Earnings volatility, cash flow volatility, and firm value

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This version: July 2003

[1]We would like to thank Susan Chaplinsky, Ken Eades, Mike Lemmon, and seminar participants at McGill University and the University of Utah for their many helpful suggestions. The first author also wishes to thank the Darden School Foundation and the Batten Institute for summer support and the second author a research fellowship from the Batten Institute.

Abstract

This paper presents empirical evidence that both earnings and cash flow volatility are negatively valued by investors. The magnitude of the effect is substantial. A one standard deviation increase in earnings (cash flow) volatility is associated with a 6-21 percent (0-14 percent) decrease in firm value. Consistent with investors' and analysts' focus on earnings and managers' focus on earnings smoothing but inconsistent with broad financial theory, we find that the value effect of earnings volatility often dominates that of cash flow volatility. We also find differences in the volatility effect depending on size, leverage, and earnings/cash flow level. Our results are consistent with risk management theory and suggest that managers' efforts to produce smooth financial statements add value to the firm.

Introduction

Corporate risk management theory argues that shareholders are better off if a firm maintains smooth cash flows. For example, Froot, Scharfstein, and Stein (1993) argue that smooth cash flows can add value by reducing a firm's reliance on costly external finance.[1] Empirically, Minton and Schrand (1999) show that cash flow volatility is costly as it affects a firm's investment policy by increasing both the likelihood and the costs of raising capital.[2] One recurring theme in this literature is that, *ceteris paribus*, firms with smoother financial statements should be more highly valued. While previous research finds that cash flow volatility is costly, no direct evidence exists linking financial statement volatility to firm value. Such a link is important because, in order for risk management to matter, smooth financials must be valued at a premium to more volatile ones. In this paper, we test the hypothesis that investors value firms with smooth cash flows at a premium relative to firms with more volatile cash flows. Consistent with risk management theory, we find strong evidence that cash flow volatility is negatively related to proxies for firm value.

However, given investors', analysts', and managers' apparent focus on earnings, rather than cash flows, earnings volatility may also play a significant role as a measure of financial smoothness, in addition to cash flow volatility. There are a number of reasons why earnings volatility may matter to the firm, independent of cash flow volatility. For example, prior empirical work suggests that analysts tend to avoid covering firms with volatile earnings, as it increases the likelihood of forecast errors (see, e.g., Brennan and Hughes (1991), and Schipper (1991)).[3] Low analyst coverage is associated to lower value due to higher information asymmetries (see e.g., Merton

[1] See also earlier related work by Shapiro and Titman (1986), Lessard (1990), and Stulz (1990). See Geczy, Minton, and Schrand (1997) for empirical evidence consistent with the Froot, Scharfstein, and Stein (1993) theory; and Nance, Smith, and Smithson (1993), Tufano (1996), Mian (1996), Haushalter (2000), Brown (2001), and Graham and Rogers (2002) for empirical evidence supportive of alternative risk management theories.

[2] Earlier related work documents an inverse relation between investment and financial liquidity (see., e.g., Fazzari, Hubbard, and Petersen (1988); Kaplan and Zingales (1997); and Lamont (1997)).

[3] Although Barth, Kasznik, and McNichols (1999) argue that analyst following could be greater for highly volatile stocks, as these are the stocks for which analysts can potentially add more value through coverage and hence stand to benefit more.

(1987) for theoretical argument, and Lang, Lins, and Miller (2002), among others, for empirical evidence). Similarly, Badrinath, Gay, and Kale (1989) find that institutional investors do not invest in companies that experience large variations in earnings. High earnings volatility also increases the likelihood of negative earnings surprises; in response, managers have engaged in extensive earnings smoothing. Trueman and Titman (1988) suggest that earnings smoothing reduces costs as it reduces a firm's perceived probability of default and therefore a firm's borrowing costs. Recently, Goel and Thakor (2003) suggest that a firm may smooth earnings so as to reduce the informational advantage of informed investors over uninformed investors, and therefore protect those investors who may need to trade for liquidity reasons. In this paper, we also examine whether earnings volatility is negatively associated to firm value, in addition to cash flow volatility. Consistent with the above arguments we find strong evidence that earnings volatility is negatively related to proxies for firm value.[4]

Of course, there are a number of other ways in which financial uncertainty interacts with firm value. According to the CAPM, systematic risk should be negatively related to value, since higher discount rates yield a lower value, *ceteris paribus*. Further, recent empirical work suggests that not only does systematic risk affect value, but also idiosyncratic risk may be priced. For example, Shin and Stulz (2000) examine the relationship between systematic, unsystematic, total risk, and firm value in a large sample of firms between 1965-1992. Similar to Shin and Stulz (2000) (but inconsistent with the CAPM), we find a positive relation between systematic risk and firm value and a negative and significant association between unsystematic risk and firm value.[5] Our paper complements these findings and contributes to this literature by focusing on the value effect of

[4]Early work in the accounting literature documented a negative stock price reaction upon announcements of changes in accounting rules expected to increase earnings volatility (see, e.g., Collins, Rozeff, and Dhaliwal (1981), and Lys (1984)). More recently, Zenner (2001) using a simulation approach shows that a reduction in earnings volatility from 85% to 20% increases firm value by roughly 4.5%. Finally, Hunt, Moyer, and Shevlin (2000) suggest that smoothing results in higher multiples on reported earnings and Thomas and Zhang (2002) find that smoothing generates higher forward P/E ratios.

[5]The negative association between idiosyncratic risk and firm value parallels recent asset pricing literature, which finds evidence that idiosyncratic risk matters (see, e.g., Green and Rydquist (1997), Goyal and Santa Clara (2003), and Malkiel and Xu (2002)).

two alternative types of risk, namely, cash flow and earnings volatility. These measures are of primary importance since, unlike financial market variables, they reflect the actual stability of the firms' financial statements and are directly affected by managerial decisions and the firms' risk management policies.

Using a large sample of non-financial firms, we present evidence that both earnings and cash flow volatility are negatively and significantly associated with Tobin's Q as proxied by the market-to-book ratio. The magnitude of the effect varies across our different tests, but is always large. Specifically, we find that a one standard deviation increase in earnings (cash flow) volatility is associated with a 6-21 percent (0-14) percent reduction in firm value. Our results are robust to various sets of control variables, estimation techniques, sub-periods, sub-samples, and to a number of different methods for estimating earnings and cash flow volatility.

In our cross-sectional tests, we find that generally cash flow volatility has a negative effect on firm value. However, in other time-series, or panel tests, cash flow volatility is often insignificant, while earnings volatility remains strongly significant (and negative). These "horserace" regressions between earnings and cash flow volatility yield an interesting result. Consistent with investors', analysts', and managers' general focus on earnings, our results suggest that earnings volatility may be a more meaningful signal of financial smoothness.

Finally, to further examine the robustness of our results, we investigate how financing constraints may affect the impact of cash flow and earnings volatility on firm value. Specifically, we investigate the differential impact of volatility on firms that differ with respect to the degree of financing constraints they face, as proxied by size, leverage, and earnings/cash flow level. Consistent with our hypothesis we find evidence that financial volatility matters more for small firms. Surprisingly, however, we also find evidence that it also matters more for firms with low leverage. A potential explanation is that firms with low leverage cannot take on more debt as they have slim growth prospects and future cash flows, which cannot support additional debt. An alternative explanation is that these (i.e., low levered) are firms with the most entrenched managers, as Berger, Ofek, and Yermack show (1997).

The remainder of the article is organized as follows. Section 1 describes our sample and develops our hypothesis. Section 2 presents our empirical methodology and the tests of the relation between earnings and cash flow volatility and firm value. Section 3 examines the robustness of our empirical results and Section 4 concludes.

1. Sample Description and Hypothesis Development

1.1 Related Literature and Hypothesis Development

Prior empirical research in risk management has answered a series of important questions. For example, Nance, Smith and Smithson (1993), Tufano (1996), Mian (1996), Geczy, Minton, and Schrand (1997), Haushalter (2000), Brown (2001), and Graham and Rogers (2002), among others, have examined currency, interest rate, and commodity hedging activities by firms across industries or within a particular industry and the extent to which these activities are consistent with existing hedging theories (e.g., Stulz (1984), Smith and Stulz (1985), Froot et al (1993), DeMarzo and Duffie (1995), Leland (1998) etc.). Related work has examined alternative hedging practices, such as the use and relationship of financial derivatives and accrual management (Barton (2001)).

Another more recent strand of the literature has focused on linking hedging activities to firm value and on examining the basic premise behind hedging, namely that volatility of cash flow is costly for firms. For example, Allayannis and Weston (2001) find that the use of currency derivatives, a proxy for hedging, improves value substantially (the hedging premium estimates vary between 0.2 percent and 9.4 percent). Similarly, Minton and Schrand (1999) find evidence that cash flow volatility is costly and that it permanently affects investment. They find a strong negative association between cash flow volatility and average levels of investment in capital expenditures, R&D and advertising and a positive association between cash flow volatility and costs of accessing external capital, suggesting that cash flow volatility increases both the likelihood as well as the costs of accessing external capital markets.

This study contributes to this literature by directly testing the hypothesis that firms with smooth financials are valued at a premium relative to firms with volatile financials while controlling for other determinants of firm value, such as size, leverage, and profitability, as well as alternative types of risk, such as systematic and idiosyncratic. Specifically, if cash flow volatility is costly as documented by Minton and Schrand (1999), then it should negatively affect firm value. Our test of this hypothesis extends the findings in Allayannis and Weston (2001) by explaining *why* hedging may have a positive impact on firm value. This is an important result because it identifies the transmission mechanism through which risk management can impact firm value, namely, by producing a smoother series of financial statements. In addition, this result also complements evidence by Minton and Schrand (1999) on the costs of cash flow volatility, as it documents the negative impact of cash flow volatility on value.

In addition, we also test the hypothesis that earnings volatility negatively affects firm value. Financial risk management affects cash flow volatility, and in turn, earnings volatility. However, firms can also affect earnings volatility directly by engaging in earnings smoothing. Low earnings volatility may increase analysts' following and improve value (Lang et al. (2002)), attract a larger number of institutional investors (Badrinath et al. (1989)), or reduce the perceived borrowing costs (Trueman and Titman (1988)). Although we do not directly examine here what causes earnings volatility, or why earnings volatility may be costly, we do provide strong evidence that earnings volatility *is* costly and is linked to lower value, even after controlling for cash flow volatility and systematic and idiosyncratic risk.

1.2 Sample Description and Methodology

Our initial sample includes all firms with nonmissing observations for assets and sales for which we find matching data on CRSP and both quarterly and annual COMPUSTAT databases between 1986 and 2000. However, the nature of our tests, which requires estimation of earnings and cash flow volatility and systematic/unsystematic risk imposes strong data requirements for inclusion in our final sample. In order to compute market model betas and residuals, we select only firms with at least 30 non-missing monthly returns for a given five-year period (1986-90, 1991-95, and 1996-2000). Further, to estimate the volatility of quarterly earnings we require each firm to have at least ten non-missing quarterly observations for earnings per share during each five-year period. Since our tests use five-year measures that are both forward and backward looking, firms must have sufficient data in both the previous five years, and in the following five years to be included in our sample. Thus, we use only valid observations for 1990 and 1995 in our analysis.

The use of independent sample periods that we use to estimate earnings and cash flow volatilities ensures that our measures of earnings and cash flow volatility (as well as idiosyncratic and systematic risk) are not suffering from severe serial correlation; however, the drawback is that such requirement reduces the number of observations used. Even so, the correlations between the earnings (cash flow) volatilities estimated between 1991-1995 and 1996-2000 are high (0.57 and 0.40 respectively), which makes the alternative of using overlapping data, an inferior one. The final sample consists of 2,008 firms in 1990 and 1,382 firms in 1995 for a total of 3,390 firm-year observations. While our sample selection may be restrictive, our sample is generally representative of the COMPUSTAT population, though our firms are a little larger and hold less debt. Nevertheless, our inferences are not contaminated by any selection bias induced by our screens since our tests are entirely restricted to within-sample comparisons.

Table 1 reports summary statistics of our main variables. Panel A reports statistics on the sample characteristics and Panel B reports statistics on our risk measures. Our sample firms have a mean value of assets of $2,002 million (median of $260) and a mean equity value of $1,766 million. On average our sample's debt-to-equity ratio is 0.62 (median of 0.21) and growth, as measured by the ratio of capital expenditures to sales, of 0.10. We use the market-to-book ratio as an approximation of Tobin's Q, proxying for firm market value.[6] [7] Our sample's mean market-to-book ratio is 1.39 and the median is 0.98. These values are similar to values for Q documented in earlier studies (see, e.g., Allayannis and Weston (2001)).

Our primary measure of cash flow is cash flow from operations computed following Minton and Schrand (1999) (Appendix 1 describes our cash flow measure in detail). Our main measure of earnings is earnings per share from operations (COMPUSTAT quarterly data item 177), but we have also used alternatively a) diluted earnings per share from operations, b) diluted earnings per share from operations excluding extraordinary items, as well as c) basic earnings per share (both with and without extraordinary items). Our results are robust to the use of these alternative earnings measures. As shown on Table 1, Panel B, the mean (median) earnings per share for our sample firms is 0.28 (0.20), and the average (median) standard deviation of earnings per share is 0.31 (0.19). The respective averages for total cash flow and earnings are 100.26 and 26.33.

It is important to note exactly which measures of risk should be related to firm value. Of course, past volatility should be priced into firm value at time t. Therefore, it is somewht difficult to make inferences regarding Tobin's Q and *past* levels of earnings or cash flow volatility. What should matter for firm value at time t is the expectation of future cash flow or earnings volatility. Since risk measures do not follow a random walk (see Shin and Stulz (2000) for a discussion) we cannot assume that earnings/cash flow volatility at time t equals earnings/cash flow volatility at time $t+1$.

[6]This methodology has been used extensively in corporate finance: research areas in which Q is used to measure firm value include cross listing (Doidge, Karolyi, and Stulz (2001), corporate diversification (Lang and Stulz (1994), and Servaes (1996)), takeovers (Servaes (1991)), equity ownership (La Porta, Lopez de Silanes, Shleifer, and Vishny (2002) and Lins (2003)), and risk management (Shin and Stulz (2000), and Allayannis and Weston (2001)).

[7]Allayannis and Weston (2001) show that several measures used to proxy for Tobin's Q are highly correlated with each other and also highly correlated with the simple market-to-book ratio used here.

As a result, we follow Shin and Stulz in constructing a "perfect foresight" model of earnings and cash flow volatility. We use earnings or cash flow volatility in $t+1$ as our measure of the time t expected future volatility. For example, our measure of earnings/cash flow volatility for firm i in 1990 would be the standard deviation of quarterly earnings/cash flow in years 1991-1995. This measure gives us a clean way to test how firm value relates to expected future volatility based only on the no-arbitrage assumption that the market does not systematically under- or over-estimate financial statement volatility.

Our measures of cash flow and earnings volatility are constructed as the standard deviation of quarterly earnings per share and cash flow per share, respectively, over a five-year period. That is, our measure for earnings volatility for each firm in 1990 is the standard deviation of quarterly earnings per share over the 20 quarterly observations between 1991 and 1995. While this method may be crude, Section 3.4 explores the sensitivity of our results to alternative measures based on alternative time-series models. Our results are not sensitive to our measure of earnings or cash flow volatility. To compare with earnings volatility, we use cash flow scaled by the number of shares, and alternatively cash flow scaled by assets, in our estimation of cash flow volatility. These two measures are highly correlated and produce similar results. Again, our estimates of earnings/cash flow volatility are not qualitatively changed by inclusion/exclusion of extraordinary items. The average cash flow per share of our sample firms is 2.1 and the average cash flow volatility is 17.8. The average cash flow volatility is large and reflects the significant left-skewness present in many of our cash flow, earnings, and volatility measures. As a result, we will use log transformations of these variables in our regression-based tests as well as check the robustness of our results to the impact of outliers in Section 3.4. Given the high observed autocorrelation of cash flow and earnings volatility, our results also do not change if we use "contemporaneous" estimates of earnings or cash flow volatility instead of the "perfect foresight" ones.

We estimate systematic and firm-specific risk based on a simple market model using the CRSP value-weighted return as a proxy for the market return. We compute the systematic risk for firm i as the product of the square of its market risk (β_i^2) and the market volatility σ_m^2. For the 1990 (1995) sample, we use alternatively the "contemporaneous" systematic risk estimated during 1986-1990 (1991-1995), as well as the "perfect foresight" estimates during 1991-1995 (1996-2000). Firm specific risk is the difference between total risk and systematic risk, where we estimate total risk as the standard deviation of monthly returns over the five-year period. Similar to systematic risk, we use alternatively the "contemporaneous" as well as the "perfect foresight" estimates. This has no significant impact on our results. Our sample's average systematic risk is 0.152, its average total risk is 0.610 and hence its average firm-specific risk is 0.447.

Table 2 presents correlations of our main variables. We note several interesting findings, although it is difficult to draw broad conclusions from such univariate statistics. For example, similar to Shin and Stulz we find a positive and significant correlation between the market-to-book ratio and systematic risk (0.199), while interestingly, both firm-specific and total risk have correlations (positive) with the market-to-book ratio that are inconsistent with our expectations. However, consistent with our hypothesis, both earnings and cash flow volatility are negatively correlated with firm value (-0.234 and -0.226 respectively).

2. Cash flow, earnings volatility and firm value

2.1 Univariate tests

In this sub-section we present univariate tests of the hypothesis that earnings and cash flow volatility are inversely related to firm value. Table 3, Panel A presents the results of these univariate tests. First, we divide our sample into quintiles according to earnings volatility (Columns 1&2) or cash flow volatility (Columns 3&4). We then compute the average Q (columns 1 & 3) and the median Q (columns 2 & 4) for each quintile and compare Qs across the volatility quintiles. Consistent with our hypothesis, firms in the largest earnings volatility quintile have the lowest average Q of any quintile (0.99), while firms in the smallest earnings volatility quintile have the highest average Q of 1.90. In fact, Q declines monotonically across quintiles, that is, firms in the quintile with the second highest earnings volatility have the second lowest average Q (1.18), firms in the third quintile have the third lowest value (1.38) and so forth until the quintile with the lowest earnings volatility, which has the highest average Q. We obtain similar results using median Q instead of average Q (column 2). Although a similar pattern is observed when we classify firms into quintiles according to cash flow volatility (i.e., a monotonically declining average Q as cash flow volatility increases), the pattern is somewhat weaker and does not hold for firms with the lowest cash flow volatility (the average Q of 1.19 is significantly lower than the average Q of firms belonging to quintiles 2-4 with higher cash flow volatility than quintile 1). A similar relation is also observed using medians (column 4).

Clearly, many factors may affect Q in a similar way as earnings/cash flow volatility, so to infer that earnings/cash flow volatility is inversely related to value, we need to exclude the impact of other factors on Q. While we develop multivariate tests of our hypothesis below, we also perform univariate tests based on portfolios formed on conditional sorts. That is, we first classify firms according to size (leverage, earnings level) quintile and then, within each quintile, we sort again by earnings/cash flow volatility quintile. Given the greater information asymmetries that exist for small firms and the potential larger bankruptcy costs that small firms face (see Warner (1977)), we would expect that the negative relationship between volatility and size is stronger (more severe) among small firms than among large firms. Table 3, Panels B, C and D present the results of these conditional univariate tests. Within each size quintile, we find that the average Q decreases almost monotonically as we move from low to high earnings volatility quintile. For example, within the largest size firms, the average Q goes down from 1.47 for the firms with the lowest earnings volatility to 0.83 for the firms with the highest earnings volatility with the difference being highly significant. A similar monotonic decrease is observed within most quintiles. The decrease in value both in absolute magnitude and in percent is highest in quintile 4, the second largest size quintile (0.99 or 52 percent), opposite from what we expected. However, the second largest decrease in magnitude is within the smallest size quintile (0.79 or 38 percent).

Table 3, Panel C shows results of a similar univariate test where we classify firms into quintiles according to their debt-to-equity ratio and earnings volatility. We expect firms with the highest debt-to-equity ratio to be more affected by earnings volatility than firms with the lowest debt-to-equity ratio, because firms with high debt-to-equity have presumably higher costs of accessing external capital markets and face higher bankruptcy costs. Surprisingly, we find that it is within the smallest debt-to-equity quintile that we find the largest decline in value as we move from low to high earnings volatility. Specifically, the average Q drops from 0.77 to 0.62 (a drop of 0.14 or 18.7 percent) within the largest debt-to-equity quintile, while it drops from 3.24 to 1.80 (a drop of 1.44 or 44.3 percent) within the smallest debt-to-equity quintile. A possible explanation is that these firms are associated with most entrenched management who dislikes being monitored (Berger, Ofek, and Yermack (1997)) or alternatively, that these are firms which cannot take on more debt as their future prospects are slim.

The level of earnings may reflect the cost of accessing external capital markets. As a result, the relationship between earnings volatility and value may differ depending on the level of earnings. Table 3, Panel D presents our results based on earnings level conditional sorts. Consistent with our expectations we find that for firms within the smallest quintile, there is a larger decline in value as we move from the quintile with the lowest earnings volatility to the quintile with the highest one (Q declines by 1.59, from 2.50 to 0.91 or 63.6 percent vs. 0.82 or 47.3 percent within the quintile with the highest earnings level). The decline however is not monotonic across earnings level quintiles.

We also perform similar conditional univariate sorts based on cash flow volatility (not reported). The results are similar with those based on earnings volatility. An exception is for the results related to size, where, consistent with our expectations, we find a significantly stronger decline within the smallest size quintile than within the largest quintile. The decline however, is not monotonic across size quintiles.

Finally, Panel E reports results from univariate tests in which we classify firms based on both cash flow and earnings volatility. With the exception of quintile 5, where the decline is not uniformly monotonic, we find that within each cash flow volatility quintile, the average Q monotonically declines as earnings volatility increases. Conversely, within each earnings volatility quintile, the average Q monotonically declines as cash flow volatility increases. This result suggests that *both* earnings and cash flow volatility affect firm value.

Overall, our univariate tests document a negative relationship between earnings and cash flow volatility and firm value, which is more severe among firms that are small in size, have low debt-to-equity ratio and low earnings/cash flow level. In the next section we perform further multivariate tests, in which we control for other factors that have been shown previously to have an impact on value.

2.2 Multivariate tests

2.2.1 Earnings and Cash flow volatility levels

In this sub-section we present further regression-based tests of the hypothesis that cash flow and earnings volatility are negatively linked to firm value. Our multivariate tests control for other factors that theory suggests, and prior empirical work has shown, to have a significant effect on firm value. Specifically, following Lang and Stulz (1994) and Allayannis and Weston (2001), we control for the following factors: (1) size, by using the log of total assets as a proxy; (2) profitability, by using ROA as a proxy; (3) investment growth and intangible assets, by using as proxies the ratio of capital expenditures to sales, the ratio of R&D to sales, and the ratio of advertising expenditures to sales; and (4) leverage, by using the ratio of long-term debt to equity. We also control for industry effects using 2-digit SIC industry controls and time-effects using a year (1990) dummy.

Given the significant skewness present in many of our variables, and to ease interpretation of our results, we put our data through two transformations before estimating our regression models. First, we take log transforms of our variables to reduce the potential impact of outliers on our analysis. Second, we standardize all of our variables by subtracting the sample mean and dividing by the sample standard deviation. Thus, all regression coefficients are presented in comparable units. None of these transformations have a qualitative impact on our results and are performed only for robustness and ease of interpretation.

In both Tables 4 and 5 we present a series of step-wise regression results where all of our various risk measures are added in sequence to a standard set of confounding factors for Tobin's Q. To provide a basis for comparison, Table 4, Column 1, presents the results of an OLS regression with our log-scaled-transformed Q as the dependent variable and the variables described above as independent variables. The results we obtain are very similar to what theory predicts and are in line with Lang and Stulz (1994) and Allayannis and Weston (2001). For example, we find that size is negatively related to Q, suggesting that smaller firms have higher values. On the other hand, profitability, growth opportunities, and intangible assets are all positively and significantly related to value, consistent with prior findings and arguments by Myers (1977) and Smith and Watts (1992). Finally, leverage is negatively related to value, consistent with a financial distress costs argument. Note also the relatively high R^2 (0.30) obtained in the regression.

In Table 4, Column 2 we add our market measures of systematic and firm-specific risk to the explanatory variables used in column 1. This regression is similar to the one in Shin and Stulz (2000) and our findings are also similar. Specifically, we find a positive and significant association between systematic risk and firm value and a negative and significant association between firm-specific risk and firm value. These results are inconsistent with the CAPM, which postulates a negative relationship between systematic risk and value and an insignificant relationship between firm-specific risk and value. Shin and Stulz point out that a possible explanation is that expected future cash flows are positively linked to systematic risk, challenging the CAPM notion that expected cash flows are unrelated to systematic risk and that this cash flow effect dominates the discount effect. The negative association between idiosyncratic risk and firm value is consistent with the findings in recent asset pricing literature which finds that idiosyncratic risk matters (see e.g., Green and Rydquist (1997), Malkiel and Xu (2002), and Goyal and Santa Clara (2003)).

Proceeding with our step-wise regressions, Table 4, Column 3, adds earnings volatility as an alternative measure of risk. Our hypothesis is that earnings volatility adversely affects firm value, even after controlling for other measures of risk and factors that are related to value such as size, profitability, growth, leverage, and industry affiliation. Consistent with our hypothesis, we find that earnings volatility is negative and significantly associated to Q suggesting that earnings volatility decreases value, as it increases the likelihood of negative earnings surprises and the perceived borrowing costs, and may result in lower analysts' coverage and lower institutional investor following (see e.g., Trueman and Titman (1988), Brennan and Hughes (1991), Lang, Lins, and Miller (2002), and Badrinath, Gay, and Kale (1989)). This finding is also interesting because it documents that the effect of earnings volatility is above and beyond the effect of firm-specific risk. Earnings volatility also significantly improves the explanatory power of the regression. Specifically, the adjusted R^2 increase by 3.4 percentage points when we add earnings volatility to our explanatory variables.

Our fourth regression (Table 4, Column 4) performs a similar test using cash flow volatility instead of earnings volatility. We find similarly that cash flow volatility is also negatively and significantly related to firm value, consistent with the risk management hypothesis suggesting that cash flow volatility is costly. Finally, regression 5 includes all measures of risk together. Our results remain unaltered: both earnings and cash flow volatility are negatively and highly significantly related to value. Similarly, firm-specific risk is also negatively related to value, whereas systematic risk is positively related to value. This model has the highest explanatory power out of all the pooled models (adjusted R^2 of 0.38) examined here. The magnitude of the impact of earnings volatility on value is also large: the coefficient suggests that a one standard deviation change in earnings volatility changes firm value by 20.8 percent. Cash flow volatility also has a large negative impact on value. A one standard deviation positive shock to cash flow volatility results in a 14.4 percent decrease in value. To our knowledge, our paper is the first to show the negative link between earnings and cash flow volatility and firm value, while controlling for market measures of idiosyncratic and systematic risk, suggesting that earnings and cash flow volatility are costly for a firm.

To control for unobservable firm characteristics that may affect value, we estimate a fixed-effects model (Hausman and Taylor (1981)). Fixed effects assign a unique intercept for each firm. Table 5 presents the within-group coefficient estimates of the fixed-effects models. Similar to the pooled results, Table 5, Column 1 presents results without any risk variables, Column 2 includes systematic and firm-specific risk, and so forth until column 5, which includes all four risk measures. As column 1 shows, most of our control variables are significant and have the same signs as in the pooled regressions. The only exception is advertising expenditures, which is no longer significant. Our second regression specification (Table 5, Column 2) finds that systematic risk is still positive, however, no longer significant in these fixed-effects regressions, while firm-specific risk remains negative and significant in most of the specifications.

Column 3 of Table 5 shows that earnings volatility is negative and significantly related to firm value, however, cash flow volatility is no longer significantly associated with value (column 4). When both are used in the same specification (Table 5, Column 5), cash flow volatility is again not significant, while earnings volatility is still strongly negatively related to value. The results from these fixed-effects regressions are surprising and suggest that earnings volatility is more relevant than cash flow volatility in explaining value. The magnitude of the effect is still economically large: a one standard deviation increase in earnings volatility is associated with a nine percent decline in value. While our finding of an insignificant (significant) cash flow (earnings) volatility effect is inconsistent with broad financial market theory, it is consistent with investor, analyst, and management focus on earnings.

In all of our tests above we have found a strong negative association between earnings volatility and Tobin's Q, and in our pooled tests also a strong negative association between cash flow volatility and Q. We have implied that it is the volatility that *causes* a reduction in value. However, it could be that high-Q firms have low cash flow and earnings volatility, and not the other way round as we have implied. Our finding in our fixed-effects regressions that it is only earnings volatility that is linked to Q and not cash flow volatility suggests that endogeneity may be less of an issue here; if the causality worked opposite from what we have hypothesized, it is not clear why high-Q firms would only have low earnings and not low cash flow volatility. Intuitively, also, one would expect that high-Q firms would be associated with high (not low) cash flow and earnings volatility, if high Q and high earnings and cash flow volatility are both associated with growth firms. Further, it is difficult to imagine why low Q firms (those with a relatively lower present value of growth opportunities) should, ceteris paribus, have more volatile cash flows. In fact, on the contrary, Berk, Green, and Naik (1999) argue that the growth options of a firm are an additional source of priced risk. Our finding that it is low earnings and cash flow volatility that are associated with high Q gives more credence to our story suggesting that volatility is costly and that it negatively impacts value (Q) and not that Q impacts volatility. As a result, we think it is unlikely that our results are systematically biased by endogeneity between cash flow/earnings volatility and value.

Another potential concern is that earnings/cash flow volatility may simply pick up the impact of hedging on Q, which Allayannis and Weston (2001) document among U.S. firms. Hedging would reduce cash flow and hence earnings volatility, such that low earnings volatility firms are those that hedge and which have therefore a higher value. However, again, our finding that only earnings volatility is consistently negatively associated with Q (and not cash flow volatility) is inconsistent with this inference. Furthermore, tests on differences between high and low earnings volatility firms with respect to firm characteristics that have been shown to be associated with an incentive to hedge, such as R&D expenditures, debt-to-equity, size and the interaction of R&D and debt-to-equity (see e.g., Geczy et al (1997)) do not show that low and high earnings volatility firms differ in their incentives to hedge.[8]

2.2.3 Cross-sectional differences in the volatility effects

To further test the robustness of our result, we examine in this section the impact of financing constraints on the volatility effect. If earnings/cash flow volatility is costly, as we have argued, then we should expect that firms that face financing constraints such as small, low earnings, highly levered firms to be more susceptible to volatility changes than large, high earnings, low levered firms. Our univariate results are broadly consistent with volatility being more important for small and low earnings firms, but not important for highly levered firms. In fact, it is firms with low levels of debt that are more affected by earnings volatility.

Tables 6-8 present multivariate results for our fully-specified regression (Column 5, Tables 4 and 5), separating our sample according to size (median size of firm), leverage (median debt-to-equity) and (median) earnings per share level. Columns 1 and 2 of Table 6 present pooled regression results, while Columns 3 and 4 of Table 6 present regression results that include firm fixed-effects. Although consistent with our expectations, the coefficient on earnings volatility is larger (in absolute value) for small firms than that on large firms in our fixed-effects results (-0.124 versus -0.072), the difference is not statistically significant (the coefficients on the pooled regressions are reverse but they are also not significantly different from each other). The coefficients on cash flow volatility in the pooled

[8] Of course we are limited here by the fact that data requirements on derivatives use for our large sample of firms, necessary for a formal test of this hypothesis, are intensive.

regressions are also consistent with our expectations, but again, not statistically significant.

Similar to our previous univariate results, we find that firms with low debt have a higher sensitivity on earnings volatility than firms with high debt. In particular, we find that the coefficient on earnings volatility for low-debt firms (-0.121, Table 7, Column 3) in the fixed-effects regressions is significantly different than the coefficient on high-debt firms (-0.043, Table 7, Column 4). In fact, high-debt firms' market-to-book ratios are not significantly associated to earnings volatility. As we mentioned earlier, one possible explanation for this result is that low-debt firms are financially constrained and cannot therefore take on more debt, or are associated with entrenched management, as Berger, Ofek, and Yermack (1997) suggest. The coefficient on the pooled regression is also similarly higher for the low-debt firms than for the high-debt firm, however the difference is not statistically significant.

Our final tests separate the sample according to the level of earnings per share (Table 8). While we find in our fixed effects regressions a smaller (higher in absolute value) coefficient on earnings volatility for firms with low earnings per share than for firms with high earnings per share (-0.216 versus -0.136) the difference is not statistically significant. The difference in coefficients in our pooled regressions is not statistically significant either.

Overall, in these multivariate tests we find that the impact of earnings volatility is higher among firms with lower debt, smaller size, and smaller earnings per share level, although the impact is significantly different only among firms with low debt. We suggest that this may be due to financial constraints that these firms face.

3. Robustness

This section explores the robustness of our results to a number of different regression specifications and estimation methodology. We begin with tests of the hypothesis that earnings and cash flow volatility are negatively related to firm value based on five-year change regressions (rather than levels). We also investigate the sensitivity of our results to a variety of specifications and estimation techniques, the role of financial distress, and our estimation of earnings/cash flow volatility. All of these tests do not change the conclusions from our tests presented in Section 2 and continue to support the hypothesis that relatively smooth financial statements are valued at a premium.

3.1 Long-Run Changes in Earnings and Cash flow volatility

In this sub-section, we test the hypothesis that earnings/cash flow volatility is negatively valued by investors using long-run changes in value, rather than contemporaneous levels. Table 9 presents results of a model of long-run changes in earnings and cash flow volatility and long-run changes in value. Specifically, we assume five-year changes in future expected earnings and cash flow volatility (1991-1995) and (1996-2000) and link them to five-year changes (between 1986-1990 and 1991-1995 respectively) in Q. Clearly, as these tests require that a firm exists during the entire sample period (1986-2000), the number of observations drops significantly. Table 9 also follows a similar format to the tables before: Column 1 presents results without any risk variables, whereas Columns 2-4 include them in step-wise fashion. Column 5 includes all four risk variables. First, similar to the pooled results, size and leverage are negatively linked to value changes, whereas profitability and growth opportunities are positively linked to value changes. Interestingly, neither systematic, nor firm-specific risk changes are significantly linked to firm value changes. Similar to our fixed-effects regressions, cash flow volatility changes are also not significant. It is only earnings volatility changes that appear significantly linked to value changes, suggesting that, on average, earnings volatility changes negatively affect value. The magnitude of the impact of earnings volatility is also large (and perhaps more reasonable than the estimate in the pooled effects) in these long-run change models. We find that a one standard deviation in earnings volatility is associated with a 6.4 percent reduction in firm value. As we argued earlier, this evidence is consistent with reduced analyst following (and increased level of asymmetric information) for firms with high earnings volatility. It is also consistent with a higher likelihood that a firm with high volatility will miss its earnings forecast; and that such a firm will have higher perceived bankruptcy risk.

Our final tests on long-run changes separate between positive and negative earnings volatility changes. It is possible that the volatility effect is not symmetric and that the market discounts firms more when volatility increases than awards them a premium when volatility decreases. Column 1 of Table 10 presents results for positive changes in earnings volatility and Column 2 for negative changes. We find significant evidence that positive earnings volatility changes (i.e., increases) negatively impact firm value. However, we find no significant evidence that a reduction in earnings volatility positively affects value. This could be due to the lower number of observations (only 269) and therefore lower power in this regression (adjusted R^2 of 4.7 percent). In addition, neither cash flow volatility, nor systematic risk are shown to significantly affect value, either during volatility increases or decreases. Firm-specific risk is found to be negatively affecting value during volatility decreases. These results add to our evidence that earnings volatility changes matter for firm value and that it is increases in volatility that the market seems to be concerned with.

3.2 Alternative specifications and estimation techniques.

Overall, both our pooled and within-firm fixed effects results are robust. Our results are almost identical regardless of the estimation technique or particular regression specification that we use. Specifically we find qualitatively similar results under the following specifications:

a) Four different measures of earnings: earnings per share from operations, earnings per share (diluted) from operations, earnings per share (basic) including extraordinary items and earnings per share (basic) excluding extraordinary items.

b) The inclusion of cash flow level and earnings per share as additional controls.

c) The inclusion of 3-, or 4-digit SIC industry controls (instead of 2-digit SICs).

d) The use of total risk in lieu of systematic and idiosyncratic risk.

e) Using the variance (instead of the standard deviation) of earnings and cash flow.

f) Using either the "perfect-foresight" measures described in section 1.2 or the contemporaneous (or lagged) value for either earnings or cash flow volatility.

g) Sensitivity to outliers: We find qualitatively similar results based on a sample where we windsorize all of our variables at ten percent. Further, our results hold in median regressions (least absolute deviation).

h) Sub-period analysis: Our results continue to hold if we estimate the cross-sectional regressions by-year rather than using pooled or between- or within-firm panel regressions. The magnitude of the effect is not qualitatively different in any of our sub-periods.

i) Nonlinearities: Using a specification which includes four dummy variables indicating whether a firm is above or below the median in earnings or cash flow volatility. We find a significant negative (positive) effect only for both high (low) cash flow and earnings volatility firms, suggesting that both volatilities matter for firm value.

Given the strength of our results, our robustness tests find support for the conclusions presented in Section 2 that financial statement smoothness matters, *ceteris paribus*, to investors. Overall, we continue to find that earnings volatility may be more relevant for firm value than cash flow volatility.

3.3 Financial Distress

It could simply be the case that our measures of earnings and cash flow volatility serve as a proxy for firms facing financial distress. Since there is nothing novel about the finding that firms in financial distress have lower value, we must be sure that our results hold even for firms that are in relatively good financial health. To test whether our results are driven by a sub-sample of firms that are in (or near) financial distress, we test our hypothesis based on a sub-sample of firms excluding firms that meet the following selection criteria:

a) Negative average quarterly earnings over the five-year period.

b) Negative average quarterly cash flows over the five-year period.

c) Average total assets in the lowest sample quintile.

d) Observations in the highest leverage quintile.

e) Observations in the lowest leverage quintile.

f) No Dividend Payments.

These filters ensure that our tests are performed only on larger, profitable companies with a moderate capital structure and at least enough cash to pay dividends; these are firms that are unlikely to be in financial distress. Such filters eliminate over 70 percent of our observations to a final sample of 880 observations. Nevertheless, we continue to find that both earnings and cash flow volatility have a negative effect on firm value. These results are, again, both statistically and economically significant. As in Section 2, we still find that cash flow volatility is statistically insignificant in the fixed-effects regression and that the magnitude of the value effect of earnings volatility is nearly twice as large as that of cash flow volatility.

3.4 Estimation of cash flow/earnings volatility.

In our previous tests, we estimate both cash flow and earnings volatility by simply computing the time-series standard deviation of a firm's quarterly earnings over a five-year period. This measure is somewhat crude and could be biased if earnings or cash flows are nonstationary (i.e., exhibit persistence, trend, or seasonality). In this sub-section we explore the sensitivity of our results to our estimation of the volatility. Our general approach is to estimate a time-series model for earnings and cash flows and compute the time–series volatility only for the stationary component of the data.

There is a vast literature in accounting (see e.g., Brown (1993) and references therein) suggesting that generally, earnings are strongly persistent and exhibit seasonality. To account for such time-series properties, we estimate a model of earnings (cash flows) that accounts for this persistence with lagged values of earnings (cash flows), as well as quarterly dummy variables. Our estimation equation for each firm is:

$$E_t = \alpha + \beta_1 E_{t-1} + \sum_{q=2}^{4} \beta_q I_{Quarter} + \varepsilon_t \tag{1}$$

In this regression the constant term, α, along with the AR(1) coefficient β_1 captures serial correlation and any time-series trend in earnings. We estimate the above model for each firm separately based on our full sample of ten years of quarterly earnings data (1990-2000). Using the results from this regression for each firm, we compute the five-year sample standard deviation of the estimated residuals:

$$\text{Volatility of earnings} = \text{Stdev}(\widehat{\varepsilon}_t)$$

We use a similar model to estimate cash flow volatility. In addition to the simple time-series model described above, we also computed residuals using alternative time-series models that include additional lags of earnings or cash flows as well as a mean reversion (E_{t-4}) term. Using the residuals from any of these alternative time-series models to compute earnings or cash flow volatility does not qualitatively alter any of our results.

As in Section 2, and consistent with the alternative specifications described above, we find that all measures of cash flow/earnings volatility continue to measure the same phenomena. Using any of the various measures of financial statement volatility, we continue to find that both cash flow and earnings volatility are negatively valued by investors.

4. Conclusions

This paper tests the hypothesis that earnings and cash flow volatility have a negative effect on firm value. While prior work suggests that cash flow volatility is costly, that it permanently affects investment, and that risk management adds value, no prior work has investigated directly such a relation between value and the smoothness of financial statements. This is important as it provides a justification for the widespread risk management activities that firms engage in.[9]

In general, we find that earnings and cash flow volatility are *both* significantly and negatively associated with firm value. However, in several of our tests, we find evidence that only earnings volatility has a negative effect on firm value. The impact of earnings volatility on firm value is also economically significant: we find that a one standard deviation increase in volatility decreases firm value between 6-21 percent. Further tests separating between positive and negative changes in earnings volatility suggest that the impact is mostly prevalent during volatility increases. Finally, our results also suggest a significantly stronger impact of volatility among low-debt firms, possibly as a result of managerial entrenchment or the existence of financing constraints among such firms.

Overall, we find that the value effect of earnings volatility is larger than the value effect of cash flow volatility. Our findings are consistent with the behavior of many market participants who seem to focus on earnings as a signal of financial stability. In this manner, our paper contributes to the broader risk management literature by documenting that financial statement volatility is

[9] Allayannis and Weston (2001) report that approximately 64% of their sample firms with exposure to exchange rate risk use currency derivatives to hedge their exposures.

costly and that it directly affects value. Our results are consistent with risk management theory and suggest that managers' efforts to produce smooth financial statements add value to the firm.

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Appendix 1

Advertising Expenditures (MM): This item represents the cost of advertising media (radio, television, newspapers, periodicals) and promotional expense. Compustat data item 45.

Beta: Computed from the market model based on five years of monthly returns against the CRSP value-weighted index. For example, the beta for a firm for the 1990 observation will be based on the monthly returns between 1986 and 1990. In the regressions, we use alternatively contemporaneous and perfect foresight betas following Shin and Stulz (2000).

Capital Expenditures (MM): This item represents capital expenditures restated up to 10 years for acquisitions, accounting changes, and/or discontinued operations. Restated data is collected from summary presentations and is reported by the company.

Cash Flow volatility: Standard deviation of *operating cash flows*. Also use alternatively the standard deviation of the residuals from various time-series models described in text.

Earnings volatility-alternative measures: Standard deviation of earnings (using earnings measure 1). Also use alternatively the standard deviation of the residuals from various time-series models described in text. Earnings measure 1 is constructed using Compustat quarterly data177 which is 'Earnings per share from operations.' We also use earnings measure 2, which is constructed using Compustat quarterly data7 which is 'Earnings per share (diluted) from operations.' Earnings measure 3 is constructed using Compustat quarterly data9 which is 'Earnings per share (diluted) from operations excluding extraordinary items.' Earnings measure 4 is constructed using Compustat quarterly data11 which is 'Earnings per share (basic) including extraordinary items.' Earnings measure 5 is constructed using Compustat quarterly data19 which is 'Earnings per share (basic) excluding extraordinary items.'

Firm-specific risk: Computed as the residual risk from the market model as in Shin and Stulz

(2000). That is, we take total risk and subtract beta squared times the variance of the market return (or *total risk* minus *systematic risk*).

Long-term debt (MM): Compustat data item 9. This item represents debt obligations due more than one year from the company's Balance Sheet date or due after the current operating cycle.

Market risk: Standard deviation of the CRSP value weighted market return based on five years of monthly returns over the previous five years of the observation unit. That is, the 1990 value for market reflects the 1986 to 1990 period. However, in our statistical tests, we use alternatively the contemporaneous as well as the perfect foresight forecast as estimators of the market return.

Number of common shares outstanding: Measured at the end of the calendar year in millions. Compustat data item 25. This item represents the net number of all common shares outstanding at year-end.

Operating cash flows: SALES(#item 2)-COGS(#30)-Selling, administrative etc(#1)-Changes in WC, where Working Capital (WC) = non-missing acc. receivables (#37)+inventory (#38) + other current asset (#39) −− nonmissing acc. payable(#46) − income taxes payable (#47) − other current liabilities (#48). (all items from quarterly compustat database). We compute this measure each quarter for each firm and take the equally-weighted time-series average over all quarters during each five year period.

Share Price: Measured at the close of the calendar year. Compustat data item 199.

Systematic risk: Constructed as beta squared multiplied by the variance of the market return. This measure follows the same construction as for the other market risk measures.

Tobin's Q: Proxied by the market-to book ratio. Constructed as the ratio of the market value of equity and book value of *long-term debt* to *total assets*. The market value of equity is constructed by multiplying the *share price* times the *number of common shares outstanding*.

Total Assets: Compustat data item 6. This item represents current assets plus property, plant, and equipment, plus other noncurrent assets (including intangible assets, deferred charges, and investments and advances).

Total risk: Constructed as the standard deviation of monthly returns over the five year period. Again, the 1990 measure for total risk is simply the standard deviation of monthly returns over the previous five years. In the regressions, we use either contemporaneous measures or the 'perfect foresight' measures as in the Stulz papers.

Table 1
Summary Statistics

This table presents descriptive statistics for our sample of firms. The sample contains all COMPUSTAT firms with available annual and quarterly data and matching data on CRSP during 1990 and 1995. The final sample consists of 2008 firms is 1990 and 1382 firms in 1995 for a total of 3390 observations. Variables are defined in detail in Appendix 1.

Panel A: Descriptive Variables	Obs	Mean	Std.	25%	median	75%
Total Assets	3,389	2,002	5,313	61	260	1,138
Equity Market Value (M$)	3,371	1,766	4,713	38	192	1,048
Return on Assets	3,384	2.164	15.771	0.914	4.716	8.258
Debt-to-equity	3,365	0.615	1.307	0.034	0.206	0.587
Growth (CAPX/SALES)	3,364	0.104	0.200	0.023	0.046	0.089
Market-to-book	3,365	1.389	1.357	0.663	0.981	1.557
Panel B: Measures of Risk						
Systematic Risk	3,389	0.152	0.190	0.034	0.093	0.194
Firm-specific risk	3,389	0.447	0.243	0.286	0.385	0.536
Total Risk	3,389	0.610	0.429	0.358	0.499	0.723
Earnings per share	3,242	0.275	0.395	0.024	0.200	0.458
Volatility of EPS (std. dev.)	3,240	0.314	0.409	0.096	0.186	0.347
Cash flow per share (CFS)	3,084	2.097	9.333	0.524	1.722	3.130
Volatility of CFS (std. dev.)	3,076	17.810	40.188	1.952	5.359	15.614
Total cash flow	3,084	100.257	393.737	2.923	22.138	94.091
Total earnings	3,242	26.327	81.531	0.118	2.238	12.939

Table 2
Correlation Table

This table presents correlations among our main risk variables used in subsequent tests. Variables are defined in detail in Appendix 1. P-values are presented in parentheses.

	Market to book	Syst. Risk	Firm Risk	Total Risk	EPS	CFPS	St. dev. (EPS)	St. dev. (CFPS)	Total Earn.
Systematic risk	0.199	1							
	(0.000)								
Firm risk	0.095	0.337	1						
	(0.000)	(0.000)							
Total risk	0.154	0.684	0.808	1					
	(0.000)	(0.000)	(0.000)						
Earnings (EPS)	-0.030	-0.158	-0.454	-0.348	1				
	(0.086)	(0.000)	(0.000)	(0.000)					
Cash flow (CFPS)	-0.033	-0.023	0.012	-0.012	0.029	1			
	(0.072)	(0.200)	(0.514)	(0.524)	(0.113)				
σ(EPS)	-0.234	-0.017	-0.181	-0.121	0.257	0.019	1		
	(0.000)	(0.325)	(0.000)	(0.000)	(0.000)	(0.284)			
σ(CFPS)	-0.226	-0.044	0.118	0.032	-0.156	0.022	0.163	1	
	(0.000)	(0.016)	(0.000)	(0.076)	(0.000)	(0.224)	(0.000)		
Total earnings.	0.027	-0.007	-0.101	-0.065	0.237	0.591	0.071	-0.076	1
	(0.143)	(0.705)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
Total cash flow	0.042	-0.062	-0.230	-0.166	0.551	0.051	0.157	-0.120	0.498
	(0.017)	(0.000)	(0.000)	(0.000)	(0.000)	(0.006)	(0.000)	(0.000)	(0.000)

Table 3
Univariate Results

This table presents univariate results. We group firms into quintiles based on their earnings and cash flow volatility. Panel A reports mean and median Tobin's Q for the earnings and cash flow volatility quintiles arranged from low to high. The difference in mean and median Q between the low and the high quintile is shown at the bottom of the panel along with p-values in parentheses. Panels B-D present further univariate results where, in addition to earnings volatility we also classify according to size, leverage, and earnings level. Finally panel E presents univariate results for firms classified according to earnings and cash flow volatility.

Panel A: Average Tobin's Q	Earnings Volatility		Cash Flow Volatility	
	Mean	Median	Mean	Median
Low	1.900	1.178	1.189	0.837
2	1.498	1.124	1.742	1.140
3	1.381	1.032	1.644	1.262
4	1.177	0.901	1.244	1.009
High	0.989	0.770	1.108	0.825
Difference (Low-High)	0.911	0.626	0.081	0.012
P-value	(0.001)		(0.101)	

Panel B: Average Tobin's Q	Size Quintile				
	Smallest	2	3	4	Largest
Low Earning Volatility	2.109	1.577	1.739	1.915	1.466
2	2.186	1.329	1.407	1.536	1.450
3	1.855	1.256	1.300	1.329	1.115
4	1.330	1.238	1.227	1.226	1.073
High Earnings Volatility	1.317	1.025	0.971	0.924	0.834
Difference (Low-High)	0.792	0.552	0.768	0.991	0.632
P-value	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)

Table 3 (Continued)
Univariate Results

Panel C: Average Tobin's Q

	DT/EQ Quintile				
	Smallest	2	3	4	Largest
Low Earning Volatility	3.241	2.088	1.206	0.921	0.765
2	2.726	1.876	1.243	0.947	0.706
3	2.386	1.578	1.230	0.889	0.754
4	2.302	1.512	1.124	0.808	0.686
High Earnings Volatility	1.801	1.371	1.075	0.848	0.622
Difference (Low-High)	1.439	0.717	0.131	0.073	0.143
P-value	(0.000)	(0.000)	(0.057)	(0.119)	(0.000)

Panel D: Average Tobin's Q

	Earnings Level Quintile				
	Smallest	2	3	4	Largest
Low Earning Volatility	2.502	1.579	2.000	1.848	1.729
2	2.128	1.264	1.561	1.585	1.496
3	1.283	1.303	1.321	1.441	1.266
4	1.094	1.169	1.245	1.276	1.135
High Earnings Volatility	0.909	1.070	1.052	1.004	0.911
Difference (Low-High)	1.592	0.509	0.948	0.844	0.818
P-value	(0.000)	(0.005)	(0.000)	(0.000)	(0.000)

Table 3 (Continued)
Univariate Results

Panel H: Average Tobin's Q

	Cash Flow Volatility Quintile				
	Smallest	2	3	4	Largest
Low Earnings Volatility	2.480	1.747	1.536	1.525	1.477
2	2.338	1.650	1.378	1.172	1.122
3	1.838	1.477	1.304	1.046	1.149
4	1.784	1.431	1.120	1.040	0.973
High Earnings Volatility	1.411	0.976	0.966	0.926	0.772
Difference (Low-High)	1.069	0.771	0.570	0.600	0.705
P-value	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)

Table 4
Pooled Regressions

This table presents results from pooled regressions, in which we use ln(Tobin's Q) as the dependent variable, proxying for firm value. All variables used in the regressions are described in Appendix 1 in detail. 2-digit SIC controls are also included. T-statistics are reported below coefficient estimates.

Dependent variable : ln(Tobin's Q)					
	(1)	(2)	(3)	(4)	(5)
log(Earnings Volatility)			-0.222		-0.208
			(-12.122)		(-10.489)
log(Cash Flow Volatility)				-0.172	-0.144
				(-10.124)	(-8.507)
log(Systematic Risk)		0.106	0.103	0.092	0.091
		(6.344)	(6.256)	(5.288)	(5.331)
log(Firm-specific Risk)		-0.220	-0.196	-0.180	-0.163
		(-7.713)	(-6.964)	(-5.859)	(-5.349)
log(Size) (Total Assets)	-0.068	-0.208	-0.103	-0.174	-0.077
	(-3.954)	(-8.819)	(-4.219)	(-6.857)	(-2.902)
Return on Assets	0.218	0.191	0.195	0.187	0.193
	(5.914)	(5.312)	(5.429)	(5.017)	(5.207)
Growth Opportunities (CAPX/Sales)	0.146	0.148	0.155	0.144	0.155
	(5.848)	(5.765)	(6.105)	(5.925)	(6.512)
Capital Structure (Debt to Equity)	-0.145	-0.088	-0.064	-0.080	-0.060
	(-8.150)	(-4.598)	(-3.400)	(-3.946)	(-2.994)
R&D Expenditures / Sales	0.331	0.34	0.346	0.328	0.334
	(11.593)	(12.147)	(12.520)	(11.021)	(11.500)
Advertising Expenditures / Sales	0.071	0.075	0.085	0.058	0.070
	(3.467)	(3.707)	(4.342)	(3.109)	(3.867)
Constant	-0.446	-0.562	-0.574	-0.552	-0.558
	(-15.066)	(-15.886)	(-16.584)	(-14.945)	(-15.422)
Year Dummy (1990)	0.256	0.325	0.332	0.32	0.324
	(-11.444)	(-13.305)	(-14.011)	(-12.573)	(-13.054)
N	3,341	3,341	3,341	3,041	3,041
R2	0.301	0.326	0.362	0.348	0.378

Table 5
Fixed-Effects Regressions

This table presents results from fixed-effects regressions, in which we use ln(Tobin's Q) as the dependent variable, proxying for firm value. All variables used in the regressions are described in Appendix 1 in detail. 2-digit SIC controls are also included. T-statistics are reported below coefficient estimates.

Dependent variable : ln(Tobin's Q)					
	(1)	(2)	(3)	(4)	(5)
Earnings Volatility			-0.095		-0.091
			(-3.487)		(-3.036)
Cash Flow Volatility				0.014	0.017
				(0.636)	(0.736)
Systematic Risk		0.025	0.029	0.028	0.032
		(1.178)	(1.377)	(1.220)	(1.404)
Firm-specific Risk		-0.074	-0.066	-0.089	-0.083
		(-2.099)	(-1.899)	(-2.359)	(-2.201)
Size (Total Assets)	-0.225	-0.234	-0.191	-0.267	-0.223
	(-2.949)	(-3.077)	(-2.495)	(-3.152)	(-2.610)
Return on Assets	0.213	0.205	0.207	0.197	0.199
	(7.610)	(7.299)	(7.393)	(6.556)	(6.662)
Growth Opportunities (CAPX)	0.116	0.114	0.128	0.132	0.147
	(3.759)	(3.716)	(4.142)	(3.849)	(4.268)
Capital Structure (Debt to Equity)	-0.102	-0.088	-0.087	-0.099	-0.096
	(-4.220)	(-3.506)	(-3.494)	(-3.556)	(-3.457)
R&D Expenditures	0.189	0.195	0.192	0.179	0.178
	(3.904)	(4.039)	(3.991)	(3.423)	(3.408)
Advertising Expenditures	-0.007	-0.004	-0.001	-0.009	-0.005
	(-0.265)	(-0.130)	(-0.046)	(-0.299)	(-0.181)
Constant	-0.341	-0.382	-0.384	-0.391	-0.392
	(-11.783)	(-11.046)	(-11.149)	(-10.456)	(-10.532)
Year Dummy (1990)	0.196	0.220	0.221	0.219	0.219
	(9.887)	(9.715)	(9.816)	(9.266)	(9.343)
N	3,341	3,341	3,341	3,041	3,041
R2	0.261	0.265	0.274	0.259	0.266

Table 6
Breakout by Median Size of the Firm

This table presents results from pooled and fixed-effects regressions, in which we use ln(Tobin's Q) as the dependent variable, proxying for firm value. Regressions are estimated separately for small and large firms, classified based on median firm size. All variables used in the regressions are described in Appendix 1 in detail. 2-digit SIC controls are also included. T-statistics are reported below coefficient estimates.

Dependent variable : ln(Tobin's Q)				
	Pooled		Fixed-Effects	
	Small	Big	Small	Big
	(1)	(2)	(3)	(4)
Earnings Volatility	-0.189	-0.211	-0.124	-0.072
	(-5.820)	(-10.001)	(-1.910)	(-2.278)
Cash Flow Volatility	-0.163	-0.098	0.093	-0.017
	(-5.630)	(-5.065)	(1.778)	(-0.785)
Systematic Risk	0.117	0.034	0.010	0.047
	(5.098)	(1.513)	(0.242)	(1.757)
Firm-specific Risk	-0.191	-0.092	-0.189	0.087
	(-4.241)	(-2.091)	(-2.403)	(2.040)
Size (Total Assets)	-0.153	-0.115	-0.220	-0.459
	(-2.086)	(-3.700)	(-1.146)	(-4.255)
Return on Assets	0.132	0.657	0.129	0.520
	(3.277)	(6.880)	(2.778)	(9.608)
Growth Opportunities (CAPX)	0.201	0.080	0.207	0.073
	(6.905)	(2.479)	(3.425)	(1.394)
Capital Structure (Debt to Equity)	-0.045	-0.049	-0.044	-0.082
	(-1.586)	(-1.615)	(-0.851)	(-2.651)
R&D Expenditures	0.321	0.258	0.250	-0.171
	(9.128)	(6.797)	(3.079)	(-1.717)
Advertising Expenditures	0.045	0.069	-0.076	0.009
	(1.440)	(3.909)	(-1.310)	(0.265)
Year Dummy (1990)	-0.577	-0.485	-0.406	-0.311
	(-10.110)	(-10.010)	(-5.642)	(-7.451)
Constant	0.254	0.291	0.080	0.472
	(4.343)	(6.770)	(0.576)	(5.283)
N	1,509	1,532	1,509	1,532
R2	0.351	0.541	0.269	0.405

Table 7
Breakout by Median Debt-to-Equity

This table presents results from pooled and fixed-effects regressions, in which we use ln(Tobin's Q) as the dependent variable, proxying for firm value. Regressions are estimated separately for high and low levered firms, classified based on median debt-to-equity. All variables used in the regressions are described in Appendix 1 in detail. 2-digit SIC controls are also included. T-statistics are reported below coefficient estimates.

Dependent variable : ln(Tobin's Q)				
	Pooled		Fixed-Effects	
	Low-DTEQ	High-DTEQ	Low-DTEQ	High-DTEQ
	(1)	(2)	(3)	(4)
Earnings Volatility	-0.265	-0.109	-0.121	-0.043
	(-8.061)	(-5.261)	(-2.064)	(-1.283)
Cash Flow Volatility	-0.119	-0.104	-0.002	-0.008
	(-4.440)	(-6.316)	(-0.054)	(-0.303)
Systematic Risk	0.153	0.019	0.065	0.042
	(4.739)	(1.310)	(1.431)	(1.767)
Firm-specific Risk	-0.152	-0.168	-0.005	0.031
	(-3.551)	(-4.523)	(-0.067)	(0.743)
Size (Total Assets)	0.008	-0.026	0.408	-0.177
	(0.206)	(-0.828)	(2.662)	(-1.695)
Return on Assets	0.146	0.119	0.199	0.101
	(3.102)	(3.158)	(3.998)	(2.157)
Growth Opportunities (CAPX)	0.244	0.060	0.306	-0.007
	(6.567)	(3.014)	(4.793)	(-0.195)
Capital Structure (Debt to Equity)	-3.383	0.003	-4.956	-0.084
	(-6.287)	(0.182)	(-5.683)	(-3.602)
R&D Expenditures	0.279	0.127	0.239	0.093
	(7.827)	(3.459)	(3.649)	(0.542)
Advertising Expenditures	0.045	0.043	-0.008	0.045
	(1.984)	(2.326)	(-0.208)	(0.919)
Year Dummy (1990)	-0.553	-0.443	-0.108	-0.261
	(-10.020)	(-10.949)	(-1.450)	(-6.352)
Constant	-0.895	-0.039	-1.666	-0.143
	(-3.980)	(-1.326)	(-4.439)	(-2.795)
N	1,514	1,527	1,514	1,527
R2	0.363	0.328	0.304	0.307

Table 8
Breakout by Level of Earnings per Share

This table presents results from pooled and fixed-effects regressions, in which we use ln(Tobin's Q) as the dependent variable, proxying for firm value. Regressions are estimated separately for high and low earnings per share level firms, classified based on median earnings per share level. All variables used in the regressions are described in Appendix 1 in detail. 2-digit SIC controls are also included. T-statistics are reported below coefficient estimates.

Dependent variable : ln(Tobin's Q)				
	Pooled		Fixed-Effects	
	Low-EPS	High-EPS	Low-EPS	High-EPS
	(1)	(2)	(3)	(4)
Earnings Volatility	-0.137	-0.279	-0.216	-0.136
	(-2.851)	(-7.832)	(-2.789)	(-2.530)
Cash Flow Volatility	-0.160	-0.111	-0.049	0.001
	(-6.170)	(-5.112)	(-1.178)	(0.023)
Systematic Risk	0.110	0.058	0.017	0.015
	(4.766)	(2.367)	(0.438)	(0.502)
Firm-specific Risk	-0.204	-0.098	-0.088	0.024
	(-4.448)	(-2.394)	(-1.203)	(0.464)
Size (Total Assets)	-0.086	-0.049	0.142	-0.261
	(-1.878)	(-1.542)	(0.896)	(-2.108)
Return on Assets	0.142	0.335	0.229	0.336
	(3.178)	(5.602)	(4.628)	(7.169)
Growth Opportunities (CAPX)	0.184	0.116	0.436	-0.033
	(5.366)	(3.834)	(5.744)	(-0.682)
Capital Structure (Debt to Equity)	-0.108	-0.016	-0.240	-0.049
	(-2.952)	(-0.623)	(-3.044)	(-1.463)
R&D Expenditures	0.356	0.282	0.332	-0.175
	(8.911)	(7.148)	(4.406)	(-1.508)
Advertising Expenditures	0.111	0.039	-0.039	-0.001
	(4.165)	(1.805)	(-0.744)	(-0.026)
Year Dummy (1990)	-0.552	-0.540	-0.244	-0.294
	(-9.937)	(-11.105)	(-3.391)	(-6.060)
Constant	0.387	0.331	0.198	0.126
	(8.182)	(7.218)	(2.587)	(2.110)
N	1,510	1,531	1,510	1,531
R2	0.370	0.413	0.354	0.338

Table 9
Long-Run Change Regressions

This table presents results from long run (five year) change regressions, in which we use the change in ln(Tobin's Q) as the dependent variable, proxying for firm value. All variables used in the regressions are described in Appendix 1 in detail. 2-digit SIC controls are also included. T-statistics are reported below coefficient estimates.

Dependent variable : ln(Tobin's Q)					
	(1)	(2)	(3)	(4)	(5)
Earnings Volatility			-0.069		-0.064
			(-2.860)		(-2.400)
Cash Flow Volatility				0.002	0.003
				(0.130)	(0.230)
Systematic Risk		0.000	0.000	0.000	0.000
		(-0.980)	(-0.740)	(-1.190)	(-1.000)
Firm-specific Risk		-0.042	-0.035	-0.054	-0.048
		(-1.020)	(-0.820)	(-1.190)	(-1.050)
Size (Total Assets)	-0.101	-0.073	-0.058	-0.079	-0.065
	(-3.070)	(-2.230)	(-1.730)	(-2.230)	(-1.790)
Return on Assets	0.016	0.016	0.016	0.016	0.016
	(6.690)	(6.330)	(6.250)	(5.930)	(5.870)
Growth Opportunities (CAPX)	0.437	0.443	0.497	0.529	0.586
	(2.480)	(2.510)	(2.730)	(2.720)	(2.900)
Capital Structure (Debt to Equity)	-0.084	-0.039	-0.039	-0.046	-0.045
	(-3.530)	(-2.180)	(-2.230)	(-2.290)	(-2.300)
Constant	0.306	0.263	0.262	0.266	0.265
	(12.650)	(9.130)	(9.040)	(8.530)	(8.450)
N	981	981	981	878	878
R2	0.155	0.1544	0.1636	0.1599	0.1673

Table 10
Long-Run Changes: Breakout by Sign

This table presents results from long run (five year) change regressions, in which we use the change in ln(Tobin's Q) as the dependent variable, proxying for firm value. Regression 1 (2) is estimated based on all positive (negative) earnings volatility changes. All variables used in the regressions are described in Appendix 1 in detail. 2-digit SIC controls are also included. T-statistics are reported below coefficient estimates.

Dependent variable : ln(Tobin's Q)		
	Positive Changes (1)	Negative Changes (2)
Earnings Volatility	-0.056	-0.006
	(-2.259)	(0.026)
Cash Flow Volatility	0.005	0.014
	(0.402)	(0.012)
Systematic Risk	0.000	0.001
	(-1.169)	(0.000)
Firm-specific Risk	-0.138	0.055
	(-2.868)	(0.038)
Size (Total Assets)	-0.024	-0.045
	(-0.667)	(0.041)
Return on Assets	0.010	0.004
	(3.912)	(0.003)
Growth Opportunities (CAPX)	0.500	0.036
	(2.728)	(0.181)
Capital Structure (Debt to Equity)	-0.010	-0.022
	(-0.577)	(0.027)
Constant	0.526	-0.325
	(15.717)	(0.033)
N	611	269
R2	0.128	0.047