Investor Fear and Earnings Management:

VIX-based Evidence

Joachim Gassen
Wirtschaftswissenschaftliche Fakultät
C.A.S.E - Center for Applied Statistics and Economics
Humboldt-Universität zu Berlin
10099 Berlin, Germany
Phone: +49-30-2093 5764
E-mail: gassen@wiwi.hu-berlin.de

Garen Markarian
IE Business School
María de Molina, 11
Phone : +34676102715
28006 Madrid, Spain
E-mail: garen.markarian@ie.edu

First Draft
September 2009

This work has been sponsored by the German research foundation (DFG, SFB 649, Project A7) at Humboldt-Universität zu Berlin. We thank Stefano Cascino, Andrea Menini (discussant), Antonio Parbonetti (discussant), participants from the ESMT/HU Berlin finance brown bag seminar and the research seminar of the University of Padua for helpful comments.

Investor Fear and Earnings Management: VIX-based Evidence

Abstract: Prior literature has documented that managers cater to investor sentiment when reporting earnings and deciding upon voluntary disclosure. We contribute to this emerging stream in the literature by explicitly investigating the impact of investor fear levels, measured by the volatility index (VIX) published by the Chicago Board Options Exchange, on the earnings management behavior of U.S. companies. We document that in high-fear periods, managers report higher absolute abnormal accruals. Also, managers more frequently meet or beat earnings forecasts in high-fear periods. Consistent with our expectations, these findings are more pronounced for high-risk firms and for firms with dedicated investors as well as for firms with significant CEO share holdings. They are less pronounced for firms with index-oriented investors and for firms with significant CEO option holdings. Interestingly, we find that earnings response coefficients tend to be smaller in high-fear periods. Our results are robust to a large number of covariates, various macroeconomic variables, and various statistical formulations including firm fixed-effects.

Keywords: VIX, Earnings Management, Earnings Quality, Investor Fear, Market Sentiment, Analyst Forecasts

JEL Codes: M41, G10, G01, M49

1 Introduction

As recent evidence provided by the ongoing financial crisis clearly demonstrates, capital markets are not only affected by rational market participants but also by behavioral biases like investor sentiment (Shiller, 2005). Still, the interplay between investor sentiment and management behavior is not well understood. This paper contributes to a small and emerging field in the literature which investigates the interplay between the sentiment of market participants and financial reporting choices of management. Using the Implied Volatility Index (VIX) reported by the Chicago Board Options Exchange, we study the impact of market-wide fear levels on the earning management behavior of publicly-listed U.S. firms. Other than the sentiment factors which have been applied in related work (Rajgopal et al. 2007, Mian and Sankaraguruswamy, 2008), the VIX score, as an asymmetric sentiment factor predominantly capturing the average investors' fear level within the market (Whaley, 2008), allows us to study the interplay between irrational fear and earnings management.

We document that in high-fear periods, managers report larger absolute abnormal accruals, resulting in a larger propensity to just meet and beat consensus analyst forecasts. However, this behavior of managers' seems to be not-beneficiary from a capital-market perspective as earnings response coefficients generally seem to decline in high fear periods. As such, earnings management to meet or beat forecasts seems to be a costly decision without the appropriate reward. We next examine whether the relationship between investor fear and earnings management is driven by firm-level riskiness, where we find that even controlling for standard risk characteristics, our relationships persist.

Also, we find that firms with higher levels of ex-ante risk are even more likely to manage earnings in high-fear periods.

Our results are robust to a large number of covariates, including controls for CEO equity holdings, ownership structure, and to alternate calculations of our earnings management variable, and across statistical methodologies including firm fixed-effects regressions. In that respect, we find that the relation between high-fear periods and earnings management is stronger when managers hold equity shares of their firms and weaker when they hold equity options. This result appears to be consistent with management incentives as higher future volatility might increase personal wealth of equity option holders. Also, the observed effect of high-fear periods appears to be stronger for firms with dedicated investors and weaker for firms with index-oriented investors, which is also inline with our expectations. Although we document a contemporaneous relationship between the VIX and earnings management, supplemental analysis seems to suggest that it is the VIX that leads managerial financial reporting decisions, and not the other way around. Finally, we document that investor fear, while also being related to overall investor sentiment and other macroeconomic factors that could affect the VIX such as interest rates, unemployment, inflation, industrial productivity, etc., is an (irrational) independent construct which in itself affects the earnings management behavior of U.S. public firms,

We contribute to the literature on the macroeconomic determinants of earnings management and to the literature investigating the impact of behavioral biases on accounting and reporting choices. Within this emerging stream in the literature, to our knowledge, this is the first paper which uses the influential VIX measure to study the

interaction between investors' fear levels and managements' financial reporting choices. In this respect, our work is related to the work of Rajgopal et al. Rajgopal et al. (2007) investigate the overall impact of market sentiment, measured by the responsiveness of stock returns on earnings surprises, on earnings management. In contrast, we are explicitly using an asymmetric investor sentiment indicator, the VIX, which serves as a proxy for investors' fear. While Rajgopal find that managers cater to overall earnings optimism by earnings management, our result contribute to these findings by indicating that in high fear periods, increased levels of earnings management by managers are not "rewarded" with higher earnings response coefficients. Our results also speak to contemporaneous research by Mian and Sankaraguruswamy (2008), who show that earnings response coefficients react asymmetrically to overall investor sentiment. Additionally, our findings are in line and extend the results of Bergman and Roychowdhury (2008) and Brown et al. (2008), who find that investor sentiment is linked to voluntary disclosure.

This paper is organized as follows. Section two presents the background and discusses the predictions. Section 3 presents the research design and variable measurement. Section 4 presents the data, sample selection, and descriptive. Section 5 presents the results and section 6 presents the robustness test. Section 7 presents other supplemental analysis and Section 8 concludes.

2 Background

2.1 The CBOE Volatility Index (VIX)

The Volatility Index (VIX) was introduced by the Chicago Board Options Exchange (CBOE) in 1993. It is nowadays measured based on the prices of S&P 500 index options and as such provides a benchmark for the expected future market volatility for the next 30 calendar dates. As it is an implied measure of expected future volatility, it has been labeled as a "fear gauge" by public media and prior literature (CBOE, 2009; for an overview: Whaley, 2008). Whaley also shows that the correlation between daily returns of the S&P 500 index and the change in the VIX is asymmetrically negative: Negative S&P returns generate higher inclines in the VIX than positive S&P returns a lower VIX. Whaley interprets this asymmetric correlation as indicating that changes in the VIX are partly driven by investors demanding portfolio insurance in times of high current market volatility.

Building on this notion, we interpret the VIX as an asymmetric measure of investor sentiment. In line with prior literature this can be viewed as an indicator for investors' average fear level. Higher levels of the VIX indicate that investors expect future market volatility to increase and that thus that they increase their demand for portfolio insurance, driving up put option prices and finally the VIX. We use the VIX as a time-series conditioning proxy for the average level of investors' fear in the market.

2.2 Investors' Fear Levels and Incentives for Earnings Management

The behavioral finance literature defines investor sentiment as the degree of optimism or pessimism about asset prices which is not backed by fundamental information (Baker and

Wurgler, 2006). Viewed that way, investor sentiment is buy definition irrational. As we are using an implied measure of expected future volatility as our main variable of interest, we cannot take a clear stand whether these expectations are backed by fundamental information or not. The VIX has been shown to be related to future market returns (Banerjee et al., 2007). It is unclear whether this relation is driven by the VIX being a priced risk factor of whether it indicates market inefficiencies. To the extent that it is related to market efficiencies this could indicate sentiment induced mispricing. Taken together, our measure of investor's fear level is conceptually different from the notion of investor sentiment. In addition, like the measures employed in research related to investor sentiment (Baker and Wurgler, 2006; Qui and Welch, 2006), it likely contains some measurement error.

Regardless of whether implied volatility is an indicator for sentiment-related miss-pricing or whether it is a priced risk factor, there are good reasons to assume that management has an incentive to reduce implied volatility. Time periods exhibiting high levels of implied volatility and thus high levels of investors' fear are also time periods of high investor uncertainty. To the extent that uncertainty and fear also relates to firm fundamentals, the idiosyncratic information environment of firms becomes relevant. As prior literature has shown that managers try to use voluntary disclosures to improve low or maintain high levels of investor sentiment (Bergman and Roychowdhury, 2008; Brown et al., 2008), it might also be expected that managers use earnings discretion to mitigate the effects of high levels of implied volatility. We test this conjecture empirically using the research design outlined in the next section

3 Research Design and Variable Measurement

3.1 Research Design

Our study examines the relationship between investor fear and earnings management. Earnings management is defined as a "purposeful intervention in the external financial reporting process, with the intent of obtaining some private gain" (Schipper, 1989, p. 92). In generally accepted terms, earnings management occurs "when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers" (Healy and Wahlen, 1999, p. 368). We argue that at any point in time, investor fear levels affects firm-level decisions to manage earnings. From this perspective, we assume that earnings management can be represented in the following form:

$$\textit{Earnings Management} = f(\textit{Investor Fear, control variables}) \qquad (1)$$

Our variables are measured over a long time horizon, across multiple firms per year. As such, our panel data tests are designed to relate investor fear to financial reporting decisions, and we test this link while controlling for a number of covariates that have been previously correlated to earnings management. In additional to our base level theoretical representation above, we also examine other earnings management proxies such as meeting/beating analyst forecasts (beating the benchmark has been identified in the literature as a strong motivation for earnings management (e.g., Burgstahler and Dichev, 1997), and the earnings quality measure of Dechow and Dichev (2002).

Given that the VIX index proxies for investor fear, in additional analysis we examine the role of firm riskiness in managerial earnings management decisions: If investor fear has an effect on managerial decisions, then this should be especially manifested in firms with higher levels of ex-ante firm risk. Additionally, we examine other factors that could be related to both VIX and earnings management, and their role in moderating this relationship. First, we examine the role of institutional investors, and ownership turnover, as it relates to managerial decisions to manage earnings. Prior studies has identified a monitoring role of institutions (Hartzell and Starks, 2003), however, Bushee (1998) argues that such a monitoring role is dependent on the incentives of different categories of institutional investors. Second, we examine the role of CEO stock options and shareholdings, given that equity holdings have been identified as incentives in managing earnings.

3.2 Variable Measurement

3.2.1 Measuring Investor Fear

As a proxy for investor fear we utilize the VIX measure (*VIX*) as calculated by the Chicago Board Options Exchange (CBOE). The CBOE publishes the stock market volatility index, called the VIX, as a key measure of market expectations of near term volatility conveyed by stock index option prices, hence captures the market's aggregate expectation of future volatility. Higher levels of VIX indicate higher levels of expected future volatility. The VIX index is popularly known as a measure of investor sentiment, given that it spikes during periods of market turmoil, and it has become known as the "*investor fear gauge*" (Whaley, 2000).

3.2.2 Measuring Earnings Management

Our main measure of earnings management is firm-level discretionary accruals (*DA*), calculated according the methodology of Jones (1991), as modified by Dechow et al. (1995). Basically, discretionary accruals are calculated to be total accruals minus nondiscretionary accruals (accruals that are related to sales growth, receivables, and property, plant, and equipment). The calculation is done for each firm on a yearly basis adjusted for industry membership. Measuring discretionary accruals is controversial and prone to error. A number of different authors claim the supremacy of their developed models, and it is not our intention to suggest a preferred measure. We estimate variants of this model by adjusting for future earnings growth and change in cash holdings (*DA2*) as per Phillips et al. (2003) and Chan et al. (2006), Inferences remain unchanged.

3.2.3 Control Variables

We employ a number of controls in our statistical tests, based on variables identified in prior literature to be related either to income smoothing or to stock price volatility. *logMktVal* denotes the logarithm of the market value of equity, used as a control for visibility and information asymmetry (Watts and Zimmerman, 1986; Bhushan, 1989).[1] Return on assets, *ROA,* is used as a control for profitability, calculated as net income before extraordinary items divided by total assets. We control for a firm's investment opportunity set and growth opportunities by calculating *MB*, which is the market value of

[1] As firm size is an important regressor, we checked for the robustness of our results given various alternate specifications of our firm size variable. We re-run our regressions using the non-logarithmic form of our size variable (*MktVal*), results remain the same. We employ firm assets in lieu of the market value of equity, results are qualitatively similar. Finally, instead of *logMktVal* we employ 10 (and 40) dummies for the various size deciles, results are again unchanged.

equity divided by the book value of equity. *Leverage* is total debt divided by total assets, controlling for adverse selection and equity risk Trueman and Titman (1988). *Institution* is the percentage of shares held by institutional investors. We also employ dummy variables for industry, classified into 23 industries according to Core and Guay (1999),[2] since managers with similar risk preferences and utility functions self-select into similar industries (Lambert et al, 1991), and risk varies across industries. Finally, we also control for year effects using year dummies. Other variables used in the robustness tests and other analyses are discussed in the respective sections. The main variables are summarized in Table 1.

(Insert Table 1 about here)

4 Data, Sample Selection, and Descriptives and Univariate Results

4.1 Data and Sample Selection

We use the VIX data available on the website of the CBOE[3] to draw our investor fear variable. The CBOE publishes two sets of VIX data, one calculated using S&P100 (available for the time period 1986-2009), and the other utilizing the S&P500 (over for the time period 1990-2009). We use the volatility index based on the S&P100 given the longer time span of data availability (in the robustness tests, we also use that of S&P500, leaving inferences qualitatively unchanged). Given that data is available on a daily basis, and financial statement data is available quarterly, we use VIX data at each calendar quarter date.

[2] Using 48 Fama and French industry groupings leaves results unchanged.
[3] Data is available at: http://www.cboe.com/micro/vix/historical.aspx.

Given that VIX is available on a daily basis, we maximize sample size and statistical power by utilizing the Compustat quarterly tapes (in lieu of yearly data) to calculate our earnings management variable. We merge our Compustat data with the VIX data using calendar quarters, the intersection of those gives us about 186,000 firm-quarter observations over the time period 1986-2005.[4] We use the I/B/E/S database to calculate the number of analysts following a firm in any given quarter, earnings forecasts, and earnings surprises. To measure firm risk we utilize the CRSP daily data in order to calculate idiosyncratic volatility. We use the CDA/Spectrum database to calculate institutional holdings, and we utilize the Bushee (1998) methodology to classify institutional investors according to their investment styles and horizons. We utilize the Execucomp database for CEO equity holdings, and the Institutional shareholder Services database to calculate board independence and CEO duality. Details about the sample selection are provided in Table 2.

(Insert Table 2 about here)

4.2 Descriptives

Table 3 presents the descriptive statistics for the sample period, all variables winsorized at 1% and 99%. We see that the absolute value of mean discretionary accruals (*DA*) is 0.11, while the median is 0.04, this is due to the fact that the estimation process is noisy

[4] In robustness tests, we use VIX data at calendar year end, and match it to Compustat annual data, results remain qualitatively unchanged.

and yields large tails.[5] *VIX* has a mean/median of about 21, with a standard deviation of 6.5, indicating that although the range is between 10 and 60, investor fear varies around a stable mean in the sample period – this is as expected, since investor fear, by definition, spikes around specific periods of time. *Beat* has a mean of 0.22, indicating that about 20% of the firms just meet or beat the mean consensus analyst forecast. Mean firm size is $1.4 billion, while mean firm size is $127 million, indicating a right skewness which is typical of firm size. Descriptives of select variables are present in Table 3.

(Insert Table 3 about here)

4.3 Univariate Results

As a first indication, we plot the relationship between investor fear and earnings management. Figure 1 displays the time series relationship between *VIX* and *DA*, where a clear pattern is observed, with an indication that *VIX* leading *DA*.

(Insert Figure 1 about here)

To go beyond the limitations of observed visual patterns, we next present univariate correlations. Table 4 shows the Pearson correlations among our variables. We see that *DA* is positively and significantly related to VIX ($\rho = 0.11$, $p < 0.01$). We also see that VIX is negatively and significantly correlated with both ROA and Return, indicating that periods of market turmoil are accompanied by poor firm performance. We see that

[5] Repeating our forthcoming multivariate analysis using ranks of this variable, or winsorization at 5% at each end, leaves results unchanged. We conclude that the distribution properties of this variable is not driving our results.

earnings management is negatively related to *Institution*, and positively related to *MB*, indicating that firms that have more institutional investors manage their earnings less, while firms with higher growth opportunities manage their earnings more.

(Insert Table 4 about here)

5 Results

5.1 Results using Discretionary Accruals

In our research design, we argue that earnings management is a function of investor fear and other control variables. Therefore, we represent our main statistical model as follows (for simplicity, firm and time subscripts suppressed):

$$DA = VIX + logMktval + ROA + MB + Leverage + Industry\ Dummies \quad (2)$$

As discussed before, *logMktVal* controls for firm size and visibility, while *ROA* and *MB* control for the past and future performance-related effects on earnings management. We estimate equation (2) both by Ordinary Least Squares (OLS) and by including firm fixed effects (FE), which controls for unobserved firm specific heterogeneity. In further analysis, we also utilize other proxies for earnings management, and other control variables, all discussed in their corresponding sections.

Table 5 presents the main results of our analysis. Model (1) regresses discretionary accruals on *VIX*, firm size, accounting returns, firm leverage, and the market to book ratio. We find that *VIX* is positively and significantly related to *DA* (t =

26.95), indicating that higher levels of investor fear is positively related to firm-level earnings management decisions. Regarding our control variables, firm size (*logMktval*) is negatively related to earnings management, indicating that larger and more visible firms manage earnings less. Firms with better performance, as proxied by *ROA*, are less likely to manage earnings (see Yu, 2008, for conflicting predictions regarding the relationship between profitability and earnings management). In contrast to prior studies, *Leverage* is negative, indicating that firms with higher debt levels manage earnings less. Although this is contrary to prior studies that find firms manage earnings to reduce debt contracting costs, in Model (4) of this table where we utilize firm fixed-effects, results are consistent with prior studies. Finally firms with larger growth opportunities (as proxied by *MB*) are more likely to manage earnings (Yu, 2008, Table 5). R-squared is 13% indicating a reasonable fit for our model.

(Insert Table 5 about here)

Model (2) repeats the analysis present in Model (1) while adding industry controls, results remaining unchanged: *VIX* is still positive, and significant (t = 23.04). However, we see that in Model (2) the coefficient has a lower magnitude, indicating that the relationship between investor fear and earnings management has an industry specific component. In other words, some industries exhibit less (or no) sensitivity to VIX in relation to earnings management, possibly those firms in less risky industries (a point to be examined in Table 6).

Since calculating our earnings management variable involves a noisy estimation process (Dechow et al., 1995) with the possibility of large outliers, in Model (3) we repeat our analysis by winsorizing at the 5% level rather than at 1%, inferences remain unchanged. We see that although the coefficient size is smaller (a natural consequence of less extreme variation in the dependent variable), it significance has increased (t = 32.43). As such, it is evident that reducing noise in the dependent variable renders statistical relationships stronger.

Finally, given that we have a large panel spanning 20 years of quarterly data, our relationships could be driven by the presence of multiple observations per firm. As a remedy, in Model (4) we utilize a firm fixed-effects regression in order to eliminate all firm-level heterogeneity across firms. In a firm fixed-effects regression, our results are based on the time series rather than the cross-section. If unobservable firm characteristics remain constant in our sample period, any variation in the dependent variable is attributed to variation in VIX. Model (4) indicates that *VIX* is still positively related to earnings management (t = 20.03).

Models (5)-(8) repeat the same analysis as in Models (1)-(4) by utilizing a different earnings management variable: *DA2* (discretionary accruals adjusted for firm growth and cash flows), results remain virtually identical. In all our models *VIX* is positive and significant to *DA2*, with a t-statistic of 13.00 or more. Given that a number of variations exist on the original modified Jones model, we perform all our subsequent analysis utilizing the original model (*DA*), so as to make results easily comparable to other studies. However, all our results are robust to the usage of *DA2* also. Finally, for the results in Table 5, when we utilize numerous additional controls (results not reported)

such as the percentage of institutional owners, the idiosyncratic volatility of the firm, past share returns, and analyst following, results remain unchanged.

Our prior arguments have been based on the notion that investor fear prompts firms to manage earnings in order to present a stable outlook of firm performance. Given this argument, then we would expect firms with higher ex-ante risk levels to be more sensitive to investor fear. Conversely, we don't expect stable non-risky firms to undergo costly financial reporting choices if investor fear does not affect their relatively stable operations. To test for this possibility, in Table 6 we utilize a host of firm-level risk characteristics as control variables, to further enhance our understanding of the role of investor fear in earnings management decisions.

Model (1) of Table 6 controls for the standard deviation of cash flows (*DevCFO*), while Models (2) and (3) control for the variability of income (*DevNI*), and stock returns (*Volat*), respectively. Finally, Model (4) regresses all three prior risk proxies (*DevCFO, DevNI, and Volat*) simultaneously. We see that our measure of investor fear, *VIX*, remains positive and significant in all specifications, where minimum t-statistic in all models is 23.06. This indicates that our results are not driven by a correlated omitted variable problem represented by firm specific risk. Interestingly, in model (4) when we utilize our various risk measures simultaneously, we find that they are jointly and significantly related to earnings management: the higher the operational or market risk, the more likely are firms to manage earnings.

(Insert Table 6 about here)

Next we assess whether there are any interactive effects between firm risk, investor fear, and earnings management decisions. We expect that managerial decisions to manage earnings are predicated upon ex-ante risk levels, where riskier firms are more sensitive to investor fear. In Model (5) we utilize an interaction variable between *VIX* and our measure of firm specific risk (*VIX***Volat*). This variable is positive, and significant (t = 8.03), hence providing evidence on an interaction effect as predicted above. We also utilize interaction variables with both *DevCFO* and *DevNI*, but both these interactions yield insignificant results and are not reported: it seems that investor fear affects firms with higher stock price risk, rather than operational risk. Model (6) repeats the prior analysis by using firm fixed-effects, where we see that *VIX* is still significant (in unreported results, the interaction variable *VIX***Volat* is also significant in a firm fixed-effects regression).

5.2 VIX and Meeting/Beating Analyst Forecasts

Another method to assess earnings management is to look at multivariate models that examine the probability of meeting/just beating sell-side financial analyst earnings benchmarks (Burgstahler and Dichev, 1997). In this "benchmark beating" game that was popularized during the dot.com era, managers whose firms met the market benchmark or exceeded them had their company stock prices increasing, while companies that missed the forecast had stock prices tumbling. Burgstahler and Dichev (1997) provide evidence that managers manage earnings to avoid losses or earnings decreases. Brown and Caylor (2003) document that the incremental valuation consequence of avoiding a negative earnings surprise is greater than that of earnings decreases or losses. The above study

indicates that managers have the highest incentives to meet forecasts by analysts, as the price effects of meeting or beating such benchmarks are higher as compared to earnings decreases or to losses. For this reason this paper examines the earnings management/investor fear relationship by examining the propensity to meet and exceed benchmarks set by analysts.

As such, we construct *Beat*, which is a dummy variable equaling 1 if reported earnings just meet, or exceed by one penny, sell-side consensus analyst forecasts (all normalized by share price), and zero otherwise. Model (1) of Table 7 presents results using a logit regression that models *Beat* as a function of *VIX* and our control variables. We see *VIX* is positive and significant (t = 12.96). Model (2) repeats the prior analysis by adding industry dummies, while Model (3) employs advanced controls such as the idiosyncratic volatility of stock price (*Volat*), past share price returns (*Return*), and institutional ownership (*Institution*). Finally, in Model (4) we employ a firm-fixed effects logistic regression. In all these models we see that *VIX* is always positive and significant (minimum t-statistic is greater than 8.39). In sum, we see that in addition to our results obtained on tests examining discretionary accruals, inferences are unchanged if we examine the probability of meeting and just beating analyst benchmarks: the more the investor fear, the more managers strive to meet/beat analyst benchmarks.

(Insert Table 7 about here)

Given that in Table 7 we found that periods of high investor fear are accompanied by a higher propensity to meet/beat analyst forecasts, we next examine stock price reactions to

earnings surprises, given differential levels of investor fear. This analysis is particularly insightful because if there are muted market reactions to earnings surprises during periods of high investor fear, then managers are engaging in costly earnings management decisions to no avail. Our next analysis examines managerial cost/benefit trade-offs from earnings management, during high investor fear periods.

Table 8 examines the inter-relationship between VIX, earnings surprises, and ensuing market reactions. Model (1) regresses 3 days cumulative abnormal returns (*CAR*) around earnings announcement dates, on *VIX*, and control variables. We see that *VIX* is positive and significant (t = 6.95). Reported earnings with respect to analyst consensus forecasts, *Surprise*, as expected, is also positive and significant (t = 26.4). Prima facie, results indicate that in high investor fear periods, stock price reactions around earnings announcements are higher.

(Insert Table 8 about here)

In Model (2) we interact investor fear with earnings surprises, *VIX***Surprise*, where we see that it is negative to 3 days CARs (t = -1.86, $p < .010$). In Model (3) we repeat the same model using a firm fixed-effects model, confirming the results in Model 2 (t = -3.0, $p < 0.01$). Results on Models (2) and (3) can be summarized as follows: periods of high investor fear render stock prices less sensitive to earnings surprises. Either because in high fear periods investors expect earnings management on behalf of management, and hence attach a lower factor to earnings surprises, or, in high fear periods the market acts

reluctantly to earnings surprises, where the overall stock price volatility overrides the effect of earnings surprises.

Given that we find earnings surprises matter less in periods of high investor fear, an implication of the above results is that management is short sighted. If they were to engage in earnings management in low fear periods they could generate larger abnormal returns, since in low fear periods earnings surprises have a higher market reaction.

6 Robustness Tests

In results we have conducted so far, we have established a positive relationship between investor fear and earnings management, additionally, we have also established a relationship between earnings surprises and ensuing stock price reactions predicated on investor fear. Next we turn our attention to a number of alternate specifications to establish the robustness of our results, and to further understand the influence of fear in earnings management decisions.

6.1 The Effect of Ownership Structure

Prior research has established differential managerial incentives in earnings management, given ownership structure. Bushee (1998) identifies different classes of institutional investors, and shows that managers are especially prone to manage earnings in order to avoid negative performance, if they have substantial short term investors (transient institutions) who trade on short term bad news. Furthermore, prior research has established that the presence of sophisticated institutional investors who render managerial earnings management decisions ineffective, where Hribar et al. (2004) show

that some classes of institutions can predict, and trade in quarters prior to an earnings restatement. As such, there seems to be differential incentives to manage earnings, given ownership structure, since managers cater to the needs of some class of investors, while simultaneously, the positive effects of earnings management are diminished given investor sophistication.

We use a number of proxies to measure ownership structure: we use share turnover (*Turnover*) as a measure of the change in the number of owners of a firm, in a given year. This measure has also been used as a measure of monitoring (Almazan et al., 2005). We next calculate the percentage of institutional owners (*Institution*) as a measure of investor sophistication (Ke and Petroni, 2004; Cready and Utama, 1997). Finally, we break down our institutional ownership variable to subcategories of monitoring, transient, or indexing institutions according to Bushee (1998).

To examine the interplay between earnings management, investor fear, and ownership structure, we use an interactive variable between VIX and our various proxies for ownership structure. Column (1) of Table 9 reports results on *VIX*Turnover*, where we see it is negative and significant ($t = -4.22$, $p < 0.01$), implying that in periods of high investor fear, in firms with a high number of investor churn, managers are less likely to manage earnings. This could be because the benefits of earnings management, in firms with high ownership, turnover is lower.

In column (2) we introduce *VIX*Intstitution* as an additional regression, where we see that it is significantly negative ($t = -9.26$). Given that *Institution* aggregates institutional investors with different investment styles and horizons, we next use the Bushee (1998) classifications to further understand the factors at play. Column (3)

indicates that *VIX*Indexer* is negative and significant (t = -14.6), while *VIX*Dedicated* is positive (t = 6.06), and *VIX*Transient* is non-significant. These results raise the possibilities of interesting interpretations. In periods of high fear, managers manage earnings less if the investor base is of the indexing type, where there is no short term trading, and there is occasional portfolio rebalancing. In contrast, if there are large owners who are monitors, CEOs manage earnings more. This could be either because managers want to appease large owners, or because large owners influence earnings management positively in order to extract rent from other investors and debt providers. Finally, CEOs do not manage earnings to appease short term investors, possibly because such investors see through the numbers, they have a demand for volatile stocks, or because managing earnings to cater for short term investors is not beneficial from a cost/benefit analysis perspective.

(Insert Table 9 about here)

6.2 Alternate Specification of our Earnings Management Variable

Given that we have established a relationship between VIX and discretionary accruals, and also the propensity to meet and beat forecasts, we next examine whether the positive relationship between VIX and earnings management extends to the Dechow-Dichev (2002) measure of earnings quality (*DD*). This measure is calculated analogous to theirs, and is based on a five year rolling window calculation, hence, all our right-hand regressors are lagged by eight quarters. Model (1) of Table 10 regresses *DD* on *VIX* and control variables. We see that *VIX* is positive to *DD* (t = 16.74) indicating that higher

levels of investor fear lead to lower levels of earnings quality. These results are also confirmed in Model (2), which utilizes a fixed effects model (t = 16.92).

(Insert Table 10 about here)

6.3 The Role of CEO Equity Holdings

Next, we examine the role of CEO share and option holdings in relation to VIX and earnings management. Prior research has identified CEO equity holdings as one motivation to manage earnings. In this context, the relationship between option holdings and earnings management is not clear. In one hand, executive stock options have been positively associated with earnings management decisions (Bergstresser and Philippon, 2006; Cheng and Warfield, 2005), on the other hand, stock options have convex payoffs and increase in volatility, hence a managerial incentive to increase risk (Lambert, 1986; Smith and Stulz, 1985). As such, an incentive not to manage earnings in periods of high volatility and investor fear. From the perspective of shareholdings, share ownership by risk-averse CEOs induces them to prefer less risk (see Knopf et al., 2002); consequently, this variable can also be a proxy for CEO firm-related risk aversion, and we expect higher motivations to manage earnings in times of high investor fear and its resultant volatility.

Results in Table 11 present our results. Model (1) regresses *DA* on *VIX* and CEO shareholdings (*Shares*). We find that *VIX* is no more significant, possibly due to a diminished sample size or because the effect of *VIX* is demonstrated through its interaction with CEO shareholdings. We see that *VIX*Shares* is positive and significant (t = 1.9, $p < 0.1$), indicating an interactive effect. This positive coefficient can be

interpreted as follows: given CEO's risk aversion due to shareholdings, periods of high investor fear prompt CEOs to manage earnings to preserve the stability of share price. Model (2) examines the role of CEO stock option holdings (*Options*). We see that the interactive variable *VIX*Options* is negative and significant in relation to *DA*, indicating that during periods of high investor fear, CEOs manage earnings less, possibly to benefit from the effect of volatility on option values.

(Insert Table 11 about here)

7 Supplemental Analysis

7.1 Investor Fear and Earnings Management: the Chicken or the Egg?

Having established a robust relationship between VIX and earnings management, we next examine the lead/lagged relationship between these two variables. A multitude of possibilities could exist, either periods of high investor fear cause earnings management, or both VIX and earnings management are driven by a third (and unknown) factor, or earnings management by managers results into a subsequent increase in investor fear. The latter possibility seems to be unlikely, while a common factor driving both could always exist, we have attempted to control for this possibility by a variety of statistical techniques.

(Insert Table 12 about here)

Table 12 present our results with leading, contemporaneous, and lagged, VIX. Given that VIX exhibits a strong time dependency, we are unable to run these time-series specifications simultaneously, rather, we split them into separate regressions. Model (1) presents results on four quarters ahead VIX (*leadVIX*), while Models (2) and (3) present results on contemporaneous and lagged *VIX*. Results are as follows: the coefficient strength of VIX increases monotonically as we move from *leadVIX* to *lagVIX* (coefficients are 0.002, 0.005, and 0.008, respectively), and inferences are the same regarding the significances of the coefficients (t-statistics are 10.8, 27.9, and 34.3, respectively). Given these results, we conclude that past periods of investor fear lead to contemporaneous earnings management – this is the most likely prediction, ex-ante, given that the VIX index is a forward looking measure of volatility (Whaley, 2008, p.1). We do not find evidence that earnings management leads VIX, the less likely possibility ex-ante.

7.2 Macroeconomic Factors, Investor Fear, and Earnings Management

In the lead/lagged analysis, we discussed the possibility of a common factor driving both VIX and earnings management. Given that the determinants of VIX are not clear, being a summary measure of "investor fear" inferred from implied option volatilities, in this section we attempt to further understand the relationship between investor fear and earnings management, excluding a number of competing explanations/omitted variables in the process.

Whaley (2008) argues that periods of high investor fear are followed by periods of high volatility. However, both investor fear and volatility could be a consequence of

many factors such as rising unemployment, interest rates, industrial production, or a slowing real estate market. In this section we attempt to control for such macroeconomic phenomena, in order to exclude the possibility that macroeconomic factors are jointly driving VIX, and managerial earnings management decisions.

(Insert Table 13 about here)

In Table 13 we regress *VIX* on a host of macroeconomic variables: interest rates (*InterestRate*), inflation as proxied by the consumer price index (*CPI*), industrial activity as measured by the Fed's index of industrial production (*IndustrialProduction*), and the costs of industrial production by measuring the producer price index of commodities (*PPIcommodities*). We measure activity in the real-estate market by measuring the extent of real estate loans (*RealEstateLoans*), while we measure the extent of consumer credit availability by including the extent of total consumer credit outstanding (*ConsumerCredit*). Finally, we control for real unemployment (*Unemployment*). All these are included in the firm-level regressions that also include the original control variables of firm size, leverage, growth opportunities

In Model 1 we see that *VIX* is positive but non-significant (t = 1.60), however, when using firm fixed-effects we see that *VIX* is positive and significant (t = 3.95). Results, as such, show that *VIX* provides for incremental explanatory power beyond our macreconomic level control variables. A number of things need to be noted. The statistical significance, and coefficient strength, has dropped sharply as compared to Model (4) of Table 5. This could be because of the high collinearity between *VIX* and

some of the macroeconomic variables. Understandably, these economy-wide variables help predict investor fear, which in turn, along such macroeconomic variables, affect firm-level earnings management decisions. We see that a number of our macroeconomic variables are statistically significant (all but *PPIcommodities*), we do not attempt to explain these significant relationships, as our study is not designed to examine the effects of economy-wide factors, and their effect on CEO sentiment and actions. Although we are not able to rule out the possibility that other omitted macroeconomic factors affect both VIX and earnings management, our results, prima facie, indicate that economy-wide factors affect earnings management, while simultaneously, VIX provides for incremental explanatory power.

7.3 The Relation between Investor Sentiment and Investor Fear

As prior research (Rajgopal et al., 2008) has documented that managers cater to overall investor sentiment by earning management, our final test investigates whether our results with respect to the VIX measure as a proxy of investor fear are orthogonal on the findings on general investor sentiment. Therefore, we repeat the analysis of Table 6, while replacing *VIX* with the Michigan Consumer Sentiment Index (*MCSI*) (column 1) or adding *MCSI* as an additional variable. The Michigan Consumer Sentiment Index has been widely used by prior literature as an overall sentiment indicator (e.g. Bergman and Roychowdhury, 2008; Qiu and Welch, 2006, for an overview and discussion of comment sentiment indicators). Our results are reported in Table 14.

(Insert Table 14 about here)

For the sake of brevity, here we only present and discuss our main variable of interest. Along with Rajgopal et al. (2008), we find that the higher levels of sentiment cause lower levels of earnings management. We take special interest in the model presented in the second column of the table. When we include both variables of interest, *MCSI* and *VIX*, it shows that *VIX* is still significantly positive (with a t-stat of 22.52 compared to a t-stat of -13.86 of *MCSI*). We conclude from this analysis that investor fear and investor sentiment have a complementary and separatable impact on the earnings management behavior of public U.S. companies.

8 Conclusion

This paper investigates the interplay between investor fear levels, earnings management behavior and its capital market consequences. We find that managers manage earnings more in high-fear periods and that the magnitude of this phenomenon is predictably related to the operating and financing risk of the given firm, its ownership structure and to the share and option holding levels of top level management. In short: managers predictably engage in earnings management to avoid fear-induced volatility if volatility is not honored by themselves or their investors. Somewhat surprisingly, we find that earnings response coefficients seem to be smaller in high-fear periods. So, at least on the short run, positive earnings management does not seem to pay off for top-level management.

Our results appear to be robust to a wide variety of controls, including potential macro-economic determinants of the VIX measure and to different statistical

specifications of our models, including firm fixed effects. However, given the lack of a convincing theory explaining the determinants of volatility and outlining the impact of behavioral biases on the capital market, no research design can completely rule out the potential existence of other time-varying determinants which might explain our findings. Future research in the macro-economic determinants of management's and market participants' behavior might help to shed light on this issue.

References

Baker, M. and J. Wurgler (2006): Investor Sentiment and the Cross-Section of Stock Returns. *Journal of Finance* 61: 1645-1680.

Banerjee, P., J. Doran and D. Peterson (2007): Implied volatility and future portfolio returns. *Journal of Banking and Finance* 31: 3183-3199.

Bergman, N. and S. Roychowdhury (2008): Investor Sentiment and Corporate Disclosure. Working Paper, MIT.

Bergstresser, D., and T. Philippon (2006): CEO incentives and earnings management. *Journal of Financial Economics* 80 (3): 511–529.

Bhushan, R. (1989): Firm characteristics and analyst following, *Journal of Accounting and Economics* 11(2-3): 255-274.

Brown, L. and M. Caylor (2003): A Temporal Analysis of Earnings Management Thresholds. Working Paper, Georgia State University.

Brown, N., T. Christensen, B. Elliott and R. Mergenthaler (2008): Do Managers Use Pro Forma Earnings Disclosures to Cater to Investor Sentiment? Working Paper, University of Southern California, Brigham Young University, University of Illinois at Urbana-Champaign and University of Iowa.

Burgstahler, D. and I. Dichev (1997): Earnings management to avoid earnings decreases and losses. *Journal of Accounting and Economics* 24 (1): 99-126.

Bushee, B. (1998): The influence of institutional investors on myopic R&D investment behaviour. *The Accounting Review* 73(3): 305-333.

CBOE (2009): The CBOE Volatility Indicator – VIX. CBOE White Paper.

Chan, K., C. Chan, N. Jegadeesh, and J. Lakonishok (2006): Earnings quality and stock returns. *The Journal of Business* 79 (3): 1041–1082.

Cheng, Q., and T. Warfield (2005): Equity incentives and earnings management. *The Accounting Review* 80 (2): 441–476.

Core, J. and W. Guay (1999): The use of equity grants to manage optimal equity incentive levels. *Journal of Accounting and Economics* 28 (2): 151–184.

Dechow, P., R. Sloan, and A. Sweeney (1995): Detecting earnings management. *The Accounting Review* 70 (2): 193–225.

Dechow, P. and I. Dichev (2002): The quality of accruals and earnings: The role of accrual estimation errors. *The Accounting Review* 77 (Supplement): 35-59.

Healy, P. and Wahlen, J (1999): A review of the creative accounting literature and its implications for standard setting. *Accounting Horizons* 13 (4): 365-383.

Hribar, P., N. Jenkins and J. Wang (2005): Institutional Investors and Accounting Restatements. AAA 2005 FARS Meeting Paper.

Jones, J. J. (1991): Earnings Management During Import Relief Investigations. *Journal of Accounting Research* 29(2): 193-228.

Knopf, J., J. Nam, and J. Thornton Jr. (2002): The volatility and price sensitivities of managerial stock option portfolios and corporate hedging. *Journal of Finance* 57 (2): 801–814.

Lambert, R. (1986): Executive effort and the selection of risky projects. *Rand Journal of Economics* 17 (1): 77–88.

Mian, M. and S. Sankaraguruswamy (2008): Investor Sentiment and Stock Market Response to Corporate News. Working Paper, National University of Singapore.

Phillips, J., M. Pincus, and S. Rego (2003): Earnings management: New evidence based on deferred tax expense. *The Accounting Review* 78 (2): 491–521.

Qiu, L. and I. Welch (2006). Investor Sentiment Measures. Working Paper, Brown University.

Rajgopal, S., L. Shivakumar, L. and A. Simpson (2007): A Catering Theory of Earnings Management. Working Paper, University of Washington, London Business School and London School of Economics.

Schipper, K. (1991): Commentary on analysts' forecasts. *Accounting Horizons* 5 (4): 105–121

Shiller, R. (2005). Irrational Exuberance, Princeton University Press (2nd edition).

Smith, C., and R. Stulz (1985): The determinants of firms' hedging policies. *Journal of Financial and Quantitative Analysis* 20 (4): 391–405.

Trueman, B., and S. Titman. 1988. An explanation for accounting income smoothing. *Journal of Accounting Research* 26 (Supplement 3): 127–139

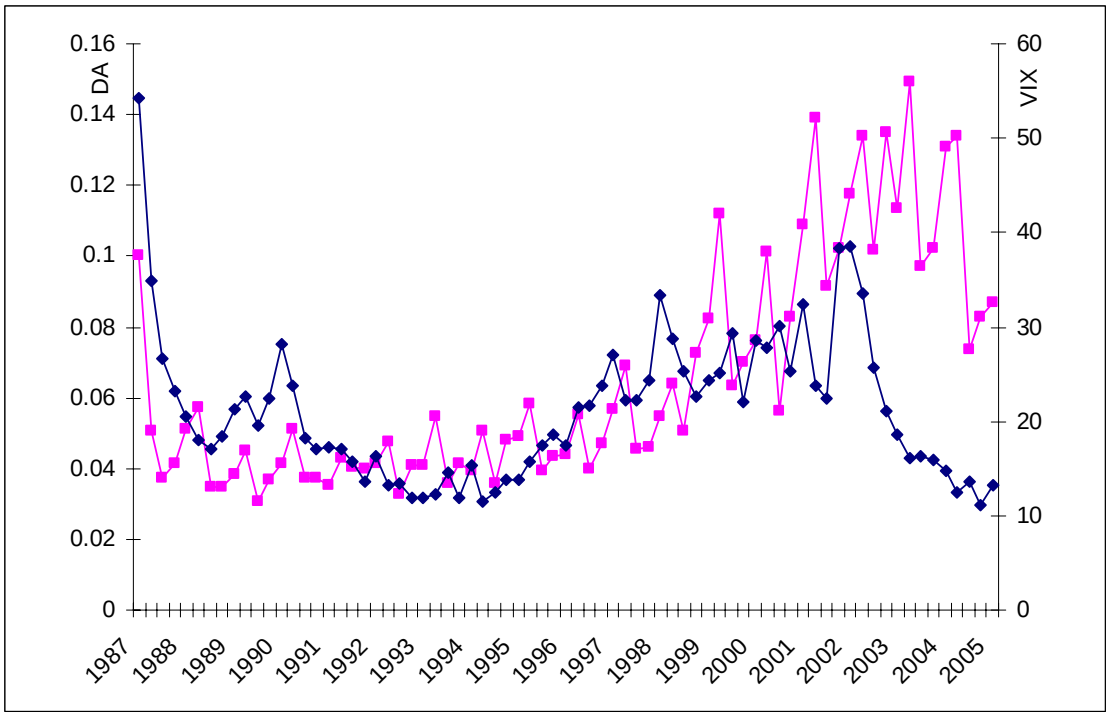
Watts, R. and J. Zimmermann (1986). Positive Accounting Theory. Prentice-Hall.

Whaley, R. (2000). The Investor Fear Gauge. Journal of Portfolio Management (26:3): 12-17.

Whaley, R. (2008). Understanding VIX. Working Paper, Vanderbilt University.

Yu, F. (2008). Analyst Coverage and Earnings Management, *Journal of Financial Economics* 88: 245-271

Figure 1:
Graph of *VIX* and *DA* for the period 1986-2005



The diamond dotted line represents *VIX*, while the squared dotted line represents *DA*.

Table 1: Variable Definitions

Research Variables

VIX = Proxy for investor fear as calculated by the Chicago Board Options Exchange (CBOE), based on the S&P100.

DA = The absolute value of discretionary accruals according to Dechow et al.(1995), calculated to be total accruals minus non-discretionary accruals (accruals that are related to sales growth, receivables, and PPE). The calculation is done for each firm on a yearly basis, adjusting for industry membership.

DA2 = Same as DA above, modified for firm growth and cash holdings.

Control Variables:

logMktval = Logarithm of the market value of equity.

ROA = Net income before extraordinary items divided by total assets.

MB = Market value of equity divided by the book value.

Leverage = Long-term debt over equity.

Institution = Percentage of shares held by institutional investors.

Return = Equity return over the prior calendar year, adjusted for returns on the S&P500 index.

DevCFO = Standard deviation of cash flow from operations calculated over a period of 12 quarters.

DevNI = Standard deviation of net income before extraordinary items, calculated over a period of 12 quarters.

Volat = Idiosyncratic volatility, estimated for each firm and year as the annual average of monthly variance of daily market-adjusted returns. Daily market-adjusted returns are the excess of daily stock return for the corresponding firm over the daily return on the value weighted market portfolio.

Table 2: Sample Selection

Complete Compustat quarterly data for sample period	364,963
Intersection with	
Compustat data to calculate earnings management	186,719
Base sample	186,719
Subsamples for various analyses:	
Sample with I/B/E/S data	153,482
Sample with CEO compensation	9,311

Table 3: Descriptive Statistics

DA denotes the absolute value of discretionary accruals calculated according to the modified Jones model. *VIX* is our measure of investor fear. *Beat* is the incidence where firm earnings just meet or beat by one penny, sell-side analyst consensus forecasts (normalized by share price). *Mktval* is the natural logarithm of the market value of equity. *ROA* is net income before extra-ordinary items divided by assets. *Return* denotes calendar year S&P500 adjusted returns. *Leverage* is firm total debt divided by the book value of equity. *Institution* denotes the percentage of shares held by institutional investors. *MB* is the market value of equity divided by the book value. The time period is 1986-2005.

Variable	N	Mean	Median	St. Dev.	P25	P75
DA	186,719	0.12	0.042	0.268	0.017	0.098
VIX	186,719	21.63	21.487	6.572	16.478	25.456
Beat	153,482	0.225	0	0.418	0	0
MktVal	186,719	1237.253	97.702	4580.335	31.837	601.05
ROA	186,719	-0.021	0.007	0.089	-0.008	0.021
Return	153,482	0.074	-0.004	0.651	-0.361	0.255
Leverage	186,719	0.182	0.112	0.202	0.005	0.292
Institution	153,482	0.59	0.55	0.394	0.12	0.678
MB	186,719	2.977	1.902	4.899	1.078	3.453

Table 4: Pearson Correlations

DA denotes the absolute value of discretionary accruals calculated according to the modified Jones model. *VIX* is our measure of investor fear. *Surprise* is actual earnings minus analyst forecasts, normalized by share price. *Beat* is a dummy variable equaling one when firm earnings just meet or beat by one penny, sell-side analyst consensus forecasts (normalized by share price). *Mktval* is the natural logarithm of the market value of equity. *ROA* is net income before extra-ordinary items divided by assets. *Return* denotes calendar year S&P500 adjusted returns. *Leverage* is firm total debt divided by the book value of equity. The time period is 1986-2005.

	DA	***VIX***	***Surprise***	***Beat***	***Mktval***	***ROA***	***Return***
VIX	0.107						
	$p < 0.01$						
Surprise	-0.0228	-0.0162					
	$p < 0.01$	$p < 0.01$					
Beat	0.0061	0.0127	0.0995				
	$p < 0.11$	$p < 0.01$	$p < 0.01$				
MktVal	-0.0021	0.032	0.0678	0.0656			
	$p < 0.50$	$p < 0.01$	$p < 0.01$	$p < 0.01$			
ROA	-0.1436	-0.0871	0.3224	0.0958	0.0977		
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$		
Return	0.0229	-0.0899	0.1588	0.0541	0.0599	0.1573	
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$	
Leverage	-0.0625	0.02	-0.0511	-0.0707	0.0064	-0.0045	-0.062
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p <0.05$	0.1109	$p < 0.01$

Table 5: Regression Analysis Examining the Relationship between VIX and Earnings Management

This table shows the coefficients from regressions of earnings management (*DA)* on the investor fear index (*VIX*). The time period is 1986-2005. All variables are winsorized at 1% and 99%. In parenthesis we report t-statistics, statistical levels are indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1. Column (1) reports results on the base level OLS regression as presented in equation (2). Column (2) presents results with the inclusion of unreported Industrial controls. Column (3) presents results utilizing a 5% winsorized *DA*. Column (4) reports results using firm fixed effects. Columns (5)-(8) repeat the same analysis for *DA2*. Control variables include firm size (*logMktval*), which is the natural logarithm of the market value of equity. *ROA* is net income before extra-ordinary items divided by assets. *Leverage* is firm total debt divided by the book value of equity. *MB* is the market value of equity divided by the book value. Controls for firm and industry effects are included, but not reported, where appropriate. All OLS regressions include Rogers standard errors

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
VARIABLES	***DA***	***DA***	***DA***	***DA***	***DA2***	***DA2***	***DA2***	***DA2***
VIX	0.00448***	0.00382***	0.00138***	0.00245***	0.00212***	0.00184***	0.00089***	0.00096***
	[26.95]	[23.04]	[32.43]	[20.03]	[20.76]	[17.97]	[31.89]	[13.57]
logMktVal	-0.00796***	-0.00614***	-0.00481***	-0.00044	-0.00388***	-0.00308***	-0.00254***	-0.00016
	[-10.22]	[-9.154]	[-25.10]	[-0.450]	[-6.143]	[-5.245]	[-16.44]	[-0.270]
ROA	-1.05840***	-0.96924***	-0.19992***	-0.51179***	-0.67547***	-0.64589***	-0.13377***	-0.32862***
	[-37.50]	[-34.95]	[-60.04]	[-49.15]	[-38.31]	[-36.91]	[-56.62]	[-52.21]
Leverage	-0.09024***	-0.03269***	-0.02099***	0.01798***	-0.05399***	-0.03840***	-0.01482***	-0.00089
	[-12.22]	[-4.427]	[-10.67]	[2.849]	[-11.23]	[-7.502]	[-10.60]	[-0.242]
MB	0.00082**	-0.00067**	0.00069***	-0.00073***	0.00013	-0.00040**	0.00036***	-0.00033***
	[2.531]	[-2.156]	[11.02]	[-4.284]	[0.670]	[-2.120]	[8.516]	[-3.298]
Constant	0.08410***	0.01847**	0.03949***	0.09012***	0.06300***	0.03449***	0.03025***	0.06909***
	[16.95]	[2.091]	[13.54]	[16.81]	[16.84]	[4.191]	[12.07]	[22.14]
Observations	186,719	186,719	186,719	186,719	173,922	173,922	173,922	173,922
R-squared	0.132	0.175	0.194	0.017	0.136	0.162	0.155	0.019
Firm-Effects	No	No	No	Yes	No	No	No	Yes
Ind. Effects	No	Yes	Yes	No	No	Yes	Yes	No

Table 6: Regression Analysis Examining the Relationship between VIX, Firm-Specific Risk, and Earnings Management

This table shows the coefficients from regressions of earnings management (*DA)* on the investor fear index (*VIX*). The time period is 1986-2005. All variables are winsorized at 1% and 99%. In parenthesis we report t-statistics, statistical levels are indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1. Column (1) reports results on the base level OLS regression as presented in equation (2), while controlling for the deviation of cash flows (*devCFO*). Column (2) presents results while controlling for the deviation of income (*devNI*). Column (3) controls for firm idiosyncratic volatility (*volat*). Column (4) utilizes the three prior risk measures simultaneously. Column (5) utilizes an interaction variable between VIX and idiosyncratic volatility (*VIX*Volat*). Column (6) is a firm fixed-effects model of the prior column. Control variables include firm size (*logMktval*), which is the natural logarithm of the market value of equity. *ROA* is net income before extra-ordinary items divided by assets. *Leverage* is firm total debt divided by the book value of equity. *MB* is the market value of equity divided by the book value. Controls for firm and industry effects are included, but not reported, where appropriate. All OLS regressions include Rogers standard errors

	1	2	3	4	5	6
VARIABLES	***DA***	***DA***	***DA***	***DA***	***DA***	***DA***
VIX	0.00375***	0.00370***	0.00372***	0.00386***	0.00269***	0.00255***
	[21.35]	[21.22]	[23.62]	[23.06]	[13.02]	[19.93]
VIX*Volat					0.02379***	
					[8.031]	
logMktVal	-0.00373***	-0.00329***	0.00449***	0.00372***	0.00350***	0.01653***
	[-5.172]	[-4.665]	[6.651]	[4.930]	[4.659]	[13.34]
ROA	-0.63663***	-0.58474***	-0.41981***	-0.35433***	-0.34326***	-0.43442***
	[-24.23]	[-22.75]	[-18.23]	[-14.94]	[-14.46]	[-29.99]
Leverage	-0.01108	-0.01848**	-0.03179***	-0.02475***	-0.02273***	-0.00154
	[-1.463]	[-2.479]	[-5.120]	[-3.673]	[-3.386]	[-0.200]
MB	-0.00160***	-0.00139***	0.00078***	0.00036	0.00042	-0.00034
	[-4.792]	[-4.251]	[2.704]	[1.147]	[1.348]	[-1.560]
devCFO	0.29673***			0.04622**	0.04585**	-0.00936
	[15.75]			[2.475]	[2.455]	[-0.644]
devNI		0.19414***		0.04490***	0.04276***	0.04503***
		[18.55]		[3.310]	[3.135]	[5.009]
Volat			0.33173***	0.25191***	-0.26567***	0.32218***
			[13.70]	[9.716]	[-4.385]	[14.88]
Constant	-0.00755	-0.00271	-0.05357***	-0.05207***	-0.02830***	-0.1346
	[-0.723]	[-0.262]	[-7.213]	[-6.773]	[-3.553]	[-1.066]
Observations	149,424	149,424	154,643	133,694	133,694	133,694
R-squared	0.167	0.173	0.097	0.102	0.103	0.015
Firm Effects	No	No	No	No	No	Yes
Ind. Effects	Yes	Yes	Yes	Yes	Yes	No

Table 7: Logit Regression Analysis Examining the Relationship between VIX and the Propensity to just Meet or Beat Analyst Forecasts

This table shows the coefficients from regressions of meeting and/or just beating analyst forecasts (*Beat)* on the investor fear index (*VIX*). The time period is 1986-2005. All variables are winsorized at 1% and 99%. In parenthesis we report t-statistics, statistical levels are indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1. Column (1) reports results on the base level logit regression, while model (2) controls for industry effects. Column (3) incorporates advance controls, while Column (4) is a firm fixed-effects logit. Control variables include firm size (*logMktval*), which is the natural logarithm of the market value of equity. *ROA* is net income before extra-ordinary items divided by assets. *Leverage* is firm total debt divided by the book value of equity. *MB* is the market value of equity divided by the book value. *logAnalyst* is the number of analysts following a firm. *Volat* is firm idiosyncratic volatility. *Return* is calendar year share returns adjusted for the S&P500 index. *Institution* is the percentage of shares held by institutional investors. Controls for firm and industry effects are included, but not reported, where appropriate.

	1	2	3	4
VARIABLES	***Beat***	***Beat***	***Beat***	***Beat***
VIX	0.01065***	0.00978***	0.01168***	0.00829***
	[12.96]	[11.83]	[13.25]	[8.390]
logMktVal	-0.09506***	-0.05292***	-0.06149***	-0.22444***
	[-17.71]	[-9.287]	[-9.502]	[-17.18]
ROA	5.00274***	5.20913***	4.86746***	3.15228***
	[29.79]	[29.80]	[24.28]	[13.07]
Leverage	-0.93913***	-0.57122***	-0.58268***	-0.43454***
	[-26.58]	[-15.02]	[-14.16]	[-5.638]
MB	0.04311***	0.03438***	0.03405***	0.01421***
	[28.46]	[21.70]	[18.72]	[5.706]
LogAnalyst	0.43616***	0.37046***	0.36372***	0.21315***
	[34.33]	[28.07]	[25.55]	[9.779]
Volat			0.05656	-0.31567
			[0.231]	[-0.941]
Return			0.03848***	0.09920***
			[3.251]	[7.281]
Institution			0.20400***	0.37885***
			[10.09]	[12.76]
Constant	-1.66879***	-1.61197***	-1.71777***	
	[-58.91]	[-13.74]	[-7.845]	.
Observations	172,573	172,573	153,482	140,851
Ind. Effects	No	Yes	Yes	No
Firm Effects	No	No	No	Yes

Table 8: Regression Analysis Examining the Relationship between VIX, Earnings Surprises, and Market Reactions

This table shows the coefficients from regressions of 3-day cumulative abnormal returns around earnings announcements (*CAR)* on the investor fear index (*VIX*), and earnings surprises w.r.t. consensus analyst forecasts (*Surprise*). The time period is 1986-2005. All variables are winsorized at 1% and 99%. In parenthesis we report t-statistics, statistical levels are indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1. Column (1) reports results on a base level OLS regression with *VIX* and *Surprise*, while model (2) introduces an interaction variable between earnings surprise and VIX (*Surprise*VIX*). Model (3) is the same as Model (2) but with firm fixed-effects. Control variables include firm size (*logMktval*), which is the natural logarithm of the market value of equity. *ROA* is net income before extra-ordinary items divided by assets. *Leverage* is firm total debt divided by the book value of equity. *MB* is the market value of equity divided by the book value. *logAnalyst* is the number of analysts following a firm. *Volat* is firm idiosyncratic volatility. *Return* is calendar year share returns adjusted for the S&P500 index. *Institution* is the percentage of shares held by institutional investors. Controls for firm and industry effects are included, but not reported, where appropriate. All OLS regressions include Rogers standard errors

	1	**2**	**3**
VARIABLES	***CAR(-1,1)***	***CAR(-1,1)***	***CAR(-1,1)***
VIX	0.00022***	0.00021***	0.00017***
	[6.948]	[6.589]	[5.568]
VIX*Surprise		-0.00529*	-0.00531***
		[-1.859]	[-3.012]
Surprise	0.55674***	0.67630***	0.72587***
	[26.40]	[10.40]	[17.13]
logMktVal	-0.00203***	-0.00203***	-0.00932***
	[-9.417]	[-9.427]	[-23.41]
ROA	0.09165***	0.09173***	0.07512***
	[12.83]	[12.85]	[13.18]
Leverage	0.00388***	0.00392***	0.00691***
	[2.837]	[2.864]	[3.119]
MB	-0.00027***	-0.00027***	-0.00011
	[-3.980]	[-3.966]	[-1.624]
logAnalyst	0.00120***	0.00119***	-0.00064
	[2.608]	[2.591]	[-1.014]
Volat	0.04694***	0.04685***	0.08395***
	[4.042]	[4.035]	[8.833]
Return	-0.00170***	-0.00170***	-0.00119***
	[-3.475]	[-3.487]	[-2.960]
Institution	0.00685***	0.00684***	0.01079***
	[10.97]	[10.95]	[12.40]
Constant	0.0053	0.00559	0.04952***
	[0.000143]	[0.000546]	[23.32]
Observations	141,272	141,272	141,272
R-squared	0.024	0.024	0.024
Ind. Effects	Yes	Yes	No
Firm Effects	No	No	Yes

Table 9: Regression Analysis Examining the Relationship between VIX, Earnings Management, and Ownership Structure

This table shows the coefficients from regressions of earnings management (*DA*) on the investor fear index (*VIX*), and various proxies for ownership structure. The time period is 1986-2005. All variables are winsorized at 1% and 99%. In parenthesis we report t-statistics, statistical levels are indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1. Column (1) reports results on a base level OLS regression with the interaction of share turnover with VIX (*VIX*Turnover*) as an independent regressor (2) introduces an interaction variable between Institutional investors and VIX (*VIX*Institution*). Model (3) is the same as Model (2) but breaks down institutional holdings according to the Bushee (1998) classification: *Transient*, *Dedicated*, and *Indexer*, and presents results in addition to the interaction variable on share turnover. Model (4) presents Model (3) but with a firm firxed-effects regression. Coefficients on independent regressors that are included in the interactive terms, are not reported (i.e., *Turnover, Percinst, Dedicated, Transient, Indexer*). Control variables that are not reported include firm size (*logMktval)*, profitability (*ROA*), the market to book ratio (*MB*), leverage ratio (*Leverage*), S&P adjusted returns (*Return*), number of analysts following a firm (*logAnalyst*), and idiosyncratic volatility (*Volat*). Controls for firm and industry effects are included, but not reported, where appropriate. All OLS regressions include Rogers standard errors

	1	**2**	**3**	**4**
COEFFICIENT	***DA***	***DA***	***DA***	***DA***
VIX	0.00429***	0.00539***	0.00542***	0.00379***
	[19.4]	[19.9]	[18.8]	[16.8]
VIX*Turnover	-0.00217***		-0.00123**	-0.00105***
	[-4.22]		[-2.29]	[-2.71]
VIX*Institution		-0.00337***		
		[-9.26]		
VIX*Transient			-0.0009	-0.00029
			[-0.97]	[-0.34]
VIX*Dedicated			0.00633***	0.00412***
			[6.06]	[4.09]
VIX*Indexer			-0.00975***	-0.00673***
			[-14.6]	[-10.7]
Constant	-0.05511***	-0.07629***	-0.07030***	0.20468
	[-5.51]	[-7.43]	[-6.56]	[0.85]
Observations	124,793	125,345	124,793	124,793
R-squared	0.1	0.1	0.1	0.02
Ind. Effects	Yes	Yes	Yes	No
Firm Effects	No	No	No	Yes

Table 10: Regression Analysis Examining the Relationship between VIX and Earnings Quality, using the Dechow-Dichev (2002) Specification.

This table shows the coefficients from regressions of earnings quality (*DD*) on the investor fear index (*VIX*), and various control variables. The time period is 1986-2005. All variables are winsorized at 1% and 99%. In parenthesis we report t-statistics, statistical levels are indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1. Column (1) reports results on a base level OLS regression while Model (2) is a firm fixed-effects model. Control variables that are not reported include firm size (*logMktval)*, profitability (*ROA*), the market to book ratio (*MB*), leverage ratio (*Leverage*), S&P adjusted returns (*Return*), number of analysts following a firm (*logAnalyst*), and idiosyncratic volatility (*Volat*), and institutional holdings (*Institution*). Controls for firm and industry effects are included, but not reported, where appropriate. *DD* is calculated using Compustat yearly data. All OLS regressions include Rogers standard errors

	1	**2**
VARIABLES	***DD***	***DD***
VIX	0.00349***	0.00209***
	[16.74]	[16.92]
Observations	22,908	22,908
R-squared	0.174	0.037
Ind. Effects	Yes	No
Firm Effects	No	Yes

Table 11: Regression Analysis Examining the Relationship between VIX, Earnings Management, and CEO Equity Holdings

This table shows the coefficients from regressions of earnings management (*DA)* on the investor fear index (*VIX*), and CEO share (*Shares*) and options holdings (*Option*). The time period is 1993-2005. All variables are winsorized at 1% and 99%. In parenthesis we report t-statistics, statistical levels are indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1. Column (1) reports results on an OLS regression with *VIX* and *Shares* and their interaction, while model (2) controls for CEO option holdings, and the interaction between *VIX* and *Options*. Control variables are per Table 5, but are not reported. Control variables that are not reported include firm size (*logMktval)*, profitability (*ROA*), the market to book ratio (*MB*), leverage ratio (*Leverage*), S&P adjusted returns (*Return*), number of analysts following a firm (*logAnalyst*), and idiosyncratic volatility (*Volat*), and institutional holdings (*Institution*). Controls for industry effects are included, but not reported. All OLS regressions include Rogers standard errors

	1	2
VARIABLES	***DA***	***DA***
VIX	-0.00001	0.00169**
	[-0.00894]	[2.355]
VIX*Shares	0.01987*	
	[1.894]	
Shares	-0.49741**	
	[-2.104]	
VIX*Options		-0.00080**
		[-2.165]
Options		0.02672***
		[2.909]
Observations	8,878	9,311
R-squared	0.195	0.193
Ind. Effects	Yes	Yes

Table 12: Regression Analysis Examining the Relationship between Leading, Lagged, and Contemporaneous VIX, and Earnings Management

This table shows the coefficients from regressions of earnings management (*DA)* on the investor fear index (*VIX*). All variables are winsorized at 1% and 99%. In parenthesis we report t-statistics, statistical levels are indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1. Column (1) reports results on the following year VIX, while model (2) presents results on contemporaneous VIX. Finally, Model (3) presents results on VIX lagged by 4 quarters. Control variables are per Table 5, but are not reported. Control variables are per Table 5, but are not reported. Control variables that are not reported include firm size (*logMktval)*, profitability (*ROA*), the market to book ratio (*MB*), leverage ratio (*Leverage*), S&P adjusted returns (*Return*), number of analysts following a firm (*logAnalyst*), and idiosyncratic volatility (*Volat*), and institutional holdings (*Institution*). Controls for industry effects are included, but not reported. All OLS regressions include Rogers standard errors

	1	**2**	**3**
COEFFICIENT	***DA***	***DA***	***DA***
leadVIX	0.00176***		
	[10.8]		
currentVIX		0.00488***	
		[27.9]	
lagVIX			0.00800***
			[34.3]
Observations	143,553	143,553	112,818
R-squared	0.15	0.16	0.15
Ind. Dummies	Yes	Yes	Yes

Table 13: Regression Analysis Examining the Relationship between VIX and Earnings Management, Controlling for Macroeconomic Factors

This table shows the coefficients from regressions of earnings management (*DA)* on the investor fear index (*VIX*). All variables are winsorized at 1% and 99%. In parenthesis we report t-statistics, statistical levels are indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1. Column (1) reports results using OLS, while Model (2) utilizes a firm fixed-effects regression. Control variables are per Table 5, but are not reported. Macroeconomic control variables are interest rates (*InterestRate*), consumer price index (*CPI*), industrial activity (*IndustrialProduction*), costs of industrial production (*PPIcommodities*), activity in the real-estate market (*RealEstateLoans*), consumer credit outstanding (*ConsumerCredit*), and real unemployment (*Unemployment*). All OLS regressions include Rogers standard errors

	1	**2**
COEFFICIENT	***DA***	***DA***
VIX	0.00029	0.00066***
	[1.60]	[3.95]
InterestRate	0.02374***	0.01913***
	[15.9]	[12.9]
CPI	-0.00229***	-0.00164***
	[-5.43]	[-3.79]
IndustrialProduction	0.00190***	0.00148***
	[3.43]	[2.75]
RealEstateLoans	0.00028***	0.00026***
	[17.3]	[20.4]
TotalConsumerCredit	0	-0.00003**
	[0.076]	[-1.96]
PPIcommodities	-0.00067*	-0.0005
	[-1.71]	[-1.40]
Unemployment	0.01376***	0.00890***
	[5.12]	[3.15]
Constant	-0.24163***	-0.12465***
	[-5.54]	[-2.68]
Observations	186,719	186,719
R-squared	0.23	0.05
Ind. Effects	Yes	No
Firm Effects	No	Yes

Table 14: Regression Analysis Examining the Interplay between VIX and the Michigan Consumer Sentiment Index.

This table shows the coefficients from regressions of earnings management (*DA*) on the investor fear index (*VIX*), the Michigan Consumer Sentiment Index (*MCSI*) and various control variables. Higher MCSI scores indicate higher levels of consumer sentiment. The time period is 1986-2005. All variables are winsorized at 1% and 99%. In parenthesis we report t-statistics, statistical levels are indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1. All columns are based on firm fixed effects. Control variables that are not reported include firm size (*logMktval)*, profitability (*ROA*), the market to book ratio (*MB*), leverage ratio (*Leverage*). Controls for firm effects are included, but not reported.

	1	**2**
VARIABLES	***DA***	***DA***
MCSI	-0.00073***	-0.00110***
	[-9.31]	[-13.86]
VIX		0.00282***
		[22.52]
Observations	186,719	186,719
R-squared	0.016	0.018
Ind. Effects	No	No
Firm Effects	Yes	Yes