4 Pure time-series tests

Estimating equation (7) using a pooled cross-sectional time-series dataset, as in section 5.2, has the advantage of significant statistical power to test our hypothesis that the secular upward trend in idiosyncratic volatility is related to a similar secular trend in reporting quality. A potential disadvantage of using a pooled dataset is the possibility of spurious cross-sectional correlations affecting inferences about the time-series relation.

For example, idiosyncratic volatility and proxies for financial reporting quality could be related in the cross-section without displaying any time-series associations (although Figure 1 and Table 2 would suggest otherwise). To guard against the possibility that pooled cross-sectional time-series design potentially induces a spurious significant coefficient on the *TIME*DD* (or |*ABACC*|) while estimating equation (7), we also conduct a pure time-series test to relate VAR_t with $|ABACC|_t$.

A limitation of the time-series test conducted over annual time intervals is the potential small sample size (n= 40 years) and the consequent low statistical power. To increase statistical power, we conduct the time-series tests using quarterly time intervals. We restrict our analysis to the |ABACC| earnings quality measure because the DD measure cannot be easily constructed on a quarterly basis. Because quarterly data for determining accruals is not available until 1976 from COMPUSTAT and analyst forecasts are only available for a reasonable sample of firms since 1978 from the Zacks and IBES databases, we use data available for 94 quarters starting from the third quarter of 1978 to the fourth quarter of 2001.

In particular, we estimate time-series regressions of the following type:

$$\begin{aligned} VAR_t &= \theta_0 + \theta_1 TIME_t + \theta_2 \left|ABACC\right|_{t-1} + \theta_3 \left|FREV_Q\right|_{t-1} + \theta_4 \left|RET\right|_{t-1} + \theta_5 NANAL_{t-1} + \theta_6 INST_{t-1} \\ &+ \theta_7 CFO_{t+1} + \theta_8 CFO_{t-1} + \theta_9 VCFO_{t-1} + \theta_{10} BM_{t-1} + \theta_{11} SIZE_{t-1} + \theta_{12} LEV_{t-1} + \theta_{13} RET_t + \kappa_t \end{aligned} \quad (8)$$

where VAR_t is equally-weighted average variance of daily market-adjusted returns measured every quarter, and $|ABACC|_{t-1}$ is equally-weighted average |ABACC| measured every quarter. Abnormal accruals are estimated using the procedure described in section 3.2 except that we rely on quarterly data. $FREV_Q$ is the forecast revision of one quarter ahead earnings as opposed to one year ahead earnings. The other independent variables in (8) represent equally-weighted quarterly averages.

The regression error-terms from equation (8) are likely to be auto-correlated with conditional heteroscedasticity. Hence, we employ GMM based t-statistics that use Newey-West (1987) type corrections (up to three lags) for auto correlation. The regression results reported in Table 4. Column (1) reports the results where we consider only the earnings quality measure |ABACC| along with the control variables. The evidence indicates a clear time-series association between VAR and |ABACC| (coefficient on |ABACC| is 1.586, t-statistic = 2.28). Thus, there is reliable evidence of a time-series based association between a downward trend in earnings quality and a concurrent increase in idiosyncratic return volatility.

The results from the time-series tests serve to underscore that a cross-sectional association between idiosyncratic risk and financial reporting quality in cross-section (reported in section 5.2) does not mechanically imply a time-series association as well. For example, in the cross-section, SIZE exhibits a very significant negative association with idiosyncratic risk (t-statistics ranging from -32.93 to -35.11 in Table 3), suggesting that smaller firms have more volatile stock returns. However, the time-series relation between idiosyncratic risk and size in the time-series results is statistically insignificant, suggesting that both idiosyncratic return volatility and firm size have increased over time.

5.5 Analyst forecast dispersion

An alternate test of our premise that worsening earnings quality is associated with greater idiosyncratic risk is to evaluate how earnings quality affects dispersion of analysts' forecasts. Analyst forecasts, just like stock prices, are an observable measure of how investors interpret earnings information. If earnings quality falls, we would expect analysts to place less weight on the common earnings signal and to place greater weight on other – possibly idiosyncratic – private information. This, in turn, may impact return volatility if different investors follow different analysts. Thus, a decrease in earnings quality is potentially associated with higher return volatility via increased dispersion in analysts' forecasts.

One way to empirically evaluate this line of reasoning is to decompose the increase in analyst forecast dispersion (DISP) into the portion explained by falling earnings quality and into a residual portion. That is, we regress DISP on EQ each year and then obtain the extent of DISP predicted by EQ (i.e., the predicted value, PDISP) and the error term from such regression (EDISP). Next, we interact TIME with both PDISP and EDISP and insert these terms in equation (7) instead of TIME*EQ. If the increase in analyst forecast dispersion is due to analysts increased reliance on idiosyncratic information (perhaps via diligent acquisition of private information) and lesser reliance on common (noisier) information, we would expect the coefficient on TIME*PDISP to be greater than the coefficient on TIME*EDISP.

One of the data-related limitations of relying on a dispersion measure is that analysts are likely to avoid covering small, illiquid firms and hence, the composition of the sample is unavoidably tilted towards large stocks. We measure forecast dispersion (DISP) as the ratio of standard deviation of analysts' earnings forecast to the absolute value of mean forecast for the fiscal year. In determining DISP we only consider forecasts issued by analysts during the three months following the month after the end of the prior fiscal year. This ensures that the earnings forecasts used in determining the dispersion are made with foreknowledge of the annual earnings of the previous fiscal year. Also, we consider only the last available forecast for each analyst so as to avoid duplicate forecasts in constructing the dispersion measure. Because the DISP sample is drawn from the intersection of the broader sample with that of analyst dispersion data obtained from Zacks database, the DISP sample is considerably smaller.

As expected, results reported in Table 5 confirm that the coefficient on TIME*PDISP is greater than the coefficient on TIME*EDISP in column (2) where EQ is measured as DD (F-statistic to test the equality of these coefficients = 4.81, p-value = 0.02). However, in column (4), where EQ is measured as |ABACC|, the coefficient on TIME*PDISP (0.021) is higher than the coefficient on TIME*EDISP (0.016) but the two coefficients are not statistically distinguishable from each other. Broadly speaking, the evidence presented in this section further corroborates our premise that worsening earnings quality over time is associated with rising idiosyncratic volatility via increased dispersion in analysts' forecasts.

5.6 Evidence from earnings announcements

Our tests document an increase in stock return volatility and a concurrent decrease in earnings quality. We rely on the implicit premise that earnings have become less informative over time to interpret the documented temporal association between poor earnings quality and higher stock return volatility. In this section, we provide evidence on this implicit premise by investigating whether lower earnings quality, as measured by our proxies DD and |ABACC|, is reflected in lower earnings response coefficients and greater return volatility around earnings announcements.

First, we modify the empirical specification in Ryan and Zarowin (2003) as follows:

$$ABRET_{it} = \gamma_0 + \gamma_1 EARN_{i,t} + \gamma_2 TIME_{i,t} * EARN_{i,t} + \gamma_3 TIME_{i,t} * EARN_{i,t} * EQ_{i,t-1} + \xi_{it} \qquad (9)$$

where ABRET is annual abnormal return, measured as fiscal period raw return adjusted for value weighted market return and EARN is annual income before extraordinary items for the year scaled by market value of equity at the beginning of the fiscal year.

Table 6, panel A shows that the coefficient on TIME*EARN is negative suggesting that contemporaneous earnings-returns association has fallen over time consistent with findings in Ryan and Zarowin (2003). More important, the coefficient on TIME*EARN*EQ is also negative suggesting that the decline in earnings response coefficients is associated with a fall in earnings quality (recall that higher EQ reflects lower earnings quality). Thus, our evidence is consistent with poor accruals quality leading to less informative earnings.

To provide additional evidence on this issue we also examine stock return volatility around earnings announcements. Landsman and Maydew (2002) document that abnormal return volatility around earnings announcements (measured as the return volatility surrounding earnings announcement days scaled by volatility around non-announcement days) has increased over time and they interpret this time trend as consistent with an increase in the informativeness of quarterly earnings. We extend their work to examine whether decreasing earnings quality could plausibly explain the increased return volatility around earnings announcement dates. In particular, we estimate the following empirical specification:

$$EVAR_{it} = \tau_0 + \tau_1 TIME_{i,t} + \tau_2 TIME_{i,t} * EQ_{i,t-1} + \chi_{it} \qquad (10)$$

where EVAR is return volatility surrounding earnings announcement days scaled by average monthly return volatility during the year. Specifically, we compute the variance of market-adjusted returns for the seven days surrounding an earnings announcement and average this variance across all the earnings announcements for a firm-year. We then scale this by the average monthly variance of market-adjusted returns for the firm-year. In computing the average monthly variance we exclude the seven days surrounding earnings announcements. As described previously, TIME and EQ are time trend variables and proxies for earnings quality respectively.

Results of estimating equation (10) are presented in Panel B of Table 6. Consistent with Landsman and Maydew (2002) we find that the time trend variable, TIME, is positive and statistically significant suggesting an increase in earnings announcement window return volatility over time. However, when we introduce the interactive term of time trend variable with earnings quality proxies, TIME*EQ, the time trend variable in column (2) loses its significance. More important, the coefficient on the interaction term is positive and strongly significant suggesting that declining earnings quality is an important contributor to the increasing return volatility around earnings announcements over time.[14]

5.6.1 A closer look at volatility around earnings announcements

One can potentially object to the result that falling earnings quality is associated with rising return volatility around earnings announcements on the three grounds raised

[14] Although we do not claim a causal relation between increasing volatility and decreased earnings quality, we acknowledge that the direction of causality could be reversed. That is earnings management may increase in volatile times. For example, Cohen, Dey, and Lys (2005) document that earnings management increased dramatically in the 1999-2003 period which was characterized by a runaway bull market, several accounting scandals and the passage of the Sarbanes-Oxley act.

in section 2.4: (i) increased disclosure of earnings related information via supplementary disclosures and conference calls and Street earnings surprises around earnings announcements (e.g., Francis, Schipper and Vincent 2002; Collins, Li and Xie (2006); (ii) increased noise trading around earnings announcements, especially in recent times; and (iii) earnings quality can potentially be informative about a firm's future cash flows.

To address these potential confounds, we implement the following changes to equation (10). First, we insert an interaction of TIME and the absolute value of change in the first available consensus analyst forecast of next quarter's earnings following the earnings announcement relative to the last available analyst consensus forecast before the earnings announcement scaled by stock price at the date of the last available analyst forecast ($|FREV_{EA}|$) as the proxy for time-based variation in value-relevant other signals about future cash flows released along with the earnings announcement. Second, we introduce an interaction of TIME and the absolute value of the street earnings surprises scaled by stock price (|FERR|) in equation (10) to address the concern that we might be merely picking up what Collins et al. (2006) find. Third, we include interaction terms TIME*INST, TIME *NANAL, and TIME*PIN in equation (10) to account for changing composition of sophisticated investors over time. While INST and NANAL capture institutional ownership and analyst following, PIN refers to the probability of informed trading proposed by Easley et al. (2006).[15] The PIN dataset covers all ordinary common stocks listed on NYSE and AMEX for the years 1983 − 2001. Finally, we introduce an interaction of TIME*CFO_{t+1} where CFO_{t+1} is the quarter-ahead operating cash flows to

[15] We obtain PIN scores from Professor Soren Hvidkjaer's wesbsite (http://www.smith.umd.edu/faculty/hvidkjaer/).

account for the possibility that earnings quality potentially inform investors about a firm's future cash flows.

The results of this modified regression are reported in column (3) of Table 6, Panel B. Notice that in column (3), regardless of whether DD or |ABACC| is considered, introducing additional control variables in column (3) drastically shrinks our sample size. However, the positive coefficient on TIME*EQ continues to remain positive and statistically significant. Thus, even after controlling for several confounding explanations, we continue to observe an association between deteriorating earnings quality and return volatility around earnings announcements over time.

6. Can institutional and accounting factors explain the time-series relation between idiosyncratic volatility and financial reporting quality?

In this section we examine whether specific institutional and accounting factors can explain time-trends in both idiosyncratic risk as well as financial reporting quality. We consider only the pooled time-series cross-sectional analysis discussed in section 5.2 because incorporating proxies for institutional factors such as new listings or loss firms into a pure time-series analysis is difficult.

6.1 New listings

Research by Wei and Zhang (2004) attributes most of the upward trend in return variance to new listings. The descriptive statistics reported in Table 1 show a steady increase in the number of stocks in the sample. It is quite plausible that the link between idiosyncratic volatility and reporting quality documented thus far may very well be driven by new listings. To explore this conjecture, in untabulated analyses, we create a constant sample of firms. In particular, we require a firm to exist for at least 25 years in the earnings quality sample. In other words, the constant DD sample excludes any new firms that have listed on the exchanges in the 25 years prior to 2001. This sample filter reduces the DD sample from the original 95,270 observations to 28,327 observations. Untabulated results of estimating equation (7) show that the positive coefficients on TIME*|ABACC| and on TIME*DD continue to be statistically significant. Note that, in the paragraphs to follow, we list five additional institutional factors that might be responsible for the positive coefficient on TIME*DD, followed by a combined empirical analysis of these five factors in section 6.6.

6.2 Technology firms

Amir and Lev (1996) and Francis and Schipper (1999) argue that reported earnings of high-technology firms may fail to recognize items that have future cash flow implications due to the application of Generally Accepted Accounting Practices (GAAP). For example, GAAP requires firms to expense R&D outlays although such outlays, in expectation, likely yield future cash flows for several years into the future. Because accruals for high-technology firms may fail to accurately reflect future cash flows relative to other firms, earnings quality for high-technology firms is likely to be relatively poor. Given the increasing number of high-technology firms in recent times, it is quite plausible that the relation between poor earnings quality and idiosyncratic volatility is driven by high-technology firms.

6.3 Loss firms

Collins, Pincus and Xie (1999) and Givoly and Hayn (2000) document a monotonic increase in the frequency of losses over the last five decades. Increased losses reflect either lower operating cash flows or significant negative accruals or a combination of the two. If losses are predominantly driven by negative accruals as opposed to lower operating cash flows, then the DD and |ABACC| measures are likely to be higher reflecting poorer earnings quality. Moreover, firms that report losses experience greater bid-ask spreads (Ertimur 2004).[16]

6.4 Mergers and acquisitions and foreign currency translation

For the two accruals-based measures of accounting quality reported earlier, we rely on changes in balance sheet accounts to measure accruals because the sample period spans a period prior to SFAS No. 95 when cash flow statements were first required (1988). As Hribar and Collins (2002) point out, one potential problem with such a measure is that mergers and acquisitions (M&A), divestitures and foreign currency translation can introduce measurement error into balance sheet estimates of accruals. For instance, consider the Dechow and Dichev measure of accruals quality where we regress accruals in period t on cash flows from operations for periods t-1, t and t+1. Because of the way purchase accounting works and because cash flow statement restated data are not readily available, reported cash flows from operations for periods t-1 and t+1 are likely measured for a different entity than the entity used to measure accruals in period t when a firm is involved in mergers and acquisitions. This means that firms active in mergers and acquisitions will exhibit higher residuals (less accruals quality) simply because of changes in the reporting entity over time. Furthermore, there is reason to believe that M&A, divestitures and foreign currency translation can contribute to increased return

[16] Dechow and Dichev (2002) show that firms with longer operating cycle will have lower accrual and earnings quality. Hence, we also include an interaction term of TIME with operating cycle and re-estimate equation (7) and find no change in our inferences. The interaction term, TIME*Operating Cycle, is positive but only weakly significant.

volatility, thus causing a spurious correlation between the accruals-based measures of earnings quality and idiosyncratic risk.

6.5 Distress risk

Another competing explanation for the results is that distress risk is likely related to idiosyncratic return volatility and such risk might have increased over time. To address this issue, we use the Altman-Z scores (ALTZ) for every firm-year to measure a firm's distress risk. [17]

6.6 Combined analysis

We estimate a modified version of equation (7) that integrates the five explanations listed above (new listings, technology firms, losses, M&A and distress) into one specification by including interaction terms on TIME*EQ. Specifically, we add the following five interaction terms: TIME*EQ*AGE, TIME*EQ*HITECH, TIME*EQ*LOSS, TIME*EQ*M&A and TIME*EQ*ALTZ. AGE is defined as the number of years since the first day for which we can find a stock price in the CRSP tapes, HITECH is a dummy variable that is set to one (zero otherwise) if the firm-year belongs to 14 three-digit SIC codes (283, 357, 360-368, 481, 737 and 873) identified as technology-intensive industries by Francis and Schipper (1999). LOSS is a dummy variable that is set to one (zero otherwise) if the firm-year reports negative earnings, M&A is a dummy variable that is set to one (zero otherwise) if the firm experiences a merger, acquisition, divestiture or foreign currency translations, ALTZ is the Altman Z score. If these five variables together explain the relation between time trends in earnings

[17] We compute ALTZ consistent with prior research as follows: ALTZ = 1.2 * (data179/data6) + 1.4* (data36/data6) + 3.3 *(data18+data16+data15)/data6 + 0.6 * (data199*data25)/data181 +data12/data6. All data item numbers referred above are COMPUSTAT data items.

quality and time trends in idiosyncratic volatility then the main interaction effect on TIME*EQ would become statistically insignificant.

Results presented in column (1) of Table 7 show that the coefficient on TIME*DD continues to be positive and significant even after simultaneously controlling for the five explanations (t-statistic = 5.09). The coefficient on TIME*|ABACC| is weakly significant (t-statistic = 1.69). On balance, the evidence points to a robust positive association between proxies for reporting quality and idiosyncratic stock return volatility.

6.7 Changes analysis

Although the above analysis controls for a wide variety of potentially omitted firm characteristics that might account for the temporal relation between return volatility and accruals quality, endogeneity is always a concern in studies such as this. Because accounting method choices are endogenous, we recognize that the relations documented in this paper are likely to be driven by underlying firm characteristics that determine firms' accounting choices rather than poor earnings quality. One way to address endogeneity concerns is to conduct a "changes" analysis. That is, if a decline in earnings quality drives the increase in idiosyncratic risk over time, then firms with the largest decrease (increase) in earnings quality over time should exhibit the greatest increase (decrease) in idiosyncratic returns. Therefore, we modify the "levels" specification in equation (7) to a "changes" specification, where in we regress annual changes in idiosyncratic stock return volatility on changes in the EQ, by itself, and interacted with a time trend variable along with changes in other economic determinants.

In the results presented in Table 8 we continue to find a positive association between changes in idiosyncratic stock return volatility and changes in financial reporting quality over time. Note that the coefficient on TIME*ΔEQ is positive and significant in columns (1) and (2) (t-statistic of 2.60 and 3.43 respectively). Overall, we are able to document that firms with the greatest declines in earnings quality over time are associated with the greatest increases in stock return volatility.

7. Conclusions

Recent work in the finance literature finds that idiosyncratic volatility has increased substantially over the last four decades. In this paper, we investigate whether changes in financial reporting quality are associated with this trend in return volatility. We use two proxies to capture earnings quality: the Dechow-Dichev measure of earnings quality and the absolute value of abnormal accruals. We find that worsening earnings quality captured by these proxies is positively associated with rising return volatility over the last 40 years. The positive association persists even after controlling for several confounding effects, control variables, and the impact of newly listed firms, accounting for technology-intensive firms and firm-year observations with negative earnings, merger activity and financial distress.

We do not claim to have found causal links between increasing return volatility and declining earnings quality. However, we believe our findings have implications for policy-makers, investors and managers with the usual caveat that drawing policy implications from statistical relations is inherently problematic. First, identifying a temporal association between idiosyncratic volatility and reporting quality can help rule makers and investors decide what (if anything) should be done to address the situation.

The temporal links between volatility and information quality could have also been affected by several recent legislative events.

Second, understanding variables correlated with the temporal shift in return volatility can help investors identify better diversification strategies. If deteriorating earnings quality is responsible for increased volatility, investors may improve their diversification strategies by focusing on firms with higher reporting quality. Finally, managers may care about changes in idiosyncratic risk to the extent it has implications for asset pricing. Controversial recent work by Goyal and Santa-Clara (2003) finds that, contrary to conventional wisdom, idiosyncratic risk is relevant for asset pricing. Hence, managers may have incentives to improve reporting quality for their firms so as to reduce the firm's cost of capital. Whether the temporal trend between worsening financial reporting quality and increased stock return volatility increases firms' cost of capital over time would be an interesting question for future research.

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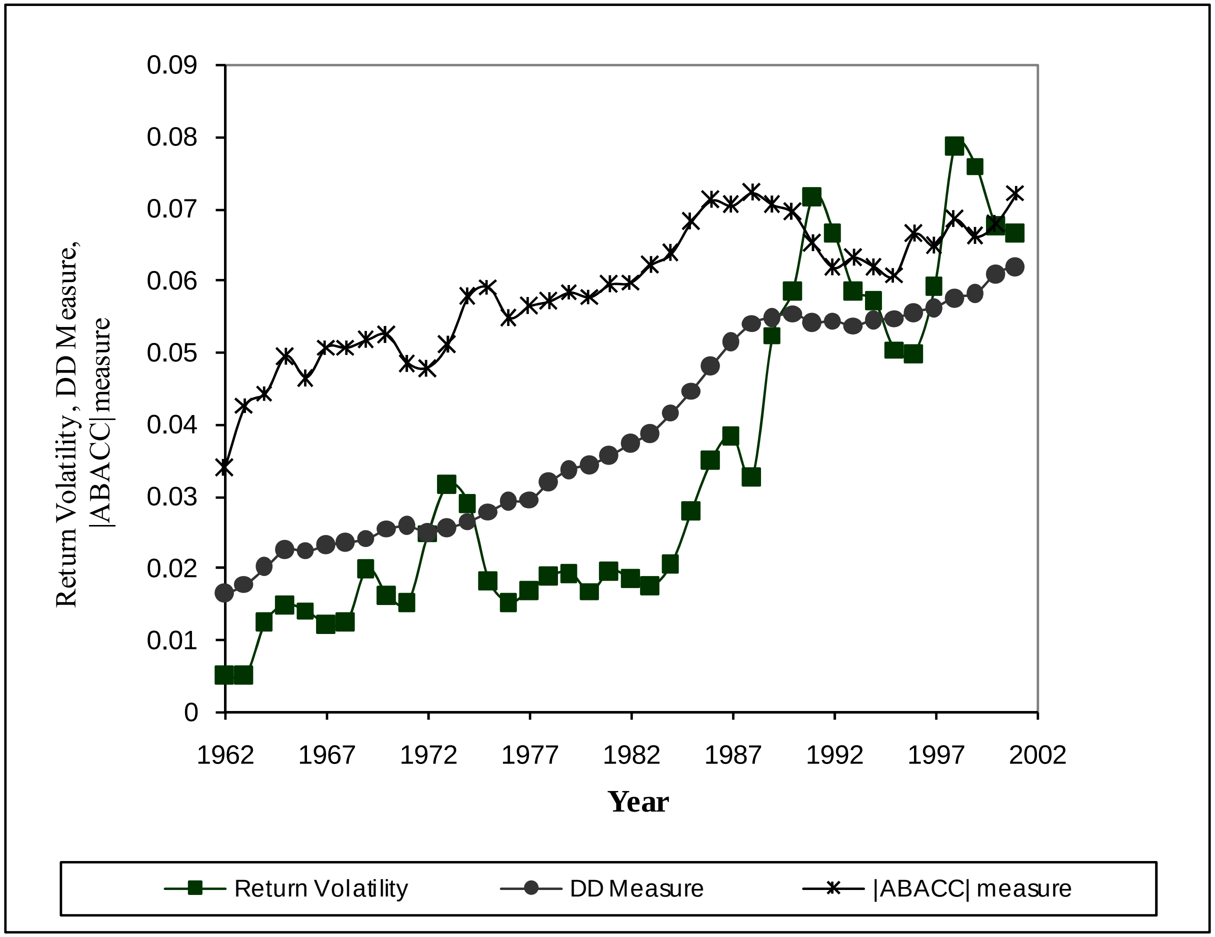
Figure 1

Average Return Volatility, Earnings Quality, Absolute Discretionary Accruals over time



The above figure plots the average return volatility, DD measure and |ABACC| measure for the period 1962-2001. Return Volatility refers to the average monthly variance of market-adjusted returns for each fiscal year, where we measure market adjusted returns as the excess of daily firm stock return over the daily return on the value-weighted market portfolio. DD measure is calculated from the modified version of the Dechow and Dichev (2002) model. |ABACC| measure is the absolute value of abnormal accruals determined using Jones (1991) model. A detailed description of these two earnings quality measures is provided in section 3 of the text.

Table 1

Summary Statistics

Variable	Mean	Median	Std dev	Q1	Q3
VAR^{Raw} (*100)	4.18	1.74	14.00	0.80	3.91
VAR^{Rmadj} (*100)	4.11	1.66	14.00	0.77	3.78
DD (*100)	4.47	3.18	4.15	1.83	5.59
|ABACC| (*100)	6.43	4.16	7.09	1.81	8.39
DISP (*100)	17.58	5.59	41.59	2.69	13.86
CFO	0.05	0.07	0.16	0.01	0.13
VCFO	8.58	6.39	7.77	3.68	10.81
BM	0.99	0.67	1.46	0.37	1.14
SIZE	4.32	4.13	2.12	2.75	5.76
LEV	0.24	0.23	0.18	0.09	0.36
RET (*100)	16.16	5.33	76.48	-20.80	35.82

The sample consists of 95270 (103589) observations for the DD (|ABACC|) measure. Descriptive statistics for control variables (CFO, VCFO, SIZE, BM, LEV, RET) are reported using the DD sample of 95270 observations. VAR^{raw} refers to the average monthly variance of raw returns for a fiscal year. Monthly variance of raw returns is computed as the sample variance of daily raw returns within a month, multiplied by the number of trading days in the month. VAR^{Rmadj} refers to the average monthly variance of market-adjusted returns for a fiscal year, where we measure market adjusted returns as the excess of daily firm stock return over the daily return on the value-weighted market portfolio. DD measure is calculated from the modified version of the Dechow and Dichev (2002) model. |ABACC| measure is the absolute value of abnormal accruals determined using Jones (1991) model. A detailed description of these two earnings quality measures is provided in section 3 of the text. DISP is analyst forecast dispersion measured as the standard deviation of analyst forecasts scaled by the absolute value of mean earnings forecasts. For this calculation, forecasts during the three months following the month after the end of the prior fiscal year are used. CFO is operating cash flows scaled by average total assets. VCFO is variance of operating cash flows scaled by average total assets over the trailing five years. BM is book-to-market ratio. SIZE is natural logarithm of market value of equity. Market value of equity is measured three months after the fiscal year end. LEV is financial leverage computed as the ratio of long-term debt to total assets. RET is annual buy-and-hold return. Variables VAR^{raw}, VAR^{Rmadj}, RET, DD, |ABACC|, DISP have been multiplied by 100 for expositional convenience.

Table 2

Time Series Trends in Idiosyncratic Volatility, Earnings Quality and Forecast Dispersion

Panel A: Descriptive statistics over time

Variable	1962-1965	1966-1969	1970-1973	1974-1977	1978-1981	1982-1985	1986-1989	1990-1993	1994-1997	1998-2001
VAR (*100)	1.13	1.48	2.31	1.95	1.85	2.09	3.97	6.38	5.40	7.22
DD (*100)	2.01	2.32	2.53	2.81	3.38	4.04	5.21	5.43	5.52	5.96
|ABACC| (*100)	4.45	5.00	4.98	5.68	5.80	6.34	7.10	6.48	6.34	6.84

Panel B: Cross-sectional relation between idiosyncratic volatility and earnings quality (defined as the DD measure) over time

$$VAR_{it} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \zeta_{it} \quad (3)$$

Variable	1962-1965	1966-1969	1970-1973	1974-1977	1978-1981	1982-1985	1986-1989	1990-1993	1994-1997	1998-2001
EQ = DD	0.372	0.302	0.452	0.372	0.264	0.334	0.490	0.836	0.693	0.701
	(12.28)	(22.12)	(18.17)	(20.44)	(34.35)	(30.54)	(23.68)	(18.63)	(23.96)	(22.29)
R^2	14.24%	14.94%	8.98%	9.67%	9.80%	8.48%	5.02%	2.70%	3.87%	3.16%
N	2000	3804	6811	9196	10853	10062	10599	12485	14255	15205

Table 2 (cont'd)

Panel C: Cross-sectional relation between idiosyncratic volatility and earnings quality (defined as the |ABACC| measure) over time

$$VAR_{it} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \zeta_{it} \qquad (3)$$

Variable	1962-1965	1966-1969	1970-1973	1974-1977	1978-1981	1982-1985	1986-1989	1990-1993	1994-1997	1998-2001
EQ = |ABACC|	0.100	0.059	0.091	0.074	0.072	0.114	0.174	0.351	0.338	0.355
	(7.65)	(13.77)	(10.43)	(20.44)	(17.94)	(17.91)	(15.49)	(13.18)	(15.99)	(17.98)
R^2	6.27%	4.96%	2.67%	2.60%	2.82%	2.88%	1.98%	1.28%	1.59%	1.87%
N	2530	4023	7179	10231	11043	10773	11829	13303	15804	16874

The sample consists of 95270 (103589) observations for the DD (|ABACC|) measure. VAR refers to the average monthly variance of market-adjusted returns for a fiscal year, where we measure market adjusted returns as the excess of daily firm stock return over the daily return on the value-weighted market portfolio. Monthly variance is computed as the sample variance within a month, multiplied by the number of trading days in the month. DD measure is calculated from the modified version of the Dechow and Dichev (2002) model. |ABACC| measure is the absolute value of abnormal accruals determined using Jones (1991) model. A detailed description of these two earnings quality measures is provided in section 3 of the text. In Panel A, the descriptive statistics of variables VAR, DD, |ABACC| have been multiplied by 100 for expositional convenience. T-statistics are presented in parentheses.

Table 3
Results from Regression of Idiosyncratic Volatility that Captures Trends over the period 1962-2001 and Interactions of Trend with Proxies of Reporting Quality

$$\begin{aligned} VAR_{it} = {} & \lambda_0 + \lambda_1 TIME_{i,t} + \lambda_2 TIME_{i,t} * EQ_{i,t-1} + \lambda_3 TIME_{i,t} * \left|FREV_A\right|_{i,t-1} \\ & + \lambda_4 TIME_{i,t} * \left|RET\right|_{i,t-1} + \lambda_5 TIME_{i,t} * NANAL_{i,t-1} + \lambda_6 TIME_{i,t} * INST_{i,t-1} \\ & + \lambda_7 TIME_{i,t} * CFO_{i,t+1} + \lambda_8 TIME_{i,t} * CFO_{i,t-1} + \lambda_9 TIME_{i,t} * VCFO_{i,t-1} + \lambda_{10} EQ_{i,t-1} \\ & + \lambda_{11} \left|FREV_A\right|_{i,t-1} + \lambda_{12} \left|RET\right|_{i,t-1} + \lambda_{13} NANAL_{i,t-1} + \lambda_{14} INST_{i,t-1} + \lambda_{15} CFO_{i,t+1} \\ & + \lambda_{16} CFO_{i,t-1} + \lambda_{17} VCFO_{i,t-1} + \lambda_{18} BM_{i,t-1} + \lambda_{19} SIZE_{t-1} + \lambda_{20} LEV_{i,t-1} + \lambda_{21} RET_{i,t} + \varepsilon_{it} \end{aligned} \tag{7}$$

	EQ = DD measure	EQ = |ABACC| measure
Intercept	0.039	0.037
	(17.09)	(18.13)
TIME	0.001	0.002
	(13.47)	(17.58)
TIME*EQ	0.018	0.007
	(10.01)	(6.15)
TIME*|$FREV_A$|	-0.002	-0.005
	(-0.89)	(-1.04)
TIME*|RET|	0.065	0.062
	(3.69)	(4.16)
TIME*NANAL	0.032	-0.026
	(0.39)	(-0.24)
TIME*INST	-0.000	0.041
	(-0.21)	(1.40)
TIME*CFO_{t+1}	-0.002	-0.001
	(-4.42)	(-2.76)
TIME*CFO	-0.004	-0.004
	(-10.58)	(-9.65)
TIME*VCFO	0.004	0.005
	(4.50)	(6.98)
EQ	-0.348	-0.150
	(-7.72)	(-6.11)
|$FREV_A$|	0.009	0.149
	(0.15)	(0.85)
|RET|	0.036	0.039
	(8.71)	(10.82)
NANAL	0.161	0.175
	(6.40)	(5.08)
INST	-0.033	-0.052
	(-4.09)	(-5.96)
CFO_{t+1}	0.056	0.039
	(5.76)	(4.24)

Table 3 (cont'd)
Results from Regression of Idiosyncratic Volatility that Captures Trends over the period 1962-2001 and Interactions of Trend with Proxies of Reporting Quality

	EQ = DD measure	EQ = |ABACC| measure
CFO	0.016	0.080
	(3.82)	(7.22)
VCFO	-0.111	-0.134
	(-5.91)	(-7.66)
BM	-0.060	-0.077
	(-0.87)	(-1.20)
SIZE	-0.013	-0.014
	(-32.93)	(-35.11)
LEV	0.021	0.021
	(6.20)	(6.16)
RET	-0.045	-0.047
	(-20.05)	(-22.38)
R^2	11.81%	11.87%
N	95270	103589

The sample consists of 95270 (103589) observations for the DD (|ABACC|) measure. VAR refers to the average monthly variance of market-adjusted returns for a fiscal year, where we measure market adjusted returns as the excess of daily firm stock return over the daily return on the value-weighted market portfolio. Monthly variance is computed as the sample variance within a month, multiplied by the number of trading days in the month. DD measure is calculated from the modified version of the Dechow and Dichev (2002) model. |ABACC| measure is the absolute value of abnormal accruals determined using Jones (1991) model. A detailed description of these two earnings quality measures is provided in section 3 of the text. CFO is operating cash flows scaled by average total assets. VCFO is variance of operating cash flows scaled by average total assets over the trailing five years. $|FREV_A|$ is the first available median consensus one year ahead earnings forecast following three months after the fiscal year end minus the two-year ahead earnings forecast available following three months after the previous fiscal year end. |RET| is the absolute value of annual buy and hold return. NANAL is the number of analysts determining the consensus forecast subsequent to the fiscal year. INST is the average percentage of institutional ownership during the fiscal year. CFO t+1 is one year ahead CFO. BM is book-to-market ratio. SIZE is natural logarithm of market value of equity. Market value of equity is measured three months after the fiscal year end. LEV is financial leverage computed as the ratio of long-term debt to total assets. RET is annual buy-and-hold return. TIME is a time trend variable that takes on the value 1..N representing each of the years in the sample. Coefficients BM, TIME*DISP, TIME*|RET|, NANAL, TIME*INST are multiplied by 100 for expositional convenience. TIME*NANAL has been multiplied by 10000 for expositional convenience. T-statistics are presented in parentheses.

Table 4
Results from Time-Series Regressions that relate Idiosyncratic Return Volatility with Reporting Quality

$$VAR_t = \theta_0 + \theta_1 TIME_t + \theta_2 \left|ABACC\right|_{t-1} + \theta_3 \left|FREV_Q\right|_{t-1} + \theta_4 \left|RET\right|_{t-1} + \theta_5 NANAL_{t-1} + \theta_6 INST_{t-1} + \theta_7 CFO_{t+1} + \theta_8 CFO_{t-1} + \theta_9 VCFO_{t-1} + \theta_{10} BM_{t-1} + \theta_{11} SIZE_{t-1} + \theta_{12} LEV_{t-1} + \theta_{13} RET_t + \kappa_t \quad (8)$$

Intercept	-0.163
	(-1.74)
TIME	0.001
	(2.86)
EQ = |ABDACC|	1.586
	(2.28)
$\|FREV_Q\|$	-0.181
	(-0.85)
|RET|	0.369
	(6.30)
NANAL	-0.001
	(-0.47)
INST	-0.122
	(-2.31)
CFO_{t+1}	0.810
	(1.39)
CFO	-1.038
	(-2.80)
VCFO	0.762
	(0.65)
BM	0.063
	(2.71)
SIZE	0.014
	(1.29)
LEV	-0.122
	(-0.78)
RET	-0.098
	(-3.37)
R^2	82.78%
N	94

The sample consists of 94 quarterly observations from the third quarter of 1978 to the fourth quarter of 2001. All variables are averages across firms in each quarter. VAR refers to the quarterly variance of market-adjusted returns, where we measure market adjusted returns as the excess of daily firm stock return over the daily return on the value-weighted market portfolio. Quarterly variance is computed as the sample variance within a quarter, multiplied by the number of trading days in the quarter. |ABACC| measure is the absolute value of abnormal accruals determined using Jones (1991) model from quarterly data. A detailed description of |ABACC| is provided in section 3 of the text. CFO is operating cash flows scaled by average total assets. VCFO is variance of operating cash flows scaled by average total assets over the trailing five years. $|FREV_Q|$ is the analyst forecast error calculated as the first available median consensus one quarter ahead earnings forecast following the earnings announcement minus the first available two quarter ahead

Table 4 (cont'd)
Results from Time-Series Regressions that relate Idiosyncratic Return Volatility with Reporting Quality

consensus earnings forecast available following the previous earnings announcement scaled by the stock price at that date. |RET| is the absolute value of annual buy and hold return. NANAL is the number of analysts determining the consensus forecast subsequent to the fiscal year. INST is the average percentage of institutional ownership during the fiscal year. CFO t+1 is one year ahead CFO. BM is book-to-market ratio. SIZE is natural logarithm of market value of equity. Market value of equity is measured three months after the fiscal year end. LEV is financial leverage computed as the ratio of long-term debt to total assets. RET is quarterly buy-and-hold return. TIME is a time trend variable that takes on the value from 1 to 94 representing each of the quarters in the sample. T-statistics are presented in parentheses.

Table 5
Results from Regression of Idiosyncratic Volatility that Captures Trends over the period 1962-2001 and Interactions of Trend with Analyst Forecast Dispersion

$$\begin{aligned} VAR_{it} = {} & \lambda_0 + \lambda_1 TIME_{i,t} + \lambda_2 TIME_{i,t} * DISP_{i,t-1} + \lambda_3 TIME_{i,t} * \left|FREV_A\right|_{i,t-1} \\ & + \lambda_4 TIME_{i,t} * \left|RET\right|_{i,t-1} + \lambda_5 TIME_{i,t} * NANAL_{i,t-1} + \lambda_6 TIME_{i,t} * INST_{i,t-1} \\ & + \lambda_7 TIME_{i,t} * CFO_{i,t+1} + \lambda_8 TIME_{i,t} * CFO_{i,t-1} + \lambda_9 TIME_{i,t} * VCFO_{i,t-1} + \lambda_{10} DISP_{i,t-1} \quad (7') \\ & + \lambda_{11} \left|FREV_A\right|_{i,t-1} + \lambda_{12} \left|RET\right|_{i,t-1} + \lambda_{13} NANAL_{i,t-1} + \lambda_{14} INST_{i,t-1} + \lambda_{15} CFO_{i,t+1} \\ & + \lambda_{16} CFO_{i,t-1} + \lambda_{17} VCFO_{i,t-1} + \lambda_{18} BM_{i,t-1} + \lambda_{19} SIZE_{t-1} + \lambda_{20} LEV_{i,t-1} + \lambda_{21} RET_{i,t} + \varepsilon_{it} \end{aligned}$$

	EQ = DD measure	EQ = DD measure	EQ = |ABDACC| measure	EQ = |ABACC| measure
Intercept	0.023	0.024	0.023	0.023
	(20.49)	(21.02)	(20.68)	(20.67)
TIME	0.001	0.001	0.001	0.001
	(10.74)	(8.23)	(10.54)	(9.02)
TIME*DISP	0.020		0.020	
	(2.51)		(2.46)	
TIME*PDISP		0.071		0.021
		(2.67)		(1.91)
TIME*EDISP		0.016		0.016
		(1.94)		(1.98)
TIME*|$FREV_A$|	0.003	0.003	0.003	0.003
	(4.82)	(4.85)	(4.94)	(4.84)
TIME*|RET|	0.048	0.055	0.046	0.050
	(5.56)	(5.86)	(5.44)	(5.54)
TIME*NANAL	-0.100	-0.100	-0.100	-0.100
	(-5.59)	(-4.95)	(-5.47)	(-5.53)
TIME*INST	0.032	0.035	0.034	0.042
	(4.13)	(4.39)	(4.44)	(5.35)
TIME*CFO_{t+1}	0.001	0.001	0.001	0.001
	(3.95)	(3.71)	(3.92)	(3.80)
TIME*CFO	-0.002	-0.002	-0.002	-0.002
	(-6.14)	(-6.92)	(-5.77)	(-5.54)
TIME*VCFO	0.003	0.003	0.003	0.003
	(5.21)	(4.93)	(5.36)	(4.58)
DISP	0.002	0.002	0.002	0.002
	(1.67)	(2.15)	(1.75)	(2.19)
|$FREV_A$|	-0.008	-0.013	-0.007	-0.009
	(-0.73)	(-1.16)	(-0.67)	(-0.83)
|RET|	0.022	0.021	0.022	0.022
	(17.89)	(16.46)	(17.96)	(17.68)

Table 5 (cont'd)
Results from Regression of Idiosyncratic Volatility that Captures Trends over the period 1962-2001 and Interactions of Trend with Proxies of Reporting Quality and Analyst Forecast Dispersion

	EQ = DD measure	EQ = DD measure	EQ = |ABDACC| measure	EQ = |ABACC| measure
NANAL	0.038	0.038	0.038	0.038
	(11.51)	(11.45)	(11.58)	(11.93)
INST	-0.014	-0.014	-0.014	-0.015
	(-12.00)	(-12.50)	(-12.39)	(-13.54)
CFO_{t+1}	-0.004	-0.003	-0.003	-0.001
	(-0.83)	(-0.70)	(-0.55)	(-0.24)
CFO	0.018	0.020	0.016	0.014
	(3.48)	(3.76)	(3.14)	(2.74)
VCFO	-0.017	-0.019	-0.017	-0.008
	(-1.92)	(-1.98)	(-1.99)	(-0.96)
BM	-0.021	-0.009	-0.028	-0.019
	(-1.19)	(-0.50)	(-1.59)	(-1.06)
SIZE	-0.004	-0.004	-0.004	-0.004
	(-25.23)	(-25.68)	(-24.99)	(-25.36)
LEV	-0.006	-0.005	-0.006	-0.005
	(-4.91)	(-4.71)	(-5.26)	(-4.53)
RET	-0.024	-0.024	-0.024	-0.024
	(-30.14)	(-30.21)	(-31.07)	(-32.33)
R^2	47.67%	47.70%	47.68%	47.70%
N	24477	24477	24245	24245

The sample consists of 24477 observations for which DISP is available. DISP is analyst forecast dispersion measured as the standard deviation of analyst forecasts scaled by the absolute value of mean earnings forecasts. For this calculation, forecasts during the three months following the month after the end of the prior fiscal year are used. We regress DISP on EQ and then obtain the extent of DISP predicted by EQ (or PDISP) and the error term from such regression (EDISP). All the other variables have been defined in notes to Table 3. Coefficients BM, TIME*DISP, TIME*|RET|, NANAL, TIME*INST are multiplied by 100 for expositional convenience. TIME*NANAL has been multiplied by 10000 for expositional convenience. T-statistics are presented in parentheses.

Table 6
Earnings Quality and Earnings Announcements

Panel A: Results from Regression of Abnormal Stock Returns on Earnings, a Time Trend and Interaction with Proxies of Reporting Quality

$$ABRET_{it} = \gamma_0 + \gamma_1 EARN_{i,t} + \gamma_2 TIME_{i,t} * EARN_{i,t} + \gamma_3 TIME_{i,t} * EARN_{i,t} * EQ_{i,t-1} + \xi_{it} \quad (9)$$

	EQ = DD measure	EQ = |ABACC| measure
Intercept	0.020	0.022
	(7.17)	(7.68)
EARN	0.732	0.816
	(15.36)	(15.95)
TIME*EARN	-0.023	-0.028
	(-9.21)	(-12.21)
TIME*EARN*EQ	-0.047	-0.017
	(-1.92)	(-1.74)
R^2	0.28%	0.29%
N	95270	103589

Panel B: Results from Regression of Return Volatility around Earnings Announcements on Time Trend and Interaction with Proxies of Reporting Quality

$$EVAR_{it} = \tau_0 + \tau_1 TIME_{i,t} + \tau_2 TIME_{i,t} * EQ_{i,t-1} + \chi_{it} \quad (10)$$

	EQ = DD measure			EQ = |ABACC| measure		
	(1)	(2)	(3)	(1)	(2)	(3)
Intercept	-0.059	-0.069	0.563	-0.068	-0.049	0.562
	(-1.29)	(-1.51)	(38.68)	(-1.54)	(-1.10)	(38.34)
TIME	0.004	0.002	-0.005	0.004	0.000	-0.004
	(2.48)	(1.20)	(-1.14)	(2.88)	(0.30)	(-0.98)
TIME*EQ		0.142	0.140		0.052	0.051
		(3.90)	(4.12)		(7.84)	(2.57)
TIME*|FERR|			-0.020			-0.019
			(-1.30)			(-1.24)
TIME*|$FREV_{EA}$|			0.019			0.023
			(0.48)			(0.55)
TIME*NANAL			0.039			0.017
			(2.38)			(2.80)
TIME*INST			0.007			0.007
			(2.03)			(1.98)
TIME*PIN			0.009			0.021
			(0.58)			(1.39)
TIME*CFO_{t+1}			0.006			0.003
			(1.62)			(0.89)
R^2	0.01%	0.03%	0.850%	0.01%	0.09%	0.61%
N	73737	73737	6569	79822	79822	6584

Table 6 (cont'd)
Earnings quality and Earnings Informativeness

In Panel A, the sample consists of 95270 (103589) observations for the DD (|ABACC|) measure. In Panel B, the sample consists of 73737 (79822) observations for the DD (|ABACC|) measure. Lack of data on the control variables, especially PIN, reduces the sample in column (3) of panel B to 6569 observations. DD measure is calculated from the modified version of the Dechow and Dichev (2002) model. |ABACC| measure is the absolute value of abnormal accruals determined using Jones (1991) model. A detailed description of these two earnings quality measures is provided in section 3 of the text. ABRET is annual abnormal return measured as raw return adjusted for value weighted market return. EARN is income before extraordinary items scaled by market value of equity at the beginning of the year. TIME is a time trend variable that takes on the value 1..N representing each of the years in the sample. EVAR is annual average variance of market-adjusted returns during the week surrounding the earnings announcement scaled by the average monthly variance of market-adjusted returns during non-announcement days. We measure market adjusted returns as the excess of daily firm stock return over the daily return on the value-weighted market portfolio. Monthly variance is computed as the sample variance (excludes returns on any days surrounding the earnings announcement) within a month, multiplied by the number of trading days in the month. $|FREV_{EA}|$ is forecast revision around the earnings announcement measured as the first available median consensus one quarter ahead earnings forecast following the earnings announcement minus the last available earnings forecast prior to the earnings announcement scaled by stock price at the date of the previous consensus forecast. |FERR| is the analyst forecast error computed as the difference between the actual earnings minus the median consensus estimate immediately prior to the earnings announcement scaled by the stock price at the date of consensus estimate.

Table 7
Results from Regression of Idiosyncratic Volatility that Captures Trends over the period 1962-2001 and Interactions of Trend with Proxies of Reporting Quality Exploring Alternative Explanations Together

$$\begin{aligned} VAR_{it} &= \lambda_0 + \lambda_1 TIME_{i,t} + \lambda_2 TIME_{i,t} * EQ_{i,t-1} + \lambda_{2a} TIME_{i,t} * EQ_{i,t-1} * AGE_{i,t} \\ &+ \lambda_{2b} TIME_{i,t} * EQ_{i,t-1} * HITECH_{i,t} + \lambda_{2c} TIME_{i,t} * EQ_{i,t-1} * LOSS_{i,t} + \lambda_{2d} TIME_{i,t} * EQ_{i,t-1} * M\&A_{i,t} \\ &+ \lambda_{2e} TIME_{i,t} * EQ_{i,t-1} * ALTZ_{i,t} + \lambda_3 TIME_{i,t} * |FREV_A|_{i,t-1} + \lambda_4 TIME_{i,t} * |RET|_{i,t-1} \\ &+ \lambda_5 TIME_{i,t} * NANAL_{i,t-1} + \lambda_6 TIME_{i,t} * INST_{i,t-1} + \lambda_7 TIME_{i,t} * CFO_{i,t+1} + \lambda_8 TIME_{i,t} * CFO_{i,t-1} \\ &+ \lambda_9 TIME_{i,t} * VCFO_{i,t-1} + \lambda_{10} EQ_{i,t-1} + \lambda_{11} |FREV_A|_{i,t-1} + \lambda_{12} |RET|_{i,t-1} + \lambda_{13} NANAL_{i,t-1} + \lambda_{14} INST_{i,t-1} \\ &+ \lambda_{15} CFO_{i,t+1} + \lambda_{16} CFO_{i,t-1} + \lambda_{17} VCFO_{i,t-1} + \lambda_{18} BM_{i,t-1} + \lambda_{19} SIZE_{t-1} + \lambda_{20} LEV_{i,t-1} + \lambda_{21} RET_{i,t} + \varepsilon_{it} \end{aligned} \quad (7'')$$

	EQ = DD measure	EQ = |ABACC| measure
	(1)	(2)
Intercept	0.036	0.034
	(17.07)	(17.20)
TIME	0.001	0.002
	(13.11)	(19.02)
TIME*EQ	0.010	0.002
	(5.09)	(1.69)
TIME*EQ*AGE	-0.003	-0.004
	(-1.18)	(-1.95)
TIME*EQ*HITECH	-0.003	-0.001
	(-2.73)	(-1.07)
TIME*EQ*LOSS	0.013	0.008
	(15.75)	(13.80)
TIME*EQ* M&A	0.001	-0.002
	(1.06)	(-2.62)
TIME*EQ*ALTZ	0.012	0.012
	(2.03)	(2.03)
TIME*|$FREV_A$|	-0.002	-0.007
	(-1.03)	(-1.59)
TIME*|RET|	0.062	0.058
	(3.54)	(3.94)
TIME*NANAL	0.039	-0.029
	(0.47)	(-0.27)
TIME*INST	0.011	0.001
	(0.40)	(1.98)
TIME*|CFO_{t+1}|	-0.002	-0.001
	(-5.39)	(-4.23)
TIME*CFO	-0.003	-0.004
	(-7.89)	(-9.84)
TIME*VCFO	0.004	0.005
	(4.94)	(6.93)

Table 7 (cont'd)
Results from Regression of Idiosyncratic Volatility that Captures Trends over the period 1962-2001 and Interactions of Trend with Proxies of Reporting Quality
Exploring Alternative Explanations Together

	EQ = DD measure	EQ = |ABACC| measure
	(1)	(2)
TIME*|$FREV_A$|	-0.002	-0.007
	(-1.03)	(-1.59)
TIME*|RET|	0.062	0.058
	(3.54)	(3.94)
TIME*NANAL	0.039	-0.029
	(0.47)	(-0.27)
TIME*INST	0.011	0.001
	(0.40)	(1.98)
TIME*|CFO_{t+1}|	-0.002	-0.001
	(-5.39)	(-4.23)
EQ	-0.278	-0.095
	(-6.05)	(-4.39)
|$FREV_A$|	0.013	0.235
	(0.21)	(1.39)
|RET|	0.037	0.039
	(9.04)	(10.89)
NANAL	0.152	0.166
	(6.23)	(4.89)
INST	-0.034	-0.053
	(-4.24)	(-6.29)
|CFO_{t+1}|	-0.003	0.041
	(-1.35)	(4.68)
CFO	0.063	0.082
	(6.85)	(7.90)
VCFO	-0.107	-0.128
	(-5.66)	(-7.19)
BM	-0.043	-0.067
	(-0.63)	(-1.05)
SIZE	-0.013	-0.014
	(-31.09)	(-34.03)
LEV	0.017	0.018
	(5.50)	(5.64)
RET	0.052	-0.046
	(5.73)	(-22.04)
R^2	12.39%	12.33%
N	95270	103589

Table 7 (cont'd)
Results from Regression of Idiosyncratic Volatility that Captures Trends over the period 1962-2001 and Interactions of Trend with Proxies of Reporting Quality Exploring Alternative Explanations Together

The sample consists of 95270 (103589) observations for the DD (|ABACC|) measure. Refer to notes at the bottom of Table 3 for definitions of the variables used here. The new variables in this table are as follows. AGE is defined as the number of years since the first day for which we can find a stock price in the CRSP tapes, HITECH is a dummy variable that is set to one (zero otherwise) if the firm-year belongs to the high technology SIC codes, LOSS is a dummy variable that is set to one (zero otherwise) if the firm-year reports negative earnings. M&A is a dummy variable that is set to one (zero otherwise) if firms have either experienced M&A transactions as reported in COMPUSTAT annual footnote code #1 or divestitures (COMPUSTAT data item 66) or foreign currency translations (COMPUSTAT data item 150). ALTZ is Altman Z score computed using COMPUSTAT data as follows: ALTZ = 1.2 * (data179/data6) + 1.4* (data36/data6) + 3.3 *(data18+data16+data15)/data6 + 0.6 * (data199*data25)/data181 +data12/data6. Coefficients BM and TIME*DISP,TIME*DISP*HITECH, TIME*EQ*AGE, TIME*EQ*ALTZ, TIME*|RET|, TIME*$|RET_{t+1}|$, NANAL, TIME*INST are multiplied by 100 for expositional convenience. TIME*DISP*AGE, TIME*NANAL has been multiplied by 10000 for expositional convenience. T-statistics are presented in parentheses.

Table 8
Results from Regression of Changes in Idiosyncratic Volatility on a Trend variables and Interactions of Trend with Proxies of Changes in Reporting Quality

	EQ = DD measure	EQ = |ABACC| measure
Intercept	0.016	0.017
	(11.45)	(12.27)
TIME	0.001	0.001
	(11.83)	(13.17)
TIME*ΔEQ	0.009	0.003
	(2.60)	(3.43)
TIME*ΔCFO	-0.001	-0.001
	(-3.18)	(-3.59)
TIME*ΔVCFO	0.001	0.009
	(0.42)	(3.20)
TIME*Δ|$FREV_A$|	0.002	0.002
	(1.08)	(1.46)
TIME*Δ|RET|	-0.000	-0.025
	(-0.00)	(-2.53)
TIME*ΔNANAL	0.560	0.630
	(6.49)	(7.28)
TIME*ΔINST	0.004	0.003
	(5.09)	(5.19)
TIME*Δ|CFO_{t+1}|	-0.002	-0.002
	(-5.12)	(-5.85)
Δ|$FREV_A$|	-0.074	-0.084
	(-1.20)	(-1.38)
Δ|RET|	0.006	0.013
	(2.30)	(4.00)
ΔNANAL	-0.174	-0.189
	(-8.30)	(-8.95)
ΔINST	-0.111	-0.109
	(-6.36)	(-6.56)
Δ|CFO_{t+1}|	0.070	0.070
	(8.61)	(9.21)
ΔEQ	0.003	-0.071
	(0.04)	(-3.69)
ΔCFO	0.031	0.037
	(3.91)	(4.18)
ΔVCFO	0.000	-0.129
	(0.01)	(-2.23)
ΔBM	-0.43	-1.125
	(-1.69)	(-3.88)
ΔSIZE	-0.041	-0.047
	(-12.85)	(-14.43)
ΔLEV	-0.003	-0.000
	(-0.48)	(-0.03)

Table 8 (cont'd)
Results from Regression of Changes in Idiosyncratic Volatility on a Trend variables and Interactions of Trend with Proxies of Changes in Reporting Quality

	EQ = DD measure	EQ = |ABACC| measure
ΔRET	-0.012	-0.014
	(-5.10)	(-6.26)
R^2	3.21%	3.26%
N	80596	87963

The sample consists of 80596 (87963) observations for the DD (|ABACC|) measure. Δ is the change operator. All variables appearing have been defined in notes to Table 3. Coefficients ΔBM, ΔNANAL, TIME*ΔDISP, TIME *ΔINST, TIME* |RET| have been multiplied by 100 for expositional convenience. Coefficient on TIME*ΔNANAL has been multiplied by 10000. T-statistics are presented in parentheses.