Equity Risk Incentives and Voluntary Disclosure

by

Mengmeng Wang

04. 17. 2019

A dissertation submitted to

the faculty of the Graduate School of the University at Buffalo,

The State University of New York

in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

Department of Accounting and Law

Acknowledgements

I have received a lot of support and assistance throughout the writing of this paper and the whole time as a doctoral student.

I would first like to express my deepest appreciation to my advisor and dissertation committee chair, Dr. Inho Suk, who provides constant guidance and help throughout my study and research process. I appreciate Dr. Suk's insights, time as well as the effort he invested for my benefit. I would also like to acknowledge the members of my dissertation committee, Dr. William Kross and Dr. Jing Chen. They offer valuable comments and suggestions when I was writing and polishing this paper.

I would like to extend my sincere thanks to faculty and doctoral students of accounting department of University at Buffalo attending my dissertation proposal presentation and providing feedbacks to improve this paper. They also provide me a great deal of help during my research process.

I am also so grateful to my family. My husband, Nantao, has always been there for me, supported me throughout this whole five year's period in the doctoral program. Without his support and patient counsel, I was not able to pursue this. I thank my parents. They always love me unconditionally and provide me the best they can.

Equity Risk Incentives and Voluntary Disclosure

Table of Contents

List of Tables

Equity Risk Incentives and Voluntary Disclosure

Abstract

This study examines whether equity risk incentives (i.e., vega) prompt managers to issue stock return volatility-increasing management earnings forecasts. First, I find that stock return volatility increases more (or decreases less) following a management earnings forecast as a firm's CEO vega is higher. Further, firms issue volatility-increasing management earnings forecasts more frequently as their CEO vega is higher. Additional analyses, including a path analysis, reveal that firms with high CEO vega are more likely to issue sporadic, bad-news, range or open-ended, and short-horizon management earnings forecasts which indirectly increase stock volatility. Finally, I show that CEOs are more likely to sell their stock options following issuance of stock volatility-increasing management earnings forecasts. Taken together, my findings suggest that although managers' equity risk incentives drive them to issue more earnings forecasts, these forecasts are less likely to increase firm transparency but rather tend to increase stock return volatility.

1. INTRODUCTION

This paper examines how equity incentives of managerial compensation affect managers' voluntary disclosures. Specifically, I investigate whether managers' equity risk incentives, measured by vega (i.e., the sensitivity of manager wealth to stock return volatility), encourage managers to release stock volatility-increasing management earnings forecasts (henceforth, MF).

Stock options are often used as a proportion of executive compensation to provide risk-averse managers with incentives to accept risky, positive-return projects, thereby aligning the interests between managers and shareholders (Jensen and Meckling 1976; Amihud and Lev 1981; Smith and Stulz 1985; Guay 1999; Rajgopal and Shevlin 2002; Coles, Daniel, and Naveen 2006). But the use of option-based compensation has been criticized in recent years because equity incentives provided by equity compensation motivate managers to pursue personal interests at the expense of shareholders' interests (e.g., Armstrong and Vashishtha 2012; Cooper, Gulen and Rau 2016). A growing body of accounting literature links managerial risk-taking incentives in the compensation portfolio to a firm's financial disclosure. Studies in this area focus on financial reporting quality or earnings management and find that high managerial equity risk incentives lead to financial misreporting (e.g., Armstrong, Larcker, Ormazabal, and Talyor 2013) and higher audit fees (Chen, Gul, Veeraraghavan, and Zolotoy 2015; Kim, Li, and Li 2015).

Compared to mandatory disclosure, managers have a greater discretion over voluntary disclosure regarding whether, when, what, and how to disclose information. Thus, voluntary disclosure can be used more flexibly by firm managers to pursue their personal benefits. However, how risk-taking incentives in managerial compensation (i.e., vega) influences manager's voluntary disclosure decisions, particularly management forecast decisions, have

received little attention in the literature[1]. I fill this void in the literature by examining the effect of mangers' equity risk incentives on MF disclosure behavior.

Risk-taking incentives in managerial compensation, measured by vega, capture the sensitivity of the manager's wealth to an increase in stock volatility. Managers with higher vega benefit from more volatile stock returns. But whether the risk incentives encourage managers to increase stock volatilities through voluntary disclosures is not ex ante clear. In particular, empirical evidence as to whether management voluntary disclosures increase or decrease stock volatility has been mixed. Some studies find that managers increase disclosures in response to a negative information shock (Leuz and Schrand 2018; Anantharaman and Zhang 2011) and that abnormal run-ups in volatility prompt managers to issue bundled guidance (Billings, Jennings, and Lev 2015), indicating voluntary disclosures lower stock price volatility. Meanwhile, some studies show that MFs do not decrease stock volatility (Hsieh, Koller, and Rajan 2006) and certain guidance increases short-term volatility (Rogers, Skinner, and Van Buskirk 2009).

Accounting for this debate, this study examines whether equity risk incentives lead managers to make aggressive voluntary disclosures to increase market uncertainty and volatilities. I first focus on the association between manager's equity risk incentives (vega) and volatility changes surrounding MF disclosures. If managers with high equity risk incentives are incentivized to increase stock volatility via MF disclosure, I expect to see a positive relation between vega and volatility changes following MF disclosure. Conditional on MFs that are disclosed, I calculate changes in stock volatility surrounding the 54,879 MFs (Sample 1) issued

[1] Prior studies show that managers opportunistically time their good news or bad news disclosures around the award or exercise of their stock options to maximize stock option compensation (Aboody and Kasznik 2000; Brockman, Martin, and Puckett 2010). Nagar, Nanda, and Wysocki (2003) find that MF frequency and analysts' subjective ratings of disclosure practice are positively related to the proportion of CEO stock price-based compensation and the value of shares held by the CEO. However, these studies do not examine the effect of risk-taking incentives (vega) on managerial voluntary disclosures.

from 2001 to 2015 (obtained from I/B/E/S guidance dataset) using the realized volatilities measured with the CRSP daily stock dataset. I examine how risk-taking incentives in CEO's compensation (i.e., vega) affect the volatility changes after an MF is announced. The results indicate that after the earnings forecasts, the realized volatility (based on 5-, 10- and 15-day measurement windows) increase with vega in CEO's compensation. These findings suggest that given more risk-taking incentives, managers issue forecasts that actually increase stock volatilities and uncertainty rather than mitigate information uncertainty. To ensure that my findings are valid and robust to alternative specifications, I conduct a number of sensitivity analyses. First, using a classical instrumental variables approach, I address the endogeneity concern such as the omitted correlated variable bias (e.g., the increase in volatility surrounding management forecasts could be caused by other factors such as firm's financing or investment decisions which are also related to vega) or reverse causality (e.g., managers require high vega to compensate for the post-forecast volatility increases). Second, I conduct a difference-in-differences test utilizing an external policy shock (FAS123R) to further rule out endogeneity problem. Third, I replicate the tests based on a propensity score-matched sample to rule out the effects from fundamental difference between firms providing high-vega compensation to managers and those who do not.

Next, instead of conditioning on disclosed MFs, I use the firm-year sample (Sample 2) and look at whether higher-vega managers *actively* issue more volatility-increasing earnings forecasts, and if so, what type of forecasts they are more likely to issue to drive up stock volatilities. However, managers could simply withhold private information and leave market less informative, *passively* expecting a high level of stock-price volatility since disclosure theory suggests that voluntary disclosures should reduce stock volatility by decreasing investor

uncertainty (Brown 1979; Lewellen and Shanken 2002; Pastor and Veronesi 2003) or information asymmetry (Diamond 1985; Diamond and Verrecchia 1991). The analysis reveals that both the frequency and the percentage of volatility-increasing MF disclosures increase with CEO vega. Next, I test the relation between vega and the likelihood of managers issuing certain types of earnings forecasts that could possibly increase stock uncertainty as suggested in prior literature, such as (1) sporadic rather than routine forecasts (sporadic forecasts), (2) forecasts that convey negative surprise (negative surprise forecasts) or bad news (bad news forecasts), (3) range or open-ended forecasts rather than precise point forecasts, and (4) short-horizon forecasts rather than long horizon forecasts.[2] The analysis reveals that higher-vega CEOs are more likely to issue sporadic forecasts, negative surprise forecasts, bad news forecasts, less precise forecasts and shorter-horizon forecasts. I next conduct a path analysis to simultaneously test the direct influence of CEO vega on volatility changes and the indirect effect of CEO vega on volatility changes through issuance of these five types of MFs that are more likely to increase stock volatility. I find that not only vega directly affects volatility changes, but also vega indirectly increases volatility through prompting managers' issuance of the above-mentioned five types of forecasts (i.e., sporadic, bad news, negative surprise, range or open-ended, and short horizon forecasts). These findings suggest that managers with higher risk-taking incentives are more likely to release stock volatility-increasing forecasts.

I replicate the previous tests using (i) sum of CEO and CFO's vega, and (ii) sum of top five executives' vega and find the results consistent with those from CEO vega. An extended test shows that high-vega CEOs are more likely to sell their options after issuing volatility-increasing MFs, lending additional credence to my argument that high-vega managers opportunistically

[2] Unlike other types of forecasts, the effect of forecast horizon on stock uncertainty is not ex ante clear. I discuss this in Section 2.2.

make volatility-increasing earnings forecasts to benefit themselves. Finally, besides the realized volatility measures, I alternatively use a conditional variance of daily market adjusted returns derived from an EGARCH model and find consistent results. Overall, my findings manifest that equity risk incentives encourage managers to release volatility-increasing forecasts, which is an unintended consequences arising from managers' equity-based compensation.

This paper contributes to the literature in several ways. First, this study extends the literature that examines how managers' equity risk incentives affect managers' disclosure behaviors. Most prior studies focus on the effect of equity risk incentives on the reporting quality of firms' mandatory disclosures, such as accruals management, real activities management, or earnings restatement. However, little attention was paid to the impact of equity risk incentives on managers' voluntary disclosures. My study directly examines the impact of equity risk incentives on the properties of management earnings forecasts.

Second, this study contributes to the literature that examines the impact of management earnings forecasts on stock return volatility or investors' uncertainty. Theoretical models generally indicate that a firm's voluntary disclosures decrease the firm's stock return volatility and investors' uncertainty (e.g., Barry 1978; Brown 1979; Dye 1985; Pastor and Veronesi 2003). Empirical studies are still on debate regarding whether management voluntary disclosures increase (e.g., Rogers et al. 2009) or decrease (Billings et al. 2015) stock price volatility. In this study, I argue that the effect of voluntary disclosures on return volatility depends on manager's risk-taking incentives. This study provides nuanced insights into the debate by demonstrating that stock volatility changes surrounding management earnings forecasts increase with the level of equity risk incentives.

Third, this study has implications for a growing concern shared by investors, regulators and researchers about unintended consequences of equity-based compensation that was originally designed to mitigate manager's and shareholder's conflicts of interests. A stream of research shows that stock or option-based compensation leads managers to pursue personal gains, thereby diminishing the quality of financial reporting (e.g., Cheng and Warfield 2005; Cheng and Farber 2008; Armstrong and Vashishtha 2012; Armstrong, Larcker, Ormazabal, and Taylor 2013). My findings shed light on this line of literature by providing evidence that option-based incentives prompt managers' volatility-increasing disclosures that could be issued opportunistically at the expense of shareholders' wealth. These findings could be a useful reference for public investors in interpreting the disclosures made by managers with heterogeneous equity risk incentives.

The rest of the paper proceeds as follows. Section 2 reviews the related literature and develops hypotheses. Section 3 describes the variable measurement and sample selection procedure along with descriptive statistics. Section 4 discusses empirical models and results, followed by additional tests and extensions in Section 5. Section 6 concludes the paper.

2. BACKGROUND AND HYPOTHESES DEVELOPMENT

2.1. Background and Related Literature

2.1.1. Equity Incentives and financial disclosures

Equity-based compensation, including stock options, is often used as a proportion of managerial compensation to mitigate managers' risk averse problem and align the manager and shareholders' interests (Jensen and Meckling 1976; Amihud and Lev 1981; Smith and Stulz 1985; Guay 1999; Rajgopal and Shevlin 2002; Coles, Daniel, and Naveen 2006). However, the equity

incentives in compensation plan prompt managers to take risky actions that only drive up stock volatility without increasing shareholder wealth. For example, Armstrong and Vashishtha (2012) find that CEOs with option compensations are incentivized to increase firm's systematic risk even though it does not increase firm value. Cooper, Gulen, and Rau (2016) argue that overconfident CEOs receiving option-heavy incentive compensation undertake activities such as overinvestment and value-destroying mergers and acquisitions that lead to shareholder wealth losses.

Accounting literature mainly focuses on the association between equity incentives and financial misreporting. Option compensation increases with both the sensitivity of the manager's wealth to changes in risk (vega) and the sensitivity of the manager's wealth to changes in stock price (delta) (Lambert, Larcker and Verrecchia 1991; Carpenter 2000; Ross 2004; Lewellen 2006; Armstrong, Larcker, Ormazabal, and Taylor 2013). Without disentangling delta and vega, early studies find mixed evidence on the relation between managerial equity incentives and financial misreporting (e.g., Cheng and Warfield 2005; Bergstresser and Philippon 2006; Burns and Kedia 2006; Erickson, Hanlon, and Maydew 2006; Efendi, Srivastava, and Swanson 2007; Cohen, Dey, and Lys 2008; Cheng and Farber 2008; Feng, Ge, Luo, and Shevlin 2011). Looking at vega and delta simultaneously, Armstrong, Larcker, Ormazabal, and Taylor (2013) document a positive association between managers' risk-taking incentives (vega) and financial misreporting and that the incentives provided by vega subsume those of delta. Consistently, later studies find a positive relation between risk-taking incentives (vega) in managers' compensation portfolio and audit fees (e.g., Chen, Gul, Veeraraghavan, and Zolotoy 2015; Kim, Li, and Li 2015).

Unlike mandatory disclosures, voluntary disclosures can be opportunistically used by managers given various types of incentives such as insider trading, large corporate transactions,

career concerns, etc. (e.g., Healy and Palepu 2001; Rogers and Stocken 2005; Graham, Harvey, and Rajgopal 2005; Cheng and Lo 2006; Rogers 2008; Kothari, Shu, and Wysocki 2009). Consistently, prior studies find evidence on managers' opportunistic timing of good news or bad news disclosures around the award or exercise of CEO stock options to maximize stock option compensation (Aboody and Kasznik 2000; Brockman, Martin, and Puckett 2010). However, how risk-taking incentives in managers' compensation (i.e., vega) affect MFs has not been examined.

2.1.2. Voluntary disclosures and stock volatilities

Theoretical models generally suggest that disclosures lower investors' uncertainty, because disclosure of information about the firm helps investors who are uncertain about the parameters of the distributions of firm's future earnings and cash flows to learn about these parameters over time and estimate the parameters with greater precision (Dye 1985; Lewellen and Shanken 2002; Pastor and Veronesi 2003). Since stock volatility is positively correlated with investors' uncertainty (Barry 1978; Brown 1979), disclosure is deemed to decrease stock volatility, such that management voluntary disclosure should reduce investor uncertainty and stock volatility.[3] Empirically, however, findings are mixed regarding whether management voluntary disclosure increases or decreases stock volatility. Some studies find that concerned about the information environment and stock price volatility, managers increase disclosure or guidance in response to a negative information environment shock (Leuz and Schrand 2018; Anantharaman and Zhang 2011), or abnormal run-ups in volatility prompt manager's issuance of bundled guidance (Billings, Jennings, and Lev 2015), indicating that manager's voluntary disclosures mitigate stock price volatility; but on the contrary, some studies document that management earnings forecasts do not decrease stock volatility (Hsieh, Koller, and Rajan 2006)

[3] However, some studies (e.g., Kim and Verrecchia 1994) allow the possibility that the unexpected nature of news increases information asymmetry between investors, thereby increasing the volatility of prices in the short run.

or certain type of guidance even increases short-term volatility (Rogers, Skinner, and Van Buskirk 2009).

The empirical study on whether disclosures reduce or increase investor uncertainty and stock volatility in the literature is inclusive. To investigate this question, we need to consider managers' incentives, particularly manager's risk-taking incentives. I take the manager's equity risk incentives into consideration, and investigate how the effect of MFs on stock volatility depends on the level of managers' risk-taking incentives.

2.2. Hypothesis Development

2.2.1. Equity risk incentives and volatility-increasing management forecast

Managers' equity incentives are commonly represented by delta and vega. Unlike delta that amplifies the effect of equity risk on the total riskiness of a manager's equity portfolio, thus hampering a manager's intention to increase stock return volatility, vega directly provides manager incentives to increase firm risk and volatility. Since managers with high equity risk incentives (i.e., vega) benefit from a high level of stock return volatility, they invest in risky projects that affect firm value (Smith and Stulz 1985; Guay 1999; Coles, Daniel, and Naveen 2006) or manipulate financial reporting (Armstrong, Larcker, Ormazabal, and Taylor 2013). I argue that managers could drive up volatility through voluntary disclosures. This could be less costly for managers because they need not take any real actions and because voluntary disclosures are less regulated and less subject to auditor's scrutiny. I focus on the most common type of voluntary disclosures – management earnings forecasts, and examine whether high vega provides managers with incentives to drive up stock return volatilities through voluntary earnings forecast disclosures.

I predict that earnings forecasts made by managers with high vega are more likely to increase return volatility than those issued by managers with low vega, such that vega is expected to be positively associated with the stock volatility increases following the management earnings forecasts. Further, unconditional on MF issuance, I predict that managers with higher vega tend to actively make volatility-increasing voluntary disclosures than staying silent on earnings forecast. Taken all together, the first two hypotheses are:

H1a: Stock return volatility increases more (or decreases less) following management earnings forecasts issued by mangers with higher equity risk incentives.

H1b: Mangers with higher equity risk incentives issue volatility-increasing management earnings forecasts more frequently.

2.2.2. Equity risk incentives and types of management forecasts

I next explore the channels through which high vega-managers drive up volatilities. In particular, I investigate whether certain types of MFs (i.e., sporadic, negative surprise, bad news, range or open-ended, and short horizon MFs) are more likely to be released by high-vega managers because prior studies document that these MFs tend to increase stock return volatility.

(a) Sporadic MFs versus routine MFs

According to Rogers, Skinner, and Van Buskirk (2009), sporadic MFs[4] are more likely to be driven by unexpected events, thus convey unanticipated information and increase uncertainty, while timing of routine forecasts are more likely to be anticipated by investors and thus less

[4] Following Rogers, Skinner, and Van Buskirt (2009), a forecast is defined as a "routine" forecast (issued by routine forecasters) if prior to the calendar quarter of the current forecast, the firm issued forecasts in at least 3 of the 4 preceding calendar quarters. Forecasts not meeting this criterion are defined as "sporadic "forecasts (issued by sporadic forecasters).

likely to increase uncertainty. Therefore, managers with high risk-taking incentives should be more likely to provide sporadic forecasts to increase volatility.

H2a: Mangers with higher equity risk incentives are more likely to issue sporadic management earnings forecasts.

(b) Forecasts containing negative versus positive surprise

Prior studies (Kothari, Li, and Short 2009; Rogers, Skinner, and Van Buskirk 2009) suggest that volatility changes surrounding disclosures containing negative surprise are greater than the disclosures containing positive surprise.[5] This asymmetric volatility change can be explained by "leverage effects" and "managers' asymmetric incentives." (i) First, equity value declines prompted by negative-surprise disclosures elevate firm leverage accordingly. The increased leverage drives up stock volatilities (Black 1976; Christie 1982; Schwert 1989; Rogers, Skinner, and Van Buskirk 2009). (ii) Second, managers who are concerned about legal or reputational issues reveal negative surprise at a timely manner which elicits a stronger market reaction and greater volatility changes than positive news revelation (e.g. Skinner 1994; Soffer, Thiagarajan, and Walther 2000). I, therefore, predict that higher-vega managers are more likely to release negative-surprise MFs which increase stock volatilities than positive-surprise MFs.

H2b: Mangers with higher equity risk incentives are more likely to issue negative-surprise earnings forecasts.

[5] Negative surprise is defined when the management earnings forecast is lower than the most recent analysts' median consensus forecast.

(c) Forecasts containing bad news versus good news[6]

Besides the leverage effects and managers' asymmetric incentives mentioned above, the "volatility feedback" effect could lead to larger volatility changes following bad news MFs than good news MFs. An increase in stock volatility triggered by a disclosure will in turn increase the required rate of return on stock price and lower the stock price, which dampens positive stock price reactions while amplifies negative stock price reactions, thus we should observe a larger volatility changes for bad news disclosures than good news ones (Pindyck 1984; French, Schwert, and Stambaugh 1987; Campbell and Hentschel 1992; Rogers, Skinner, and Van Buskirk 2009). Taken together, higher-vega managers are more incentivized to release bad news MFs which are more likely to drive up stock volatilities than good news MFs.

H2c: Mangers with higher equity risk incentives are more likely to issue bad news earnings forecasts.

(d) Range or open-ended versus point forecasts

Compared to range and open-ended forecasts, point forecasts convey more specific and precise information to investors (Kim and Verrecchia 1991; Subramanyam 1996; Bamber and Cheon 1998). Prior studies show greater earnings response coefficients to point forecasts than range or open-ended forecasts, presumably due to smaller market uncertainty in forecast news (Baginski, Conrad, and Hassell 1993). Thus, it is expected that managers with higher risk-taking incentives are more inclined to release less precise and specific earnings forecasts which are more likely to drive up stock volatilities than precise and specific forecasts.

[6]Although bad news MFs are conceptually similar to negative-surprise MFs, I identify bad news MFs based on the market reaction to MFs when the firm's market-adjusted stock returns within the 3-day forecast window are negative (Rogers, Skinner, and Van Buskirt 2009).

H2d: Mangers with higher equity risk incentives are more likely to issue range or open-ended earnings forecasts.

(e) Short term versus long term forecasts

The effect of forecast horizon on stock uncertainty is not as unambiguous as other types of forecasts.[7] Long horizon forecasts, compared to short horizon forecasts, could induce larger volatility because their earnings estimates are generally less accurate (e.g., Baginski and Hassell 1997). Alternatively, short horizon forecasts could elicit larger volatility than long short horizon forecasts because short horizon forecasts, which could have been issued earlier in a timely manner, are more likely to contain unexpected information and thus elicit larger stock volatility than long horizon forecasts. Therefore, it is not ex ante clear how mangers perceive the forecast horizon in terms of volatility. I offer the hypothesis in an alternative form:

H2e: Mangers with higher equity risk incentives are more likely to issue short horizon earnings forecasts.

3. VARIABLE MEASUREMENT AND SAMPLE CONSTRUCTION

3.1. Variable measurement

3.1.1. Stock return volatility

I measure changes in stock return volatility surrounding management earnings forecast based on an ex post volatility measure – realized volatilities (as used in Kothari, Li, and Short 2009). The realized volatilities are measured by the standard deviation of market-adjusted daily

[7] A forecast is classified as a short horizon forecast if forecast horizon is less than a year. A forecast is classified as a long horizon forecast if forecast horizon is longer than a year.

returns derived from CRSP daily stock dataset over a 5, 10 or 15-day measurement window. I measure the realized volatilities just before (i.e., three-day before) and after (i.e., three-day after) a forecast is issued,[8] and calculate the change of the realized volatilities around the forecast by subtracting the logged volatilities over pre-MF 5, 10, and 15 days from the logged volatilities over corresponding post-MF 5, 10, and 15 days, respectively:

$$\Delta Nd\_RealVol = ln(Nd\_RealVol_{(t+3,\, t+3+N)} / Nd\_RealVol_{(t-3-N,t-3)}) \quad (1)$$

Nd_RealVol is the standard deviation of market-adjusted daily returns over an *N*-day window (i.e., 5, 10, or 15 days) and the subscript, *t*, represents the MF announcement date. *ΔNd_RealVol* in Equation (1) is defined as the natural logarithm of the ratio of the standard deviation of market-adjusted daily returns over post-MF *N* days beginning three days after the MF announcement date to the standard deviation of market-adjusted daily returns over pre-MF *N* days ending three days before the MF announcement date. *ΔNd_RealVol* represents *Δ5d_RealVol, Δ10d_RealVol,* or *Δ15d_RealVol*.

3.1.2. Equity risk incentive

I use CEO vega (i.e. the sensitivity of the CEO's wealth to changes in stock return volatility) to capture CEOs' equity risk incentives while controlling for the CEO's total cash compensation and the sensitivity of the CEO's wealth to changes in equity price (CEO delta). Guay (1999) shows that option vega is dominant over stock vega in influencing managers' equity risk incentives and most prior studies (e.g. Knopf, Nam, and Thornton 2002; Rajgopal and Shevlin 2002; Coles, Daniel, and Naveen 2006) use the vega of the option portfolio to measure the vega of managers' wealth. Following prior studies, I use the approximation approach for the pre-2006 period. Vega and delta are first calculated following Guay (1999) and Core and Guay

[8] "3-day before and after" is chosen following Rogers, Skinner, and Van Buskirk (2009) to avoid the noise right before and after the MF announcement date. Nonetheless, the use of 1-day or 2-day before and after MF announcement date does not alter my inference.

(2002), based on the Black-Scholes (1973) option valuation model as modified by Merton (1973) to account for dividends.

CEO vega (*Vega_CEO*) is measured as the natural logarithm of one plus the change in the million dollars of the CEO's option value for a 0.01 change in the annualized standard deviation of stock returns (e.g., Armstrong, Larcker, Ormazabal, and Talyor 2013). Similarly, CEO delta (*Delta_CEO*) is measured by the natural logarithm of one plus the change in executive's stock and option value in million dollars for a 1% change in stock price. While I primarily use the CEO's equity incentives because the influence of the CEO on firm disclosures is likely to be most influential, later in Section 5.1, I also use the average vega and delta for CEO and CFO's (*Vega_CEOCFO, Delta_CEOCFO*), as well as for the top five executives (*Vega_TOP5, Delta_TOP5*).

3.2. Sample Construction

For my main tests, I construct two samples – (1) Sample 1 (management earnings forecast sample) that includes the sample conditional on issued management earnings forecasts to examine volatility changes surrounding forecasts, and (2) Sample 2 (vega-based firm-year sample), which comprises firm-year observations unconditional on management earnings forecasts that are used in forecast likelihood/frequency tests for certain types of forecasts and the path analysis.

First, to construct the management earnings forecast sample (Sample 1), I obtain management earnings (EPS) forecasts from the I/B/E/S Guidance Feed dataset for the period between October 24, 2000 and December 31, 2015, which encompasses the post-Regulation Fair Disclosure (FD) period. I initially obtain 137,734 management EPS forecasts with non-missing

relevant information (e.g. firm ticker, forecast announcement date, forecast period end, etc.) disclosed by US firms. Daily stock returns, and financial information are collected from the CRSP daily stock file and Compustat fundamentals annual dataset. Corresponding to the sample period of management earnings forecasts, I obtain executive compensation data for the fiscal year ended between December 31, 2000 and December 31, 2015 from Execucomp. I estimate litigation risk following the model (3) in Kim and Skinner (2012) after collecting the key information on filings of securities class action lawsuits from the Stanford Law School Securities Class Action Clearinghouse. Control variables related to analyst forecasts are obtained from I/B/E/S detail history or actual datasets.

To look at stock return volatility changes surrounding each forecast, I delete the duplicated or multiple forecasts made within one day to keep the sample at forecast-date level, and the sample is reduced to 100,784 observations. Then I match the management EPS forecast sample with prior year-end compensation/incentive variables (from Execucomp), key financial information variables (from Compustat) and control variables constructed from the relevant datasets, deleting observations with missing values for these independent or control variables. After requiring non-missing volatility measures around management earnings forecasts, the sample size varies depending upon the data availability of the dependent variables (i.e., the changes of stock volatility variables). When realized volatilities, which are calculated using CRSP realized stock returns, are used, 54,828, 54,795 and 54,760 MFs are used in testing for 5, 10 or 15 days' measurement windows, respectively.

Second, without conditioning on forecast issuance (Sample 2), I also investigate the effect of vega on forecast frequency and likelihood of certain types of forecasts. I initially collect 29,150 firm-year observations form Execucomp for the fiscal year 2000 - 2015. After merging

with incidence and frequency of certain types of forecasts (e.g., volatility-increasing forecasts, bad-news forecast, etc.) and requiring for relevant control variables from Compustat, CRSP and other datasets, I am left with 25,168 firm-year observations for Sample 2.

3.3. Descriptive Statistics

Table 1 Panel A displays the descriptive statistics for the MF sample (Sample 1). On average, all volatility changes surrounding MF measures have a negative mean except for the realized volatility measured by the 5-day window, which indicates that overall volatilities decrease after MF disclosures in the sample. The average CEO vega of 0.154 indicates that on average the CEO's option value increases by 0.17 million dollars with a 0.01 increase in the annualized standard deviation of stock returns. The average CEO delta is 0.416, which means on average the executive's stock and option value increases by 0.52 million dollars with a 1% increase in stock price.

Table 1 Panel B shows the descriptive statistics for the firm-year sample of CEO compensation variables (Sample 2). 53% of total firm-year observations experience at least one incidence of management earnings forecast disclosure and the mean *Freq_MF* of 0.976 indicates that on average a firm in Sample 2 issues 1.65 times of earnings forecasts in a year. The annual average of stock volatility changes following an MF is still negative, which is consistent with those in Panel A, except when the realized volatility is measured with the 5-day window. The average CEO vega for the firm year sample is 0.109 (that is, on average, the increase in the executive's option value is 0.12 million dollars for a 0.01 increase in the annualized standard deviation of stock returns in Sample 2), and average CEO delta is 0.358 (i.e., the increase in executive's stock and option value is, on average, 0.43 million dollars in response to a 1% increase in stock price). Both vega and delta in the firm year sample are smaller than those in the

MF sample, indicating that higher vega and delta CEOs are more likely to issue earnings forecasts.

Regarding other control variables, firms in the MF sample (Sample 1) on average have larger market values, higher firm age, sales growth, operating profit, market-to-book ratios, more analysts following, lower historical stock volatilities, lower leverage ratios, and higher litigation risk, compared to those firms in the firm-year sample (Sample 2).

4. EMPIRICAL ANALYSIS

4.1. Changes in Volatility Surrounding Management Earnings Forecasts

To test whether stock return volatility increases more following management earnings forecasts issued by mangers with higher equity risk incentives (H1a), I estimate the following OLS regression for the MF sample (Sample 1):

$$\begin{aligned}\Delta Vol_{m,i,t} = {} & \beta_0 + \beta_1 Vega\_CEO_{i,t-1} + \beta_2 Delta\_CEO_{i,t-1} + \beta_3 CashComp\_CEO_{i,t-1} \\ & + \beta_4 Age\_CEO_{i,t-1} + \beta_5 Tenure\_CEO_{i,t-1} + \beta_6 Size_{i,t-1} + \beta_7 Firmage_{i,t-1} + \beta_8 Capx_{i,t-1} \\ & + \beta_9 Sgrow_{i,t-1} + \beta_{10} ROA_{i,t-1} + \beta_{11} MTB_{i,t-1} + \beta_{12} LEV_{i,t-1} + \beta_{13} Vol\_Mon_{i,t-1} \\ & + \beta_{14} Equ\_Iss_{i,t+1} + \beta_{15} LTDebt\_Iss_{i,t+1} + \beta_{16} LitRisk_{i,t-1} + \beta_{17} AnnMF_{m,i,t} \\ & + \beta_{18} LongHR_{m,i,t} + \beta_{19} LossMF_{m,i,t} + \beta_{20} NegSurp_{m,i,t} + \beta_{21} Abs\_MFSurp_{m,i,t} \\ & + \beta_{22} Bundle_{m,i,t\pm3} + \beta_{23} SUE_{m,i,t} + \beta_{24} AF_{i,t-90d} + \beta_{25} AD_{i,t-90d} + \beta_{26} Pre\_Vol_{i,t-3d} \\ & + \sum \gamma_t Year_t + \sum \tau_l Industry_l + \varepsilon_{m,i,t} \end{aligned} \quad (2)$$

Subscripts, *m*, *i* and *t*, represent MF, firm and year, respectively. The dependent variable, *ΔVol*, is computed by ex post realized stock return volatility changes surrounding each earnings forecast (*ΔNd_RealVol*,) as described in Section 3.1, so *ΔVol* represents three realized volatility changes measures (i.e., *Δ5d_RealVol, Δ10d_RealVol, and Δ15d_RealVol*) with measurement windows of 5, 10, and 15 days. The variable of interest is CEO vega (*Vega_CEO)* measured at the fiscal year end before the management forecasts. If the change of stock volatility following an MF increases with CEO risk-taking incentives, the coefficient, β_1, is expected to be positive.

Following prior studies on managerial incentives (e.g. Rajgopal and Shevlin 2002; Coles, Daniel, and Naveen 2006; Armstrong, Larcker, Ormazabal, and Talyor 2013; Ali and Zhang 2015; Pae, Song, and Yi 2015), I control for other CEO incentives and CEO characteristics, such as delta (*Delta_CEO*), cash compensation (*CashComp_CEO*), CEO age (*Age_CEO*) and tenure (*Tenure_CEO*), together with firm characteristics including firm size (*Size*), firm age (*firmage*), capital expenditures (*Capx*), sales growth (*Sgrow*), returns on assets (*ROA*), market-to-book ratio (*MTB*), and financial leverage (*LEV*). Other firm or MF characteristics that are found to affect stock volatility or MF behavior in the literature (e.g., Frankel, Johnson, and Skinner 1999; Lang and Lundholm 2000; Rogers and Stocken 2005; Rogers, Skinner, and Van Buskirk 2009) are also controlled. For example, I control for monthly return volatility of prior year (*Vol_Mon*), analyst following (*AF*) and analyst forecast dispersion (*AD*), an indicator variable of managers forecasting a loss (*LossMF*), a negative surprise indicator (*NegSurp*), the absolute value of forecast surprise (*Abs_MFSurp*), an annual MF indicator (*AnnMF*), a long horizon forecast indicator (*LongHR*), and an indicator of the MF bundled with an earnings announcement (*Bundle*), the magnitude of earning surprise if bundled (*SUE*), and two indicators which equal one if the firm issues any equity (*Equ_Iss*) or long-term debt (*LTDebt_Iss*) during the concurrent year.

Since litigation risk can affect managers' incentives to provide forward-looking information disclosures (Healy and Palepu 2001; Chen, Matsumoto, and Rajgopal 2011), I control for litigation risk (*LitRisk*) measured by the probability of litigation estimated using a logistic model following the model (3) in Kim and Skinner (2012).[9] To reduce the effect of pre-

[9] In Kim and Skinner (2012), Model (3) is the logit model of regressing a litigation dummy on the indicator variable of high-litigation risk industry (*FPS*), lagged assets ($LNASSESTS_{t-1}$), lagged sales growth ($SALES\_GROWTH_{t-1}$), lagged market-adjusted return($RETURN_{t-1}$), lagged return skewness ($RETURN\_SKEWNESS_{t-1}$), lagged return standard deviation ($RETURN\_STD\_DEV_{t-1}$), and lagged turnover ($TURNOVER_{t-1}$) as in the following regression:

MF volatility run-up, I control for the level of volatility right before (three days before) each forecast for the corresponding volatility measures (i.e. *Pre_Vol* stands for *Pre_5dRVol, Pre_10dRVol,* or *Pre_15dRVol*). I add year and industry fixed effects to control for the industrial heterogeneity and macroeconomic trends. Standard errors are clustered within firm to correct for within-firm dependence and heteroscedasticity. The definitions of all variables are detailed in Appendix A.

Regression results are reported in Table 2. The coefficients on CEO vega (*Vega_CEO*) are positive at 5%, 1% and 1% significant level when post-MF volatility changes are measured by *Δ5d_RealVol, Δ10d_RealVol,* and *Δ15d_RealVol* in Column (1) (2) and (3), respectively, while the magnitude of the *Vega_CEO* coefficient is quite stable (around 0.055) across the three realized volatility measures. The effects of CEO vega on the realized volatility changes are also economically significant. A one-standard deviation increase in *Vega_CEO* increases the 5, 10 and 15-day window stock volatilities (*Δ5d_RealVol, Δ10d_RealVol,* and *Δ15d_RealVol*) by 1.12%, 1.10%, and 1.12%, respectively.

Results in Table 2 suggest that CEO vega is significantly and positively associated with volatility changes surrounding management earnings forecasts, consistent with my prediction in H1a that stock return volatility increases more (or decrease less) following management earnings forecasts issued by mangers with higher equity risk incentives.

4.2. Endogeneity and Robustness Tests

4.2.1. Instrumental variables approach

I interpret the findings in Table 2 as indicative that CEO vega increases stock volatility changes surrounding management earnings forecasts. Some may argue that there could be

---

$Pr(SUED=1) = Logit\ (b_0 + b_1*FPS + b_2*LNASSESTS_{t-1} + b_3*SALES\_GROWTH_{t-1} + b_4*RETURN_{t-1} + b_5*RETURN\_SKEWNESS_{t-1} + b_6*RETURN\_STD\_DEV_{t-1} + b_7*TURNOVER_{t-1} + e).$

omitted variables causing so-called omitted correlated variable bias. For example, firms with greater information asymmetry use more stock and option incentives (e.g., Demsetz and Lehn 1985; Smith and Watts 1992; Core and Guay 1999; Bryan, Hwang, and Lilien 2000; Core 2001), and information asymmetry is also related to manager's voluntary disclosures and stock volatility changes surrounding the disclosures (e.g., Lang and Lundholm 1993; Billings, Jennings, and Lev 2015). Further, volatility changes could be driven by firm's investment or financing policies which are related to CEO vega. It can also be argued that, when managers frequently make voluntary disclosures over high uncertain issues which could increase investors uncertainty, they could require higher options compensations to compensate for the increased uncertainty. If this is the case, there is a potential reverse causality.

To address the potential endogeneity concern, I employ an instrumental variables approach. I employ two instrument variables: (1) an indicator variable of post-FAS 123R era - *FAS123R*, (which equals one if the fiscal year end is after Dec 2005, and zero otherwise). FAS 123R which took effect after Dec 2005, is an exogenous change in accounting treatment of stock option compensation. According to prior studies (Hayes, Lemmon, and Qiu 2012), vega decreases significantly following the adoption of FAS 123R. But since it is an exogenous shock, it cannot be directly related to post-MF volatility changes without going through changes in CEO vega; (2) the average CEO vega of all firms which do not share the two-digit industry code, but whose headquarters share the zip code with the firm – *Vega_ZipNSic*. The average CEO vega of all firms in the same geographical location, but not in the same industry, are correlated with the firm's CEO vega, while it has little impact *directly* on post-MF stock volatility changes, while affecting them only *indirectly* via the relation with the firm's CEO vega. I ensure that *FAS123R* and *Vega_ZipNSic* are significantly (p-value < 0.01) correlated with the *Vega_CEO* but are not

(*p*-value > 0.1) with any of the volatility changes surrounding management earnings forecast (*Δ5d_RealVol, Δ10d_RealVol, Δ15d_RealVol*).[10]

In the first stage, I estimate the instrumented (i.e., fitted) values of CEO vega (*Fitted_Vega_CEO*) using *FAS123R* and *Vega_ZipNSic* along with the control variables used in the main test of Equation (2). Specifically, I estimate the following first-stage regression to obtain fitted values of CEO vega (*Fitted_Vega_CEO*):

$$Vega\_CEO = \beta_0 + \beta_1 FAS123R + \beta_2 Vega\_ZipNSic + \sum \beta_{it} Control_{it} + \varepsilon \quad (3)$$

In the second stage, I replicate the previous regression models (in Equation (2)) with the instrumented values obtained from Equation (3). Table 3 provides the results from the second-stage regressions with adjusted standard errors. As shown in Columns (1) – (3), the instrumented CEO vega (*Fitted_Vega_CEO*) is positively associated with all of the stock volatility changes after management earnings forecasts measured by various ways at the 1% significant level. Overall, the results from the instrumented CEO vega confirm the main findings in Table 2 that CEO vega positively affects the volatility changes surrounding MFs.

4.2.2. Difference-in-differences test

To further address endogeneity in an experimental setting, I employ a difference-in-differences design using the adoption FAS 123R in 2005, which is an exogenous change in accounting treatment of stock options.[11] As mentioned above, prior studies (e.g., Hayes,

[10] Specifically, the exclusion criterion is not rejected (*p*-values are larger than 0.2) in all specifications except *F-statistics* against the null that this instrument is weak in the first-stage regression, suggesting the instrument is not weak.

[11] The FAS123R was issued by Financial Accounting Standards Board (FASB) and became effective in Dec 2005. The complete statement is available at http://www.fasb.org/pdf/fas123r.pdf. In the pre-FAS123R period, firms were allowed to expense option compensation at their intrinsic value instead of its fair value on income statement, so firms granting at-the-money option compensation actually did not record any expenses on income statement, but after the implementation of FAS123R firms are required to expense stock-based compensation at its fair value which increases the amount of compensation expenses recorded on income statement. Therefore, firms significantly reduced the use of option compensation after the adoption of FAS123R.

Lemmon, and Qiu 2012) find that vega decreases significantly after the adoption of FAS 123R. Especially, firms that would face higher accounting charges under 123R (defined as "highly impacted firms") reduce their reliance on stock options compensations the most. Following Hayes, Lemmon, and Qiu (2012), I thus define a firm as "highly impacted firms" if the firm reported above-median pro forma option expense in the pre-FAS123R period (from 2002 to 2004), and take the "high accounting impact firms" as the treatment group since these firms were affected most by the adoption of FAS123R, and the other firms fall into the control groups. Then I run the following difference-in-differences regression using the MF sample:

$$\begin{aligned}\Delta Vol_{m,i,t} = {} & \beta_0 + \beta_1 TG_{i,t-1} + \beta_2 FAS123R + \beta_3 TG_{i,t-1} * FAS123R + \beta_4 Delta\_CEO_{i,t-1} \\ & + \beta_5 CashComp\_CEO_{i,t-1} + \beta_6 Age\_CEO_{i,t-1} + \beta_7 Tenure\_CEO_{i,t-1} + \beta_8 Size_{i,t-1} \\ & + \beta_9 Firmage_{i,t-1} + \beta_{10} Capx_{i,t-1} + \beta_{11} Sgrow_{i,t-1} + \beta_{12} ROA_{i,t-1} + \beta_{13} MTB_{i,t-1} \\ & + \beta_{14} LEV_{i,t-1} + \beta_{15} Vol\_Mon_{i,t-1} + \beta_{16} Equ\_Iss_{i,t+1} + \beta_{17} LTDebt\_Iss_{i,t+1} \\ & + \beta_{18} LitRisk_{i,t-1} + \beta_{19} AnnMF_{m,i,t} + \beta_{20} LongHR\_MF_{m,i,t} + \beta_{21} LossMF_{m,i,t} \\ & + \beta_{22} NegSurp\_MF_{m,i,t} + \beta_{23} Abs\_MFSurp_{m,i,t} + \beta_{24} Bundle_{m,i,t\pm 3d} + \beta_{25} SUE_{m,i,t} \\ & + \beta_{26} AF_{i,t-90d} + \beta_{27} AD_{i,t-90d} + \beta_{28} Pre\_Vol_{i,t-3d} + \sum \gamma_t Year_t + \sum \tau_l Industry_l + \varepsilon \end{aligned} \quad (4)$$

The dependent variable, ΔVol, represents the three dependent variables of volatility changes measured as in Table 2 (i.e., $\Delta 5d\_RealVol$, $\Delta 10d\_RealVol$, $\Delta 15d\_RealVol$). The independent variable, *TG*, is an indicator variable which equals one if the firm is within the treatment group defined above. The variable of interest is the interaction of TG and FAS123R, *TG* FAS123R*, where *FAS123R* is equal to one if the fiscal year end is after Dec 2005, and zero otherwise. Control variables are the same as those in equation (2), including industry and year fix effects. If high CEO vega prompts managers to increase stock volatility through management earnings forecasts, then after FAS123R took effect, for the firms in treatment group of which CEO vega decreases to a greater level, we should observe a larger reduction in post-MF stock

volatility changes after the implementation of FAS123R for the treatment group than for the control group, so β_3 is expected to be significantly negative. [12]

Table 4 reports the results of difference-in-differences test, where changes of stock volatility surrounding MFs measured by *Δ5d_RealVol, Δ10d_RealVol, Δ15d_RealVol* are displayed in Column (1) – Column (3), respectively. Consistent with my expectation, the interaction term, *TG* FAS123R*, is significantly and negatively associated with all of the volatility changes after management forecast, and the indicator variable, *TG*, is significantly and positively associated with most of volatility change measures, suggesting that before FAS123R became effective, firms in the treatment group, compared to control firms, did experience significantly higher stock volatility changes following MFs, but after the FAS123R, the volatility changes decrease significantly. The findings in Table 4 support my inference that it is CEO vega that leads to a volatility increase following management forecasts.

4.2.3. Analysis with a propensity score-matched sample

To address the endogeneity concern that my findings may be driven by some fundamental differences between firms with high vega and those with non-high vega, such as the firm's life cycle, performance, or risk level, etc., I replicate the above tests based on a propensity score-matched sample. To construct the sample, I match each of the management earnings forecast issued by a CEO whose vega is within the top quantile (25%) of that year's two-digit SIC industry CEO vega distribution (i.e. *Vega_top25=1*) with an MF that is issued by a CEO with vega below the top quantile (i.e. *Vega_top25=0*). Specifically, for each of the observation, I first calculate the probability (i.e., the propensity score) of the *Vega_CEO* falling within the top

[12] For robustness, I run a regression of CEO vega on an indicator of treatment group (*TG*), an indicator variable of post FAS 123R era (*FAS123R*), as well as the interaction of these two variables, and I find a significantly negative coefficient on the interaction term, which ensures that for firms in the treatment group, CEO vega decreased to a greater extent than for firms in the control group after the effectiveness of FAS123R, which is consistent with Hayes, Lemmon, and Qiu (2012).

quantile (i.e. *Vega_top25*) of the same year and industry's CEO vega distribution by estimating a logistic regression (Equation (5)) of *Vega_top25* on firm size (*Size*), returns on assets (*ROA*), market-to-book ratio (*MTB*), and financial leverage (*LEV*), firm age (*Firmage*), R&D expenses (*RnD*), capital expenditures (*Capx*), tangible assets (*Tang*), sales growth (*Sgrow*), prior year monthly return volatility (*Vol_Mon*), number of analyst following (*AF*), a loss firm indicator (*Loss*), litigation risk (*LitRisk*), CEO age (*Age_CEO*) and tenure (*Tenure_CEO*), two indicators for equity issuance and long-term debt issuance (*Equ_Iss*, *LTDebt_Iss*), and industry and year fixed effects:

$$\begin{aligned} Pr(Vega\_top25=1) = F(&\beta_0 + \beta_1 Size + \beta_2 ROA + \beta_3 MTB + \beta_4 LEV \\ &+ \beta_5 Firmage + \beta_6 RnD + \beta_7 Capx + \beta_8 Tang + \beta_9 Sgrow + \beta_{10} Vol\_Mon + \beta_{11} AF \\ &+ \beta_{12} Loss + \beta_{13} LitRisk + \beta_{14} Age\_CEO + \beta_{15} Tenure\_CEO + \beta_{16} Equ\_Iss \\ &+ \beta_{17} LTDebt\_Iss + \sum \gamma_t Year_t + \sum \tau_l Industry_l + \varepsilon) \end{aligned} \quad (5)$$

Next, I match each of *Vega_top25=1* observations with a *Vega_top25*=0 observation with the closest propensity score with replacement, and nearest neighbor method, and construct a new matched sample that includes 8,257 pairs of *Vega_top25*=1 and *Vega_top25*=0 observations (i.e., 16,514 observations). Using the propensity-score-matched sample, I replicate the main analyses of Equation (2). Table 5 presents the regression results for the matched samples. The results are consistent with those in Table 2. Specifically, *Vega_CEO* is significantly and positively associated with all of the volatility changes after management forecast at the 5% level. The propensity score matched sample analysis suggests that my main findings are not driven by fundamental differences in firm characters. Collectively, the results suggest it is managers' risk incentives (i.e. vega) that lead to their issuance of volatility-increasing MFs.

4.3. Frequency and Percentage of Volatility-Increasing Management Forecasts

To test H1b, I explore the association between CEO vega and the frequency of managers' releasing volatility-increasing earnings forecasts using the firm-year sample (Sample 2). If

managers with higher equity risk incentives are encouraged to increase stock volatility through making earnings forecasts, they may benefit from actively providing more volatility-increasing forecasts. I test this prediction by estimating the following regression model for the firm-year sample (Sample 2) which includes both firms making earnings forecasts and the ones that do not during the test period:

$$\begin{aligned} Freq\_VolInc\_MF_{i,t} \text{ (or } \%\_VolInc\_MF_{i,t}) \\ = \beta_0 + \beta_1 Vega\_CEO_{i,t-1} + \beta_2 Delta\_CEO_{i,t-1} + \beta_3 CashComp\_CEO_{i,t-1} \\ + \beta_4 Age\_CEO_{i,t-1} + \beta_5 Tenure\_CEO_{i,t-1} + \beta_6 Size_{i,t-1} + \beta_7 Firmage_{i,t-1} \\ + \beta_8 Capx_{i,t-1} + \beta_9 Sgrow_{i,t-1} + \beta_{10} ROA_{i,t-1} + \beta_{11} MTB_{i,t-1} + \beta_{12} LEV_{i,t-1} \\ + \beta_{13} Vol\_Mon_{i,t-1} + \beta_{14} Equ\_Iss_{i,t} + \beta_{15} LTDebt\_Iss_{i,t} + \beta_{16} LitRisk_{i,t-1} \\ + \beta_{17} Loss_{i,t-1} + \beta_{18} AF_{i,t-1} + \sum \gamma_t Year_t + \sum \tau_l Industry_l + \varepsilon_{i,t} \end{aligned} \quad (6)$$

The frequency-based dependent variable, $Freq\_VolInc\_MF_{i,t}$, is measured by the natural logarithm of one plus the total number of volatility-increasing MFs in a year *t*, while the percentage-based dependent variable, $\%\_VolInc\_MF_{i,t,}$ is calculated as the ratio of the total number of volatility-increasing MFs to the total number of MFs in a year *t*. Consistent with the three volatility changes measures in Table 2 (i.e., *Δ5d_RealVol*, *Δ10d_RealVol, Δ15d_RealVol*), the dependent variable, *Freq_VolInc_MF,* represents the number of the corresponding three volatility-increasing management forecasts released in a year (i.e., *Freq_5dRVolInc_MF*, *Freq_10dRVolInc_MF, Freq_15dRVolInc_MF),* and *%_VolInc_MF,* indicates the percentage of the corresponding three volatility-increasing MFs out of the total MFs released in a year (i.e., *%_5dRVolInc_MF*, *%_10dRVolInc_MF, %_15dRVolInc_MF).* If managers with higher equity risk incentives provide more volatility-increasing forecasts, the coefficient, β_1, in equation (6) is expected to be positive.

Following prior literature (e.g., Rajgopal and Shevlin 2002; Coles, Daniel, and Naveen 2006; Armstrong, Larcker, Ormazabal, and Talyor 2013; Frankel, Johnson, and Skinner 1999; Lang and Lundholm 2000; Healy and Palepu 2001; Rogers and Stocken 2005), I control for CEO

and firm characteristics, such as CEO delta (*Delta_CEO*), cash compensation (*CashComp_CEO*), age (*Age_CEO*) and tenure (*Tenure_CEO*), firm size (*Size*), firm age (*Firmage*), capital expenditures (*Capx*), sales growth (*Sgrow*), returns on assets (*ROA*), market-to-book ratio (*MTB*), financial leverage (*LEV*), monthly return volatility (*Vol_Mon*), analyst following (*AF*), a loss firm indicator (*Loss*), and litigation risk (*LitRisk*). All these control variables and the main independent variable *Vega_CEO* are measured at the previous fiscal year-end. Again I also control for two indicators, *Equ_Iss* and *LTDebt_Iss* along with year and industry fixed effects.

The regression results are presented in Table 6. Panel A displays the results when dependent variables are based on the frequency measures, *Freq_VolInc_MF*. As a benchmark, I first examine the effect of CEO vega (*Vega_CEO*) on the likelihood (*MF*) and frequency (*Freq_MF*) of MFs. *MF* equals one if the firm releases at least one MF during the fiscal year, and zero otherwise, and *Freq_MF* is measured by the natural logarithm of one plus the total numbers of MFs released by a firm during the fiscal year. As shown in Column (1) and (2), the coefficients on *Vega_CEO* is positive and significant at the 1% level, indicating that CEO vega (*Vega_CEO*) is positively associated with the likelihood (*MF*) and frequency (*Freq_MF*) of MFs. Columns (3) to (5) report the results when the dependent variables are the natural logarithm of one plus the total number of management earnings forecasts that are followed by an increase in volatility. The coefficients on *Vega_CEO* are all positive and significant at the 1% level, suggesting that high equity risk incentives stimulate managers to release more volatility-increasing earnings forecasts. Economically, an increase in *Vega_CEO* by one standard deviation raises the frequency of managers' volatility-increasing forecast by 5.52%, 5.42%, and 5.42% when the volatility changes is measured by *Δ5d_RealVol*, *Δ10d_RealVol*, and *Δ15d_RealVol*, respectively. Panel B shows regression results based on percentage measures, *%_VolInc_MF*.

Columns (1) to (3) report the results when the dependent variables are *%_5dRVolInc_MF*, *%_10dRVolInc_MF, and %_15dRVolInc_MF,* respectively. The coefficients on *Vega_CEO* are all positive and significant at the 1% level, suggesting that high equity risk incentives stimulate managers to release more volatility-increasing earnings forecasts. Economically, an increase in *Vega_CEO* by one standard deviation raises the percentage of managers' volatility-increasing forecast by 1.87%, 1.82%, and 1.77% when the volatility changes is measured by *Δ5d_RealVol*, *Δ10d_RealVol*, and *Δ15d_RealVol,* respectively.

In sum, consistent with my prediction, the findings in Table 6 indicate that CEO risk-taking incentives captured by *Vega_CEO* are positively associated with the frequency and percentage of managers making volatility-increasing earnings forecasts. The results in Table 2 and 6 together suggest that managers with high risk-taking incentives release more earnings forecasts that are followed by an increase in volatilities.

4.4. Likelihood of Issuing Certain Types of Management Earnings Forecasts

Next, I investigate the channels through which high-vega managers drive up volatilities using MFs. I focus on certain types of MFs (i.e., sporadic MFs, negative surprise MFs, bad news MFs, range or open-ended MFs, short horizon MFs) that are known to increase uncertainty and stock volatilities, and expect that MFs made by high-vega managers are more likely to concentrate on these types of MFs. I estimate the following probit regressions for the firm-year sample (Sample 2):

$$\begin{aligned} Pr\,(Certain\_MF_{i,t} = 1) = Probit\,(&\beta_0 + \beta_1 Vega\_CEO_{i,t-1} + \beta_2 Delta\_CEO_{i,t-1} \\ &+ \beta_3 CashComp\_CEO_{i,t-1} + \beta_4 Age\_CEO_{i,t-1} + \beta_5 Tenure\_CEO_{i,t-1} + \beta_6 Size_{i,t-1} \\ &+ \beta_7 Firmage_{i,t-1} + \beta_8 Capx_{i,t-1} + \beta_9 Sgrow_{i,t-1} + \beta_{10} ROA_{i,t-1} + \beta_{11} MTB_{i,t-1} \\ &+ \beta_{12} LEV_{i,t-1} + \beta_{13} Vol\_Mon_{i,t-1} + \beta_{14} Equ\_Iss_{i,t} + \beta_{15} LTDebt\_Iss_{i,t} + \beta_{16} LitRisk_{i,t-1} \\ &+ \beta_{17} Loss_{i,t-1} + \beta_{18} AF_{i,t-1} + \sum \gamma_t Year_t + \sum \tau_l Industry_l + \varepsilon) \end{aligned} \quad (7)$$

The dependent variable, *Certain_MF*, equals one if more than a half of MFs made in a year are a certain type of earnings forecasts, i.e., *Sporadic_MF, NegSurp_MF, Badnews_MF, NotPoint_MF, ShortHR_MF*, measured as indicator variables which equal to one if more than a half of MFs made in a year are sporadic MFs (*Sporadic_MF*=1), negative surprise MFs (*NegSurp_MF*=1), bad news MFs (*Badnews_MF*=1), range or open-ended MFs (*NotPoint_MF*=1), or short horizon MFs (*ShortHR*=1), respectively, and zero otherwise.[13] If the firm does not release any MF in a year, these indicator variables equal zero.

Consistent with the frequency tests in Equation (6), I add the following control variables: prior-year CEO delta (*Delta_CEO*), cash compensation (*CashComp_CEO*), CEO age (*Age_CEO*), CEO tenure (*Tenure_CEO*), firm size (*Size*), firm age (*Firmage*), capital expenditures (*Capx*), Sales growth (*Sgrow*), returns on assets (*ROA*), market-to-book ratio (*MTB*), financial leverage (*LEV*), monthly return volatility (*Vol_Mon*), analyst following (*AF*), a loss firm indicator (*Loss*), litigation risk (*LitRisk*), two indicators for equity issuance and long-term debt issuance (*Equ_Iss, LTDebt_Iss*), as well as year and industry fixed effects. If, as predicted in H2a - H2e, managers' equity risk incentives are positively associated with the likelihood of managers making a certain type of MFs, the coefficient of *Vega_CEO* in Equation (7), β_1, is expected to be positive when the dependent variable is each of the five types of MF indicators.

Table 7 displays the likelihood test results when the dependent variable alternately represents *Sporadic_MF*, *NegSurp_MF*, *Badnews_MF*, *NotPoint_MF*, and *ShortHR_MF* in Columns (1) – (5). CEO vega is positively associated with the likelihood of all of the five types of forecasts. Specifically, Column (1) shows that *Vega_CEO* is positively related to the propensity of issuing sporadic MFs at a 5% significant level. Both likelihoods of negative surprise MFs and bad news MFs increase with CEO vega (*Vega_CEO*) at 1% and 5% significant

[13] These types of forecasts are defined in Section 2.2 and Appendix A.

levels, respectively, as shown in Columns (2) and (3). As presented in Columns (4) and (5), the likelihood of range or open-ended format MFs and the likelihood of short horizon MFs are also positively associated with CEO vega (*Vega_CEO*) at the 1% significant level. The effects of CEO vega on the likelihood of these five types of forecasts are also economically significant. Specifically, a one-unit increase in *Vega_CEO* increases the probability of managers giving more sporadic MFs, negative surprise MFs, bad news MFs, range or open-ended MFs, or short horizon MFs by 5.52%, 10.55%, 6.27%, 10.60%, and 16.62%, respectively. Overall, the results in Table 7 suggest that high-vega CEOs are more likely to make sporadic, negative surprise, bad news, range or open-ended format, and short horizon MFs.

4.5. Channels: Path Analysis

To more thoroughly investigate the channels suggested in H2a - H2e, I now extend the analysis to examine whether the five types of forecasts examined in Section 4.4 indeed increase stock volatilities and how much of the volatility change is attributed to issuance of such five types of MFs. To this end, I conduct a path analysis to simultaneously test the direct influence of CEO vega on volatility changes and the indirect effect of CEO vega on volatility changes through issuance of these five types of forecasts. By running the path analysis, I am able to investigate whether the direct or an indirect effect of CEO vega is a main driving factor of my results.[14] Using the path analysis, I conduct five exercises (with each exercise applying to all volatility changes measures) by employing *Sporadic_MF*, *NegSurp_MF*, *Badnews_MF*, *NotPoint_MF*, *ShortHR_MF* alternately as mediators, and *Vega_CEO* as source variable, because CEO vega increases the likelihood of these five types of management forecasts, and then these five types of forecasts are likely to increase stock volatilities. To measure volatility

[14] Another advantage of the path analysis in the setting is that the direct path, although unintended, captures the firm's risk taking behaviors other than MFs (e.g., risky investment, aggressive tax avoidance, earnings management, etc.) and thus controls for such behavior.

changes after MFs as the dependent variables, I calculated three annual averages of the volatility changes measures surrounding all MFs released by a firm during the year (i.e., *AnnΔ5dRVol*, *AnnΔ10dRVol*, and *AnnΔ15dRVol*).[15] I also include all control variables in Equation (7) in testing the path from *Vega_CEO* to the mediator (i.e., the five indicator variables), while I use all control variables in Equation (7) plus an annual average of pre-forecasts volatility levels[16] for testing the path from a mediator to the annual average of stock volatility changes. In sum, using this path analysis, I examine the extent to which CEO vega (*Vega_CEO*) directly increases the stock volatilities (i.e., direct effect), and indirectly affects the stock volatilities via an increase in the likelihood of releasing any of the five types (i.e., sporadic, negative surprise, bad news, range or open-ended, or short horizon) forecasts, thereby assessing the relative importance of direct and indirect effects of CEO vega on the stock volatility changes.

Table 8 shows the results. For each panel, columns (1) to (3) shows the results when the annual average volatility changes surrounding management forecasts are measured by *AnnΔ5dRVol*, *AnnΔ10dRVol*, and *AnnΔ15dRVol*, respectively. Panel A presents the results when the likelihood of sporadic MFs (*Sporadic_MF*) is a potential channel (i.e., mediator) for the indirect effect of *Vega_CEO*. The total path estimate from *Vega_CEO* to each of the annual average volatility changes is decomposed into direct and indirect path estimates. For instance, in columns (1), (2), and (3), the direct path estimates from *Vega_CEO* to *AnnΔ5dRVol*, *AnnΔ10dRVol* and *AnnΔ15dRVol*, i.e., p[*Vega_CEO*, *AnnΔ5dRVol*], p[*Vega_CEO*, *AnnΔ10dRVol*], and p[*Vega_CEO*, *AnnΔ15dRVol*], are, respectively, 0.039, 0.023, and 0.019,

[15] Since the sample used in path analysis is the firm-year sample that allows us to compute the likelihood of a certain type of MFs, I cannot directly use the volatility change surrounding each MF as the dependent variable, and thus I construct instead the three annual average of volatility changes surrounding all of the management earnings forecasts measures, which are used as dependent variables in the path analysis.

[16] The annual average of pre-forecasts volatility levels (*Ann_Pre_5dRVol*, *Ann_Pre_10dRVol*, *Ann_Pre_15dRVol*) are controlled when dependent variables are *AnnΔ5dRVol, AnnΔ10dRVol,* and *AnnΔ15dRVol,* respectively.

which are statistically significant and explain 86.67%, 85.19%, and 86.36% of the total effects of 0.044, 0.027, and 0.022, respectively. Meanwhile, the indirect path estimates, i.e., p[*Vega_CEO, Sporadic_MF*]*p[*Sporadic_MF, AnnΔ5dRVol*], p[*Vega_CEO, Sporadic_MF*]*p[*Sporadic_MF, AnnΔ10dRVol*], and p[*Vega_CEO, Sporadic_MF*] *p[*Sporadic_MF, AnnΔ15dRVol*], are, respectively, 0.006, 0.004, and 0.003, which are significant and address 13.33%, 14.82%, and 13.64% of the total effects. In sum, although the direct path outweighs the indirect path in explaining the total effect of *Vega_CEO* on the volatility changes, the indirect effect via the increased likelihood of sporadic forecasts is statistically and economically significant.

Panel B of Table 8 displays the results when the issuance of negative surprise MFs (*NegSurp_MF*) is a potential channel for indirect effect of *Vega_CEO*. In columns (1) – (3), the direct path estimates from *Vega_CEO* to *AnnΔ5dRVol*, *AnnΔ10dRVol*, and *AnnΔ15dRVol*, are 0.033, 0.021, and 0.017, respectively, and explains 71.74%, 72.41%, and 73.91% of the total effects, while the indirect path estimates, 0.013, 0.008, and 0.006 address 28.26%, 27.59%, and 26.09% of the total effects, which are all significant. Panel C contains the results when bad news MFs are used as the mediator. Similar to Panel B, columns (1) – (3) show that the indirect path estimates from *Vega_CEO* to *AnnΔ5dRVol*, *AnnΔ10dRVol*, and *AnnΔ15dRVol* through issuing bad news MFs explain 17.39%, 17.86%, and 17.39% of the total effects, which are all significant. Taken together, Panel B and C suggest that the indirect effects of CEO vega on volatility changes via releasing negative surprise MFs and bad news MFs are not trivial.

Panel D shows that the direct path outweighs the indirect path in explaining the total effect of *Vega_CEO* on the volatility changes and all direct effects are significant. The indirect path for the realized volatility changes is a significantly (though smaller than the direct path) important portion of the total effect. Panel E shows the direct and indirect path when the

potential channel (i.e., mediator) is issuance of short horizon MFs. The direct effects on the three average realized volatility changes measures- *AnnΔ5dRVol, AnnΔ10dRVol, AnnΔ15dRVol* shown in Columns (1) (2) and (3) are 0.009, 0.008, and 0.009, respectively, accounting for 16.67%, 22.86%, and 31.03% of the total effects, all of which are insignificant and are smaller than indirect effects, which are 0.045, 0.027, 0.020, respectively, and explains 83.33%, 77.14%, and 68.97% of the total effects.

Overall, the results in Table 8 from the path analysis suggest that while *Vega_CEO* has a direct positive effect on the overall changes of the annual average of stock volatility changes, the indirect effect of *Vega_CEO* on volatility changes through providing certain types of MFs – sporadic, negative surprise, bad news, range or open-ended, and short horizon MFs – is an important channel, consistent with my predictions in H2a – H2e.

5. EXTENSIONS

5.1. Equity Risk Incentives for other Top Executives

Thus far in the paper, I have focused on the CEO's risk-taking incentives (*Vega_CEO*). While the influence of the CEO is likely to be largest, CFO or other top executives on the top management team could affect voluntary disclosure behaviors. Thus, I examine the influence of (1) the CEO-CFO combined vega, and (2) top five executives' vega (including the CEO, CFO and other top three executives based on total compensation) on the issuance of volatility-increasing MFs while controlling for the delta, cash compensation, average age and tenure of the corresponding group.

I define the CEO and CFO's vega (*Vega_CEOCFO*), or top five executive vega (*Vega_TOP5*) as the sum of vegas of CEO and CFO's, or top five executives, respectively. The

delta of CEO and CFO's (*Delta_CEOCFO*), or top five executives (*Delta_TOP5*) are similarly defined. Cash compensation of the CEO and CFO's (*CashComp_CEOCFO*), or the top five executives (*CashComp_TOP5*) are defined as the logarithm of one plus average cash compensation (including salary and bonus) of the CEO and CFO, or the top five executives', while age (*Age_CEOCFO*, *Age_TOP5*) and tenure (*Tenure_CEOCFO*, *Tenure_TOP5*) of the two teams are also average of the age or tenure of the CEO and CFO, or the top five executives. I replicate the analysis of Equation (2) after replacing the CEO related variables (i.e. *Vega_CEO, Delta_CEO, CashComp_CEO, Age_CEO, Tenure_CEO*) with those of CEO and CFO's (i.e., *Vega_CEOCFO, Delta_CEOCFO, CashComp_CEOCFO, Age_CEOCFO, Tenure_CEOCFO*) or the top five executives (i.e., *Vega_TOP5, Delta_TOP5, CashComp_TOP5, Age_TOP5, Tenure_TOP5*) while maintaining the same set of other controls.

Regression results based on the incentives of CEO and CFO's are shown in Table 9 Panel A, and the results for the incentives of top five executives are shown in Table 9 Panel B. The coefficients on both CEO and CFO's vega (*Vega_CEOCFO*), and top five executives' vega (*Vega_TOP5*) are significantly and positively associated with all of post-MF volatility changes measures, consistent with the results in Table 2 when the incentives are based on CEO's (*Vega_CEO*) only. The findings in Table 9 generalize my proposition regarding CEO risk-taking incentives to the CFO or other top executives.

5.2. CEO's Post- Forecast Option Trading Behavior

If risk-taking incentives are a key driver of the post-MF volatility increase, high-vega managers might be able to realize gains following these volatility-increasing forecasts by selling their options during the high volatility period. As such, I examine managers' option trading behavior after issuance of volatility-increasing MFs.

I construct a decile-ranked CEO vega measure (*D_Vega*) and three decile-ranked post-MF volatility changes measures (i.e., *D_Δ5dRVol, D_Δ10dRVol, D_Δ15dRVol*). I next create an indicator variable, *Sell*, which equals one if the CEO sells options (or is a net option seller) within 15 days after making an earnings forecast, and zero otherwise. I use a (+1, +15)-day window after MF, since, as shown in the main test results, post-MF increases in volatilities are concentrated in this period and thus managers are more likely to benefit from selling their options in this period following an MF issuance.[17] I run the following Probit model:

$$\begin{aligned} Pr\,(Sell_{(t+1d,t+15d)} = 1) = Probit\,(&\beta_0 + \beta_1 D\_Vega_{i,t-1} + \beta_2 D\_\Delta Vol_{i,t} + \beta_3 D\_Vega_{i,t-1} * D\_\Delta Vol_{i,t} \\ &+ \beta_4 Delta\_CEO_{i,t-1} + \beta_5 CashComp\_CEO_{i,t-1} + \beta_6 Age\_CEO_{i,t-1} + \beta_7 Tenure\_CEO_{i,t-1} \\ &+ \beta_8 Size_{i,t-1} + \beta_9 Firmage_{i,t-1} + \beta_{10} Capx_{i,t-1} + \beta_{11} Sgrow_{i,t-1} + \beta_{12} ROA_{i,t-1} + \beta_{13} MTB_{i,t-1} \\ &+ \beta_{14} LEV_{i,t-1} + \beta_{15} Equ\_Iss_{i,t+1} + \beta_{16} LTDebt\_Iss_{i,t+1} + \beta_{17} LitRisk_{i,t-1} + \beta_{18} LossMF_{i,t} \\ &+ \beta_{19} NegSurp\_MF_{i,t} + \beta_{20} Abs\_MFSurp_{i,t} + \beta_{21} AF_{i,t-90d} + \beta_{22} AD_{i,t-90d} + \beta_{23} Pre\_Vol_{i,t-3d} \\ &+ \sum \gamma_t Year_t + \sum \tau_l Industry_l + \varepsilon_{m,i,t}) \end{aligned} \quad (8)$$

The variable, *D_ΔVol*, in Equation (8) represents one of the three decile-ranked post-MF volatility changes measures. The variable of interest is the interaction term, $D\_Vega*D\_\Delta Vol_i$, after controlling for other CEO incentives and firm and forecast characteristics. If a high-vega CEO is more likely to sell their options following a larger MF-induced volatility increase, I expect the coefficient on $D\_Vega*D\_\Delta Vol_i$, β_3, to be significantly positive.

Table 10 presents the results from estimating Equation (8), where Columns (1) – (3) show the result when *D_ΔVol* represents *D_Δ5dRVol, D_Δ10dRVol, D_Δ15dRVol,* respectively. All interaction terms of *D_Vega* and the respective *D_ΔVol* are significantly and positively associated with the (+1, +15)-day option sale indicator, suggesting that CEOs with high equity risk incentives are more likely to sell options when the volatility increases more following an MF, such that they benefit directly from trading on options during the high-volatility period that is induced by MF issuance.

[17] When I extend this post-MF horizon to 20 or 30 days, the results are not affected.

5.3. Conditional Volatilities Estimated From EGARCH Model

In addition to realized stock return volatility measures based on the CRSP daily stock return file, I employ a conditional volatility measure to assess changes in volatility due to management earnings forecasts. To this end, I estimate an exponential generalized autoregressive conditional heteroscedasticity (EGARCH) (1, 1) model, which is a commonly used model of the conditional variance of financial time series (Bollerslev 1986; Nelson 1991), using the time series of daily stock returns around issuance of each management earnings forecast.[18] Specifically, for each of the 54,879 management earnings forecasts in the sample, I obtain the daily market-adjusted returns (r_t) over the (-90, +30) days' window around the forecast announcement date, such that I have a sample of balanced time-series of daily market-adjusted returns. Then I construct an indicator variable, *DMEF*, which equals one on the day (t = 0) a management earnings forecast is issued, and zero otherwise. The relation between daily market adjusted returns (r_t) and whether there is an issuance of management forecast (*DMEF*) are specified in the following EGARCH model:

$$r_t = \beta_0 + \beta_1 * DMEF_t + \varepsilon_t, \quad (9\text{-}1)$$

$$\varepsilon_t = \sigma_t v_t \text{ ,where } v_t \sim N(0,1) \text{ \& i.i.d} \quad (9\text{-}2)$$

$$ln\sigma_t^2 = \alpha_0 + \alpha_1 e_{t-1} + \alpha_2 |e_{t-1}| + \alpha_3 ln\sigma_{t-1}^2 + \delta_1 DMEF_t, \text{ where } e_t = \varepsilon_t / \sigma_t \text{ , and } e_t \sim N(0,1) \text{ and i.i.d.} \quad (9\text{-}3)$$

In Equation (9-1), ε_t captures the unpredictable movement of stock returns and has a time varying conditional heteroscedasticity, which is assumed to follow an EGARCH (1, 1) process. ε_t can be decomposed into two components as shown in Equation (9-2): (i) a stochastic component (v_t), and (ii) a deterministic component, σ_t, which provides the main channel for the day of management forecast issuance to have a separate effect on stock volatility (in Equation (9-3)). The conditional variance of daily market-adjusted returns is therefore affected by whether a

[18] Nelson and Cao (1992) argue that the nonnegativity constraints in the linear GARCH model are too restrictive, while there are no restrictions on these parameters in the EGARCH model.

management forecast is issued on that day. After running the EGARCH model above, I am able to derive the coefficient, δ_1, which indicates how much the issuance of management earnings forecasts impacts the conditional variance of daily market-adjusted returns (i.e., $\sigma_t = 1+ \delta_1 DMEF_t$).

Next, I investigate how the impact of management earnings forecasts on the conditional stock returns variance varies with CEO vega (*Vega_CEO*) by estimating the following regression:

$$\begin{aligned}\delta_1 = {} & \beta_0 + \beta_1 Vega\_CEO_{i,t-1} + \beta_2 Delta\_CEO_{i,t-1} + \beta_3 CashComp\_CEO_{i,t-1} + \beta_4 Age\_CEO_{i,t-1} \\ & + \beta_5 Tenure\_CEO_{i,t-1} + \beta_6 Size_{i,t-1} + \beta_7 Firmage_{i,t-1} + \beta_8 Capx_{i,t-1} + \beta_9 Sgrow_{i,t-1} \\ & + \beta_{10} ROA_{i,t-1} + \beta_{11} MTB_{i,t-1} + \beta_{12} LEV_{i,t-1} + \beta_{13} Vol\_Mon_{i,t-1} + \beta_{14} Equ\_Iss_{i,t} \\ & + \beta_{15} LTDebt\_Iss_{i,t} + \beta_{16} LitRisk_{i,t-1} + \beta_{17} Loss_{i,t-1} + \beta_{18} AF_{i,t-1} + \beta_{19} Bundle_{i,t} \\ & + \sum \gamma_t Year_t + \sum \tau_l Industry_l + \varepsilon \end{aligned} \quad (10)$$

The dependent variable, δ_1, is the coefficient derived from running the EGARCH model, and captures the impact of management earnings forecasts on the conditional stock returns variance. I control for relevant CEO and firm characteristics along with industry and year fixed effects. Since δ_1 is a coefficient estimate from a time-series model, I calculate White standard errors that allows for the possibility of heteroscedasticity. The variable of interest is again *Vega_CEO*. If high-vega CEOs issue management forecast to drive up stock volatilities, I expect β_1 to be positive.

Table 11 displays the results from estimating Equation (11). CEO vega (*Vega_CEO*) is significantly positively associated with δ_1, suggesting that the impact of management forecasts on stock volatility, which is alternatively measured by the conditional variance of daily market-adjusted returns, increases with the level of CEO vega, indicating that management forecasts issued by firms with higher-vega CEOs are more likely to drive up stock volatility. Overall, the findings in Table 11 support the main findings.

6. CONCLUSIONS

This study examines the effect of equity risk incentives (i.e., vega) on management earnings forecast behavior. First, I find that stock return volatility increases more following an MF disclosure as a firm's CEO vega is higher. Second, firms issue volatility-increasing management earnings forecasts more frequently as their CEO vega is higher. Additional analyses, including a path analysis, reveal that firms with high CEO vega are more likely to issue sporadic, bad-news, range or open-ended, and short-horizon management earnings forecasts which indirectly increase stock volatility. Finally, I show that CEOs are more likely to sell their stock options following issuance of stock volatility-increasing management earnings forecasts.

The implication of my findings links (1) how incentives in managers' compensation affect management voluntary disclosure behaviors, which has attracted little attention, to (2) the impact of management earnings forecasts on stock uncertainty and volatility, which is on debate in the literature. When researchers examine the effect of management earnings forecasts on stock uncertainty, they should consider the role of managers' equity risk incentives and interpret the results differently depending upon the extent of managers' risk-taking incentives. From a practical perspective, this study has implications for a growing concern shared by investors, regulators and researchers about the negative effect of using stock-based compensations in that managers' equity risk incentives promote volatility-increasing voluntary disclosures that do not always increase shareholders' wealth.

References

Aboody, D., and R. Kasznik. 2000. CEO stock option awards and the timing of corporate voluntary disclosures. Journal of Accounting and Economics 29: 73–100.

Ali, A., and W. Zhang. 2015. CEO tenure and earnings quality. Journal of Accounting and Economics 59(1): 60–79.

Amihud, Y., and B. Lev. 1981. Risk reduction as a managerial motive for conglomerate mergers. Bell Journal of Economics 12: 605–617.

Anantharaman, D., and Y. Zhang. 2011. Cover me: managers' responses to changes in analyst coverage in the post-regulation FD period. The Accounting Review 86: 1851–1885.

Armstrong, C. S., F. Larcker, G. Ormazabal, and D. Taylor. 2013. The relation between equity incentives and misreporting: The role of risk-taking incentives. Journal of Financial Economics 109: 327–350.

Armstrong, C., and R. Vashishtha. 2012. Executive stock options, differential risk-taking incentives, and firm value. Journal of Financial Economics 104: 70–88.

Baginski, S. P., E. J. Conrad, and J. M. Hassell. 1993. The effects of management forecast precision on equity pricing and on the assessment of earnings uncertainty. The Accounting Review 68: 913–927.

Baginski, S. P., and J. M. Hassell. 1997. Determinants of management forecasts precision. The Accounting Review 72: 303–312.

Bamber, L. S., and Y. S. Cheon. 1998. Discretionary management earnings forecast disclosures: Antecedents and outcomes associated with forecast venue and specificity choices. Journal of Accounting Research 36: 167–190.

Barry, C. 1978. Effects of uncertain and nonstationary upon capital market equilibrium conditions. Journal of Financial and Quantitative Analysis 13: 419–433.

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

Billings, M. B., R. Jennings, and B. Lev. 2015. On guidance and volatility. Journal of Accounting and Economics 60: 161–180.

Black, F. 1976. Studies of stock price volatility changes. In: Proceedings of the 1976 Meetings of the American Statistical Association, Business and Economic Statistics Section.

Black, F., and M. Scholes. 1973. The pricing of options and corporate liabilities. Journal of Political Economy 81: 637–654.

Bollerslev, T. 1986. Generalized autoregressive conditional heteroscedasticity. Journal of Econometrics 31: 307–327.

Brockman, P., X. Martin, and A. Puckett. 2010. Voluntary disclosures and the exercise of CEO stock options. Journal of Corporate Finance 16: 120–136.

Brown, S. 1979. The effect of estimation risk on capital market equilibrium. Journal of Financial and Quantitative Analysis 14: 215–220.

Bryan, S., L. Hwang, and S. Lilien. 2000. CEO stock option awards: an empirical analysis and synthesis of the economic determinants. Journal of Business 73: 661–694.

Burns, N., and S. Kedia. 2006. The impact of performance-based compensation on misreporting. Journal of Financial Economics 79: 35–67.

Campbell, J. Y., and L. Hentschel. 1992. No news is good news: an asymmetric model of changing volatility in stock returns. Journal of Financial Economics 31: 281–318.

Carpenter, J. 2000. Does option compensation increase managerial risk appetite? Journal of Finance 55: 2311–2331.

Chen, S., D. Matsumoto, and S. Rajgopal. 2011. Is silence golden? An empirical analysis of firms that stop giving quarterly earnings guidance. Journal of Accounting and Economics 51(1-2): 134–150.

Chen, Y., F. Gul, M. Veeraraghavan, and L. Zolotoy. 2015. Executive equity risk-taking incentives and audit service pricing. The Accounting Review 90(6): 2205–2234.

Cheng, Q., and K. Lo. 2006. Insider trading and voluntary disclosures. Journal of Accounting Research 44: 815–848.

Cheng, Q., and D. Farber. 2008. Earnings restatements, changes in CEO compensation, and firm performance. The Accounting Review 83: 1217–1250.

Cheng, Q., and T. D. Warfield. 2005. Equity incentives and earnings management. The Accounting Review 80: 441–476.
Christie, A. A. 1982. The stochastic behavior of common stock variances: value, leverage, and interest rate effects. Journal of Financial Economics 10: 407–432.
Cohen, D., A. Dey, and T. Z. Lys. 2008. Real and accrual-based earnings management in the pre- and post-Sarbanes-Oxley periods. The Accounting Review 83(3): 757–787.
Coles, J., N. Daniel, and L. Naveen. 2006. Managerial incentives and risk-taking. Journal of Financial Economics 79: 431–468.
Cooper, M.J., H. Gulen, and P. R. Rau. 2016. Performance for pay? The relation between CEO incentive compensation and future stock price performance. Working paper. Available at SSRN.
Core, J. E. 2001. A review of the empirical disclosure literature: discussion. Journal of Accounting and Economics 31: 441–456.
Core, J. E., and W. Guay. 1999. The use of equity grants to manage optimal equity incentive levels. Journal of Accounting and Economics 28: 151–184.
Core, J. E., and W. Guay. 2002. Estimating the value of employee stock option portfolios and their sensitivities to price and volatility. Journal of Accounting Research 40: 613–630.
Demsetz, H., and K. Lehn. 1985. The structure of corporate ownership: Causes and consequences. Journal of Political Economy 93: 1155–1177.
Diamond, D. 1985. Optimal release of information by firms. Journal of Finance 40: 1071–1094.
Diamond, D., and R. Verrecchia. 1991. Disclosure, liquidity, and the cost of capital. Journal of Finance 46: 1325–1359.
Dye, R. 1985. Disclosure of nonproprietary information. Journal of Accounting Research 23: 123–145.
Efendi, J., A. Srivastava, and E. Swanson. 2007. Why do corporate managers misstate financial statements? The role of option compensation and other factors. Journal of Financial Economics 85: 667–708.
Erickson, M., M. Hanlon, and E. Maydew. 2006. Is there a link between executive equity incentives and accounting fraud? Journal of Accounting Research 44: 113–143.
Feng, M., W. Ge, S. Luo, and T. Shevlin. 2011. Why do CFOs become involved in material accounting manipulations? Journal of Accounting and Economics 51: 21–36.
Frankel, R., M. Johnson, and D. J. Skinner. 1999. An empirical examination of conference calls as a voluntary disclosure medium. Journal of Accounting Research 37(1): 133-150.
French, K.R., G. W. Schwert, and R. F. Stambaugh. 1987. Expected stock returns and volatility. Journal of Financial Economics 19: 3–29.
Graham, J. R., C. R. Harvey, and S. Rajgopal. 2005. The economic implications of corporate financial reporting. Journal of Accounting and Economics 40: 3–73.
Guay, W. R. 1999. The sensitivity of CEO wealth to equity risk: An analysis of the magnitude and determinants. Journal of Financial Economics 53: 43–71.
Hayes, R. M., M. Lemmon, and M. Qiu. 2012. Stock options and managerial incentives for risk taking: Evidence from FAS123R. Journal of Financial Economics 105: 174–190.
Healy, P. M., and K. G. Palepu. 2001. Information asymmetry, corporate disclosure, and the capital markets: A review of empirical disclosure literature. Journal of Accounting Economics 31: 405–440.
Hsieh, P., T. Koller, and S. R. Rajan. 2006. The misguided practice of earnings guidance. McKinsey on Finance.
Jensen, M., and W. Meckling. 1976. Theory of the firm: managerial behavior, agency costs, and ownership structure. Journal of Financial Economics 3: 305–360.
Kim, Y., H. Li, and S. Li. 2015. CEO equity incentives and audit fees. Contemporary Accounting Research 32(2): 608–638.
Kim, I., and D. J. Skinner. 2012. Measuring securities litigation risk. Journal of Accounting and Economics 53: 290–310.
Kim, O., and R. Verrecchia. 1991. Trading volume and price reactions to public announcements. Journal of Accounting Research 29: 302–321.
Kim, O., and R. Verrecchia. 1994. Market liquidity and volume around earnings announcements. Journal of Accounting and Economics 17: 41–67.
Knopf, J., J. Nam Jr., and J. Thornton. 2002. The volatility and price sensitivities of managerial stock option portfolios and corporate hedging. Journal of Finance 57: 801–814.

Kothari, S. P., X. Li, and J. E. Short. 2009. The effect of disclosures by management, analysts, and business press on cost of capital, return volatility, and analyst forecasts: A study using content analysis. The Accounting Review 84(5): 1639–1670.
Kothari, S. P., S. Shu, and P. D. Wysocki. 2009. Do managers withhold bad news? Journal of Accounting Research 47(1): 241–276.
Lang, M. H., and R. J. Lundholm. 1993. Cross-sectional determinants of analyst ratings of corporate disclosures. Journal of Accounting Research 31(2): 246–271.
Lang, M. H., and R. J. Lundholm. 2000. Voluntary disclosure and equity offerings: Reducing information asymmetry or hyping the stock? Contemporary Accounting Research 17(4): 623–662.
Lambert, R., D. Larcker, and R. Verrecchia. 1991. Portfolio considerations in valuing executive compensation. Journal of Accounting Research 29: 129–149.
Leuz, C., and C. Schrand. 2018. Disclosure and the cost of capital: Evidence from firms' responses to the Enron shock. Working Paper. Available at SSRN.
Lewellen, K. 2006. Financing decisions when managers are risk averse. Journal of Financial Economics 82: 551–589.
Lewellen, J., and J. Shanken. 2002. Learning, asset pricing, and market efficiency. Journal of Finance 57: 1113–1145.
Merton, R. 1973. Theory of rational option pricing. Bell Journal of Economics and Management Science 4: 141–183.
Nagar, V., D. Nanda, and P. Wysocki. 2003. Discretionary disclosure and stock-based incentives. Journal of Accounting and Economics 34: 283–309.
Nelson, D. B. 1991. Conditional heteroskedasticity in asset returns: A new approach. Econometrica 59: 347–370.
Nelson, D. B., and C. Q. Cao. 1992. Inequality constraints in the univariate GARCH model. Journal of Business and Economic Statistics 10: 229–235.
Pae, S., C. J. Song, and A. C. Yi. 2015. Career concerns and management earnings guidance. Contemporary Accounting Research 33(3): 1172–1198.
Pastor, L., and P. Veronesi. 2003. Stock valuation and learning about profitability. Journal of Finance 58: 1749–1789.
Pindyck, R. S. 1984. Risk, inflation, and the stock market. American Economic Review 74: 335–351.
Rajgopal, S., and T. Shevlin. 2002. Empirical evidence on the relation between stock option compensation and risk taking. Journal of Accounting and Economics 33: 145–171.
Rogers, J. L. 2008. Disclosure quality and management trading incentives. Journal of Accounting Research 46: 1265–1296.
Rogers, J., D. Skinner, and A. Van Buskirk. 2009. Earnings guidance and market uncertainty. Journal of Accounting and Economics 48: 90–109.
Rogers, J. L., and P. C. Stocken. 2005. Credibility of management forecasts. The Accounting Review 80: 1233–1260.
Ross, S. 2004. Compensation, incentives, and the duality of risk aversion and riskiness. Journal of Finance 59: 207–225.
Schwert, G.W. 1989. Why does stock volatility change over time? Journal of Finance 44: 1115–1153.
Skinner, D. J. 1994. Why firms voluntarily disclose bad news. Journal of Accounting Research 32: 38–60.
Smith, C., and R. Stulz. 1985. The determinants of firms' hedging policies. The Journal of Financial and Quantitative Analysis 20: 391–405.
Smith, C., and R. Watts. 1992. The investment opportunity set and corporate financing, dividends, and compensation policies. Journal of Financial Economics 32: 263–292.
Soffer, L.C., S. R. Thiagarajan, and B. R. Walther. 2000. Earnings preannouncement strategies. Review of Accounting Studies 5: 5–26.
Subramanyam, K. R. 1996. Uncertain precision and price reactions to information. The Accounting Review 71: 207–220.

APPENDIX A. Variable Definition

Main Variables	
Vega_CEO	Natural logarithm of one plus the change in the million dollars of the CEO's option value for a 0.01 change in the annualized standard deviation of stock returns as of the end of the fiscal year *t*-1.
Δ5d_RealVol	Natural logarithm of the ratio of the standard deviation of market-adjust daily returns over 5 day's *forward* window beginning three days after the MF announcement date to the standard deviation of market-adjust daily returns over 5 day's *backward* window ending three days before the MF announcement date.
Δ10d_RealVol	Natural logarithm of the ratio of the standard deviation of market-adjust daily returns over 10 day's *forward* window beginning three days after the MF announcement date to the standard deviation of market-adjust daily returns over 10 day's *backward* window ending three days before the MF announcement date.
Δ15d_RealVol	Natural logarithm of the ratio of the standard deviation of market-adjust daily returns over 15 day's *forward* window beginning three days after the MF announcement date to the standard deviation of market-adjust daily returns over 15 day's *backward* window ending three days before the MF announcement date.
MF	An indicator variable, which equals one if the firm releases at least one MF during the fiscal year, and zero otherwise.
Freq_MF	Natural logarithm of one plus the total numbers of MFs released by a firm during the fiscal year.
Freq_5dRVolInc_MF	Natural logarithm of one plus the total number of the management earnings forecasts that are followed by a 5-day realized market-adjusted return volatility increase (measured by *Δ5d_RealVol>0*) released by a firm during a fiscal year.
Freq_10dRVolInc_MF	Natural logarithm of one plus the total number of the management earnings forecasts that are followed by a 10-day realized market-adjusted return volatility increase (measured by *Δ10d_RealVol>0*) released by a firm during a fiscal year.
Freq_15dRVolInc_MF	Natural logarithm of one plus the total number of the management earnings forecasts that are followed by a 15-day realized market-adjusted return volatility increase (measured by *Δ15d_RealVol>0*) released by a firm during a fiscal year.
%_5dRVolInc_MF	The ratio of the number of the management earnings forecasts that are followed by a 5-day realized market-adjusted return volatility increase (measured by *Δ5d_RealVol>0*) to the sum of one plus the total number of management earnings forecasts released by a firm during a fiscal year.
%_10dRVolInc_MF	The ratio of the number of the management earnings forecasts that are followed by a 10-day realized market-adjusted return volatility increase (measured by *Δ10d_RealVol>0*) to the sum of one plus the total number of management earnings forecasts released by a firm during a fiscal year.
%_15dRVolInc_MF	The ratio of the number of the management earnings forecasts that are followed by a 15-day realized market-adjusted return volatility increase (measured by *Δ15d_RealVol>0*) to the sum of one plus the total number of management earnings forecasts released by a firm during a fiscal year.
AnnΔ5dRVol	The average of the 5-day realized market-adjusted return volatility changes, *Δ5d_RealVol,* surrounding all MFs released by a firm during the year. If no MFs are issued during the year, it is set to be zero.
AnnΔ10dRVol	The average of the 10-day realized market-adjusted return volatility changes, *Δ10d_RealVol,* surrounding all MFs released by a firm during the year. If no MFs are issued during the year, it is set to be zero.
AnnΔ15dRVol	The average of the 15-day realized market-adjusted return volatility changes, *Δ15d_RealVol,* surrounding all MFs released by a firm during the year. If no MFs are issued during the year, it is set to be zero.
Vega_CEOCFO	Natural logarithm of one plus the sum of change in the million dollars of the CEO's and CFO's option value for a 0.01 change in the annualized standard deviation of stock

	returns as of the end of the fiscal year.
Vega_TOP5	Natural logarithm of one plus the sum of change in the million dollars of the top five executives' option value for a 0.01 change in the annualized standard deviation of stock returns as of the end of the fiscal year.
D_Vega	Decile rank of CEO vega (*Vega_CEO*)
Sell	An indicator variable, which equals one if the CEO sells options within 15 days after making an earnings forecast, and zero otherwise.
D_Δ5dRVol	Decile rank of the 5-day realized market-adjusted return volatility changes, *Δ5d_RealVol* surrounding the management earnings forecast.
D_Δ10dRVol	Decile rank of the 10-day realized market-adjusted return volatility changes, *Δ10d_RealVol* surrounding the management earnings forecast.
D_Δ15dRVol	Decile rank of the 15-day realized market-adjusted return volatility changes, *Δ15d_RealVol* surrounding the management earnings forecast.
Control Variables	
Delta_CEO	Natural logarithm of one plus the change in CEO's stock and option value in million dollars for a 1% change in stock price as of the previous fiscal year end.
CashComp_CEO	Natural logarithm of one plus the sum of CEO's salary and bonus compensation in thousand dollars in the previous fiscal year.
Age_CEO	Natural logarithm of one plus CEO's age as of the previous fiscal year end.
Tenure_CEO	Natural logarithm of one plus the number of years the person serves as the CEO of the firm as of the previous fiscal year end.
Size	Natural logarithm of firm's market value at the end of previous fiscal year.
ROA	Firm's return on assets at the end of previous fiscal year, measured as income before extraordinary items, scaled by total assets.
Firmage	Natural logarithm of one plus the number of years since the firm became a public firm.
Capx	The amount of capital expenditures spent in the previous fiscal year, deflated by total assets.
Sgrow	Sales growth ratio. Measured as the natural logarithm of pre-MF year's total sales over the previous year's total sales.
MTB	The firm's market value to the book value of equity at the end of previous fiscal year.
LEV	Firm's leverage. Measured as the sum of long-term debt and short-term debt, deflated by total assets at the end of previous fiscal year.
Vol_Mon	Standard deviation of the firm's monthly stock returns during the previous fiscal year.
Equ_Iss	An indicator variable, which equals one if the firm issues equity during the fiscal year and zero otherwise.
LTDebt_Iss	An indicator variable, which equals one if the firm issues long term debt during the fiscal year and zero otherwise.
LitRisk	The probability of litigation risk of the facial year before management forecasts estimated using a logit model following Kim and Skinner (2012).
Loss	An indicator variable, which equals one if the firm experience a loss (*NI<0*) in the fiscal year before management forecasts.
AnnMF	Target's ratio of net liquid assets (total current assets – current liabilities) to total assets at the fiscal year-end before the acquisition announcement. Target's sales growth ratio. Measured as the natural logarithm of target's total sales at the fiscal year-end before the acquisition announcement over the previous year's total sales.
LongHR	An indicator variable which equals one if the gap between the earnings forecast announcement date and forecast ending period is longer than a year, and zero otherwise.
LossMF	An indicator variable which equals one if the management forecast amount is a negative number, and zero otherwise.
NegSurp	An indicator variable which equals one if management forecast amount is less than the amount of most recent analysis consensus ("median" number of analysts' forecasts).
Abs_MFSurp	The absolute value of the difference between management forecast amount and the median of the amount of analysts' forecasts.

Bundle	An indicator variable which equals one if the management forecast is bundled with earnings announcement, i.e., the earnings forecast is released within (-2, +2) days surrounding an earnings announcement, and zero otherwise.
SUE	The amount of earnings surprise (i.e., the difference between earnings and most recent analyst forecasts consensus before earnings announcement scaled by stock price at the fiscal period end) if the management forecast is bundled with an earnings announcement, zero if management forecast is not bundled with earnings announcement.
AF	Natural logarithm of one plus the number of analysts following the firm within 90 days before a management forecast (*AF01*) or at the fiscal year end before the earnings forecast (*AF02*).
AD	Standard deviation of the amounts of analyst forecasts within the most recent quarter before management forecast.
Pre_5dRVol	Standard deviation of market-adjust daily returns over 5 day's backward window measured at three days before MF announcement date.
Pre_10dRVol	Standard deviation of market-adjust daily returns over 10 day's backward window measured at three days before management forecast announcement date.
Pre_15dRVol	Standard deviation of market-adjust daily returns over 15 day's backward window measured at three days before management forecast announcement date.
Delta_CEOCFO	Natural logarithm of one plus the sum of change in CEO's and CFO's stock and option value in million dollars for a 1% change in stock price as of the fiscal year end before the management forecast announcement.
CashComp_CEOCFO	Natural logarithm of one plus the average of CEO's and CFO's salary and bonus compensation in thousand dollars in the fiscal year before the management forecast announcement.
Age_CEOCFO	Natural logarithm of one plus the average CEO's and CFO's ages as of the fiscal year end before the management forecast announcement.
Tenure_CEOCFO	Natural logarithm of one plus the average number of years the person serves as the current positions as CEO or CFO in the firm as of the fiscal year end before the management forecast announcement.
Delta_TOP5	Natural logarithm of one plus the sum of change in top five executives' stock and option value in million dollars for a 1% change in stock price as of the fiscal year end before the management forecast announcement.
CashComp_TOP5	Natural logarithm of one plus the average of top five executives' salary and bonus compensation in thousand dollars in the fiscal year before the management forecast announcement.
Age_TOP5	Natural logarithm of one plus the average top five executives' ages as of the fiscal year end before the management forecast announcement.
Tenure_TOP5	Natural logarithm of one plus the average number of years the person serves as the current positions as one of the top five executives in the firm as of the fiscal year end before the management forecast announcement.
FAS123R	An indicator variable, which is equal to one if the fiscal year end before management forecasts is in the period after FAS123R took effect (Dec, 2005), zero otherwise.
TG	An indicator variable, which is equal to one if the firm is within the treatment group defined as "high accounting impact firm" if the firm reported above-median pro forma option expense in the pre-FAS123R period of from 2002 to 2004, and zero otherwise.

Table 1. Descriptive Statistics

Panel A Sample 1 (Management Earnings Forecast Sample, N=54,879)

	N	Mean	Std. Dev	Q1	Median	Q3
Δ5d_RealVol	54,828	0.0017	0.6747	-0.4387	0.0025	0.4458
Δ10d_RealVol	54,795	-0.0201	0.5042	-0.3483	-0.0178	0.3065
Δ15d_RealVol	54,760	-0.0321	0.4434	-0.3144	-0.0318	0.2514
Vega_CEO	54,879	0.1536	0.2044	0.0198	0.0745	0.2005
Delta_CEO	54,879	0.4161	0.4493	0.1146	0.2598	0.5543
CashComp_CEO	54,879	6.9206	0.6121	6.5589	6.8962	7.2006
Age_CEO	54,879	4.0304	0.1177	3.9512	4.0431	4.1109
Tenure_CEO	54,879	2.1834	0.5644	1.7918	2.3026	2.6391
Size	54,879	8.0803	1.5004	6.9726	7.9720	9.1197
Firmage	54,879	3.0599	0.7847	2.4849	3.0445	3.6636
Capx	54,879	0.0440	0.0371	0.0179	0.0334	0.0593
Sgrow	54,879	0.0775	0.1577	0.0038	0.0702	0.1457
ROA	54,879	0.0575	0.0666	0.0288	0.0565	0.0914
MTB	54,879	3.3726	3.5724	1.6444	2.4744	3.8531
LEV	54,879	0.2146	0.1642	0.0711	0.2051	0.3253
Vol_Mon	54,879	0.0939	0.0503	0.0584	0.0817	0.1152
Equ_Iss	54,879	0.8927	0.3095	1.0000	1.0000	1.0000
LTDebt_Iss	54,879	0.6103	0.4877	0.0000	1.0000	1.0000
LitRisk	54,879	0.0362	0.0247	0.0198	0.0291	0.0439
AnnMF	54,879	0.7721	0.4195	1.0000	1.0000	1.0000
LongHR	54,879	0.0115	0.1067	0.0000	0.0000	0.0000
LossMF	54,879	0.0291	0.1681	0.0000	0.0000	0.0000
NegSurp	54,879	0.5138	0.4998	0.0000	1.0000	1.0000
Abs_MFSurp	54,879	0.0043	0.0148	0.0003	0.0010	0.0028
Bundle	54,879	0.7001	0.4582	0.0000	1.0000	1.0000
SUE	54,879	0.0007	0.0023	0.0000	0.0000	0.0011
AF01	54,879	2.1627	0.6625	1.7918	2.1972	2.7081
AD	54,879	0.0024	0.0049	0.0005	0.0010	0.0023
Pre_5dRVol	54,847	0.0153	0.0118	0.0078	0.0121	0.0189
Pre_10dRVol	54,847	0.0161	0.0111	0.0090	0.0130	0.0196
Pre_15dRVol	54,847	0.0164	0.0108	0.0094	0.0135	0.0199

Panel B Sample 2 (firm-year sample, N=25,168)

	N	Mean	Std. Dev	Q1	Median	Q3
MF	25,168	0.5296	0.4991	0.0000	1.0000	1.0000
Freq_MF	25,168	0.9759	0.9984	0.0000	0.6931	1.9459
Freq_5dRVolInc_MF	25,168	0.5789	0.6481	0.0000	0.0000	1.0986
Freq_10dRVolInc_MF	25,168	0.5664	0.6392	0.0000	0.0000	1.0986
Freq_15dRVolInc_MF	25,168	0.5534	0.6278	0.0000	0.0000	1.0986
%_5dRVolInc_MF	25,168	0.1946	0.2957	0.0000	0.0000	0.3333
%_10dRVolInc_MF	25,168	0.1886	0.2865	0.0000	0.0000	0.3333
%_15dRVolInc_MF	25,168	0.1826	0.2787	0.0000	0.0000	0.3333
Sporadic_MF	25,168	0.1744	0.3795	0.0000	0.0000	0.0000
NegSurp_MF	25,168	0.3568	0.4791	0.0000	0.0000	1.0000

Badnews_MF	25,168	0.3016	0.4590	0.0000	0.0000	1.0000
NotPoint_MF	25,168	0.4733	0.4993	0.0000	0.0000	1.0000
ShortHR_MF	25,168	0.5213	0.4996	0.0000	1.0000	1.0000
AnnΔ5dRVol	25,168	0.0079	0.2896	-0.0266	0.0000	0.0379
AnnΔ10dRVol	25,168	-0.0044	0.2143	-0.0415	0.0000	0.0089
AnnΔ15dRVol	25,168	-0.0106	0.1910	-0.0474	0.0000	0.0000
Vega_CEO	25,168	0.1087	0.1684	0.0081	0.0410	0.1319
Delta_CEO	25,168	0.3579	0.4589	0.0719	0.1869	0.4515
CashComp_CEO	25,168	6.7414	0.899	6.3986	6.7598	7.0987
Age_CEO	25,168	4.0337	0.1259	3.9512	4.0431	4.1109
Tenure_CEO	25,168	2.1219	0.5816	1.7918	2.1972	2.5649
Size	25,168	7.5346	1.6352	6.4361	7.4149	8.5510
Firmage	25,168	2.9802	0.7614	2.4849	2.9957	3.5553
Capx	25,168	0.0444	0.0477	0.0138	0.0301	0.0576
Sgrow	25,168	0.0610	0.2003	-0.0206	0.0610	0.1488
ROA	25,168	0.0342	0.1034	0.0104	0.0423	0.0809
MTB	25,168	2.8654	3.4287	1.3578	2.0988	3.4368
LEV	25,168	0.2156	0.1871	0.0491	0.1916	0.3299
Vol_Mon	25,168	0.1091	0.0656	0.0650	0.0921	0.1332
Loss	25,168	0.1792	0.3835	0.0000	0.0000	0.0000
AF02	25,168	1.3506	0.9157	0.6931	1.386	2.0794
Equ_Iss	25,168	0.8226	0.3821	1.0000	1.0000	1.0000
LTDebt_Iss	25,168	0.5600	0.4964	0.0000	1.0000	1.0000
LitRisk	25,168	0.0347	0.0285	0.0172	0.0260	0.0412

Panel A (Panel B) reports descriptive statistics for the variables used in the tests based on management earnings forecast sample (Vega (compensation)-based firm-year sample). All variables are defined as in Appendix A. All continuous variables are winsorized at the 1% and 99% levels. Superscripts a, b, and c represent the significance at the 0.01, 0.05, and 0.10 (two-sided) significance levels, respectively.

Table 2. Equity Risk Incentives (Vega) and Volatility Changes Surrounding Management Earnings Forecasts

	(1) *Δ5d_RealVol*	(2) *Δ10d_RealVol*	(3) *Δ15d_RealVol*
Vega_CEO	0.055[b]	0.054[a]	0.055[a]
	(2.43)	(3.03)	(3.43)
Delta_CEO	0.020[b]	0.016[b]	0.017[b]
	(1.99)	(2.05)	(2.24)
CashComp_CEO	-0.007	-0.006	-0.008[c]
	(-1.05)	(-1.28)	(-1.67)
Age_CEO	-0.009	-0.011	-0.009
	(-0.34)	(-0.52)	(-0.44)
Tenure_CEO	-0.024[a]	-0.022[a]	-0.023[a]
	(-3.89)	(-4.51)	(-5.07)
Size	-0.055[a]	-0.048[a]	-0.044[a]
	(-13.27)	(-14.55)	(-14.71)
Firmage	-0.013[b]	-0.008[c]	-0.009[b]
	(-2.48)	(-1.92)	(-2.32)
Capx	0.357[a]	0.212[b]	0.225[a]
	(3.18)	(2.52)	(2.93)
Sgrow	0.051[b]	0.055[a]	0.051[a]
	(2.45)	(3.22)	(3.34)
ROA	-0.285[a]	-0.248[a]	-0.243[a]
	(-4.97)	(-5.69)	(-6.12)
MTB	0.003[a]	0.003[a]	0.002[a]
	(2.94)	(4.00)	(3.92)
LEV	-0.013	-0.005	-0.010
	(-0.57)	(-0.26)	(-0.61)
Vol_Mon	1.637[a]	1.426[a]	1.265[a]
	(18.64)	(20.76)	(19.69)
Equ_Iss	-0.033[a]	-0.023[a]	-0.020[a]
	(-3.38)	(-3.00)	(-2.75)
LTDebt_Iss	0.012[c]	0.010[b]	0.003
	(1.93)	(1.97)	(0.81)
LitRisk	0.371[b]	0.341[a]	0.435[a]
	(2.37)	(2.66)	(3.62)
AnnMF	-0.037[a]	-0.044[a]	-0.048[a]
	(-4.57)	(-6.77)	(-7.90)
LongHR	-0.023	-0.068[a]	-0.054[a]
	(-1.00)	(-3.88)	(-3.33)
LossMF	0.142[a]	0.142[a]	0.140[a]
	(6.28)	(8.19)	(8.75)
NegSurp	0.011[b]	0.012[a]	0.010[a]
	(2.00)	(2.86)	(2.67)
Abs_MFSurp	1.334[a]	1.168[a]	1.073[a]
	(3.13)	(3.40)	(3.09)
Bundle	0.038[a]	0.001	-0.011[b]
	(5.93)	(0.23)	(-2.32)
SUE	-0.835	-1.632[c]	-2.012[b]
	(-0.65)	(-1.69)	(-2.36)

AF01	0.003	-0.000	-0.002
	(0.48)	(-0.05)	(-0.61)
AD	6.000[a]	4.809[a]	4.061[a]
	(6.20)	(6.20)	(5.61)
Pre_5dRVol	-35.212[a]		
	(-74.26)		
Pre_10dRVol		-28.953[a]	
		(-70.77)	
Pre_15dRVol			-26.188[a]
			(-66.19)
Ind Fix	Yes	Yes	Yes
Year Fix	Yes	Yes	Yes
Const	1.199[a]	0.999[a]	0.936[a]
	(9.75)	(10.08)	(10.25)
N	54,828	54,795	54,760
R^2	0.283	0.278	0.264

This table presents the results from the regression of volatility changes surrounding management earnings forecast, i.e., *Δ5d_RealVol, Δ10d_RealVol, or Δ15d_RealVol* on CEO vega (*Vega_CEO*). The variables are defined in Appendix A. Standard errors are clustered within firm level. T-statistics are in parentheses. Superscripts a, b, and c indicate the significance of parameter estimates at the 1, 5, and 10 % (two-sided) significance levels, respectively.

Table 3. Instrumental Variable Approach

	(1) *Δ5d_RealVol*	(2) *Δ10d_RealVol*	(3) *Δ15d_RealVol*
Fitted_Vega_CEO	1.127[a]	1.032[a]	1.054[a]
	(3.05)	(3.15)	(3.30)
Delta_CEO	-0.194[b]	-0.175[a]	-0.176[a]
	(-2.47)	(-2.59)	(-2.67)
CashComp_CEO	-0.134[a]	-0.122[a]	-0.121[a]
	(-3.78)	(-3.85)	(-3.99)
Age_CEO	0.023	0.018	0.024
	(0.49)	(0.44)	(0.60)
Tenure_CEO	-0.028[a]	-0.024[a]	-0.027[a]
	(-3.06)	(-3.14)	(-3.87)
Size	-0.081[a]	-0.071[a]	-0.069[a]
	(-6.24)	(-6.24)	(-6.27)
Firmage	-0.010	-0.008	-0.007
	(-1.18)	(-1.14)	(-1.03)
Capx	0.406[b]	0.283[c]	0.290[b]
	(2.28)	(1.90)	(2.01)
Sgrow	0.115[a]	0.106[a]	0.110[a]
	(2.99)	(3.14)	(3.50)
ROA	-0.243[a]	-0.204[a]	-0.221[a]
	(-2.80)	(-2.87)	(-3.39)
MTB	0.004[b]	0.003[a]	0.003[a]
	(2.33)	(2.63)	(2.81)
LEV	0.086[b]	0.066[b]	0.058[c]
	(2.28)	(2.10)	(1.91)
Vol_Mon	1.414[a]	1.248[a]	1.070[a]
	(10.96)	(12.01)	(10.64)
Equ_Iss	-0.073[a]	-0.056[a]	-0.055[a]
	(-4.25)	(-3.88)	(-4.10)
LTDebt_Iss	0.027[b]	0.025[a]	0.018[b]
	(2.54)	(2.76)	(2.15)
LitRisk	0.458[c]	0.359[c]	0.410[c]
	(1.82)	(1.65)	(1.87)
AnnMF	-0.024[c]	-0.033[a]	-0.035[a]
	(-1.94)	(-3.10)	(-3.52)
LongHR	0.011	-0.036	-0.012
	(0.38)	(-1.50)	(-0.51)
LossMF	0.120[a]	0.123[a]	0.126[a]
	(4.19)	(5.47)	(6.05)
NegSurp	0.012[c]	0.013[b]	0.010[b]
	(1.72)	(2.41)	(2.05)
Abs_MFSurp	1.478[a]	1.366[a]	1.264[a]
	(3.54)	(3.99)	(3.71)
Bundle	0.042[a]	0.002	-0.009
	(4.72)	(0.28)	(-1.35)
SUE	-3.393[b]	-3.646[a]	-3.797[a]

	(-2.05)	(-2.88)	(-3.32)
AF01	-0.015[c]	-0.014[c]	-0.013[c]
	(-1.70)	(-1.95)	(-1.92)
AD	4.283[a]	3.559[a]	2.902[a]
	(4.16)	(4.10)	(3.52)
Pre_5dRVol	-33.904[a]		
	(-60.14)		
Pre_10dRVol		-27.492[a]	
		(-58.01)	
Pre_15dRVol			-24.730[a]
			(-53.20)
Ind Fix, Year Fix, Const	Yes	Yes	Yes
N	36,304	36,284	36,261
R^2	0.232	0.201	0.161

This table presents the second-stage regression results from replicating previous tests in Table 2 by using *Fitted_Vega_CEO*, which is the fitted value of *Vega_CEO* obtained from the first stage regression explained in the Section 4.2.1. Other variables are defined in Appendix A. Standard errors are heteroscedasticity-adjusted in all models and clustered within the firm level. T-statistics are in parentheses. Superscripts a, b, and c indicate the significance of parameter estimates at the 1, 5, and 10 % (two-sided) significance levels, respectively.

Table 4. Difference-in-Differences Analysis with CEO Vega-Decreasing Shock

	(1) *Δ5d_RealVol*	(2) *Δ10d_RealVol*	(3) *Δ15d_RealVol*
TG	0.017	0.027[a]	0.018[b]
	(1.30)	(2.72)	(1.96)
FAS123R	0.334[a]	0.291[a]	0.255[a]
	(2.64)	(3.28)	(3.40)
FAS123R×TG	-0.035[b]	-0.037[a]	-0.026[a]
	(-2.52)	(-3.45)	(-2.65)
Delta_CEO	0.028[a]	0.025[a]	0.025[a]
	(3.07)	(3.39)	(3.67)
CashComp_CEO	-0.003	-0.003	-0.004
	(-0.54)	(-0.55)	(-0.88)
Age_CEO	-0.012	-0.013	-0.011
	(-0.43)	(-0.62)	(-0.56)
Tenure_CEO	-0.023[a]	-0.022[a]	-0.022[a]
	(-3.65)	(-4.41)	(-4.94)
Size	-0.053[a]	-0.047[a]	-0.042[a]
	(-12.98)	(-14.23)	(-14.20)
Firmage	-0.012[b]	-0.007[c]	-0.008[b]
	(-2.33)	(-1.69)	(-2.13)
Capx	0.348[a]	0.200[b]	0.218[a]
	(3.10)	(2.37)	(2.82)
Sgrow	0.046[b]	0.051[a]	0.048[a]
	(2.24)	(3.05)	(3.12)
ROA	-0.284[a]	-0.250[a]	-0.244[a]
	(-4.97)	(-5.78)	(-6.19)
MTB	0.003[a]	0.003[a]	0.002[a]
	(2.80)	(3.78)	(3.72)
LEV	-0.012	-0.002	-0.009
	(-0.50)	(-0.11)	(-0.53)
Vol_Mon	1.623[a]	1.409[a]	1.253[a]
	(18.48)	(20.51)	(19.48)
Equ_Iss	-0.031[a]	-0.021[a]	-0.018[b]
	(-3.21)	(-2.80)	(-2.52)
LTDebt_Iss	0.012[c]	0.009[c]	0.003
	(1.81)	(1.90)	(0.71)
LitRisk	0.368[b]	0.327[b]	0.427[a]
	(2.33)	(2.53)	(3.54)
AnnMF	-0.038[a]	-0.045[a]	-0.048[a]
	(-4.70)	(-6.79)	(-7.91)
LongHR	-0.024	-0.069[a]	-0.055[a]
	(-1.05)	(-3.96)	(-3.40)
LossMF	0.143[a]	0.143[a]	0.140[a]
	(6.33)	(8.21)	(8.79)
NegSurp	0.011[b]	0.012[a]	0.010[a]
	(2.00)	(2.90)	(2.69)
Abs_MFSurp	1.325[a]	1.161[a]	1.064[a]
	(3.08)	(3.34)	(3.03)
Bundle	0.038[a]	0.001	-0.011[b]

	(5.95)	(0.22)	(-2.34)
SUE	-0.730	-1.523	-1.919[b]
	(-0.57)	(-1.57)	(-2.25)
AF01	0.003	0.000	-0.002
	(0.62)	(0.08)	(-0.47)
AD	6.039[a]	4.867[a]	4.114[a]
	(6.22)	(6.28)	(5.68)
Pre_5dRVol	-35.226[a]		
	(-74.39)		
Pre_10dRVol		-28.967[a]	
		(-70.88)	
Pre_15dRVol			-26.190[a]
			(-66.25)
Const	1.154[a]	0.957[a]	0.896[a]
	(9.40)	(9.71)	(9.87)
N	54,854	54,821	54,786
R^2	0.283	0.278	0.264

This table presents the difference-in-differences analysis results from the regression of volatility changes surrounding MF disclosure on the interaction of *FAS123R* and *TG*. *FAS123R* equals one if the fiscal year is in the post-FAS123R period, and *TG* represents treatment firms which are firms affected more by FAS123R as defined in Section 4.2.2. Other variables are defined in Appendix A. Standard errors are heteroscedasticity-adjusted in all models and clustered within firm level. T-statistics are in parentheses. Superscripts a, b, and c indicate the significance of parameter estimates at the 1, 5, and 10 % (two-sided) significance levels, respectively.

Table 5. Tests based on propensity score matched sample

	(1) *Δ5d_RealVol*	(2) *Δ10d_RealVol*	(3) *Δ15d_RealVol*
Vega_CEO	0.090[b]	0.067[b]	0.064[b]
	(2.42)	(2.15)	(2.33)
Delta_CEO	0.054[a]	0.048[a]	0.037[a]
	(3.58)	(3.87)	(3.25)
CashComp_CEO	-0.022	-0.015	-0.020[b]
	(-1.64)	(-1.46)	(-2.33)
Age_CEO	-0.112[c]	-0.078[c]	-0.027
	(-1.90)	(-1.70)	(-0.63)
Tenure_CEO	-0.048[a]	-0.040[a]	-0.042[a]
	(-3.32)	(-3.52)	(-4.08)
Size	-0.047[a]	-0.038[a]	-0.033[a]
	(-5.58)	(-5.73)	(-5.60)
Firmage	-0.003	-0.004	0.000
	(-0.33)	(-0.55)	(0.06)
Capx	0.850[a]	0.748[a]	0.709[a]
	(2.75)	(3.21)	(3.13)
Sgrow	0.115[b]	0.061	0.061
	(2.14)	(1.44)	(1.57)
ROA	0.011	0.000	0.015
	(0.09)	(0.01)	(0.18)
MTB	0.002	0.004[a]	0.003[b]
	(1.06)	(2.96)	(2.09)
LEV	-0.012	0.005	-0.007
	(-0.24)	(0.12)	(-0.20)
Vol_Mon	1.720[a]	1.349[a]	1.209[a]
	(7.98)	(7.89)	(7.30)
Equ_Iss	-0.028	-0.015	-0.010
	(-1.60)	(-1.11)	(-0.78)
LTDebt_Iss	0.016	0.011	0.007
	(1.25)	(1.04)	(0.76)
LitRisk	0.673[b]	0.827[a]	0.788[a]
	(2.11)	(3.23)	(3.32)
AnnMF	-0.066[a]	-0.064[a]	-0.067[a]
	(-3.76)	(-4.56)	(-5.23)
LongHR	0.011	-0.065	-0.048
	(0.18)	(-1.59)	(-1.21)
LossMF	0.342[a]	0.265[a]	0.240[a]
	(3.60)	(3.58)	(4.06)
NegSurp	0.004	-0.000	0.004
	(0.32)	(-0.00)	(0.47)
Abs_MFSurp	3.683[a]	3.005[a]	2.961[a]
	(2.99)	(2.72)	(2.87)
Bundle	0.055[a]	0.016	0.019[c]
	(4.07)	(1.43)	(1.82)
SUE	1.559	0.195	-2.041

	(0.42)	(0.07)	(-0.91)
AF01	0.008	0.007	0.010
	(0.66)	(0.80)	(1.22)
AD	8.040[a]	6.029[a]	4.247[b]
	(3.16)	(2.98)	(2.22)
Pre_5dRVol	-40.275[a]		
	(-30.84)		
Pre_10dRVol		-32.862[a]	
		(-30.86)	
Pre_15dRVol			-29.080[a]
			(-28.29)
Ind Fix, Year Fix, Const	Yes	Yes	Yes
N	16,514	16,514	16,514
R^2	0.281	0.341	0.311

This table presents the regression results from replicating previous tests in Table 2 based on propensity score matched sample constructed as explained in the Section 4.2.3. Other variables are defined in Appendix A. Standard errors are heteroscedasticity-adjusted in all models and clustered within the firm level. T-statistics are in parentheses. Superscripts a, b, and c indicate the significance of parameter estimates at the 1, 5, and 10 % (two-sided) significance levels, respectively.

Table 6. Equity Risk Incentives (Vega) and Frequency and Percentage of Volatility-increasing Management Earnings Forecasts

Panel A: Frequency of volatility increasing forecasts

	(1) *MF*	(2) *Freq_MF*	(3) *Freq_5dRVolInc_MF*	(4) *Freq_10dRVolInc_MF*	(5) *Freq_15dRVolInc_MF*
Vega_CEO	0.521[a]	0.442[a]	0.328[a]	0.322[a]	0.322[a]
	(3.73)	(4.79)	(5.63)	(5.68)	(5.80)
Delta_CEO	-0.319[a]	-0.173[a]	-0.113[a]	-0.108[a]	-0.104[a]
	(-5.35)	(-4.27)	(-4.71)	(-4.63)	(-4.52)
CashComp_CEO	0.023	0.024	0.011	0.010	0.007
	(1.01)	(1.61)	(1.35)	(1.19)	(0.81)
Age_CEO	-0.274[c]	-0.287[a]	-0.120[b]	-0.120[b]	-0.129[b]
	(-1.74)	(-2.85)	(-1.96)	(-2.00)	(-2.20)
Tenure_CEO	0.086[b]	0.055[b]	0.026[c]	0.020	0.021
	(2.44)	(2.41)	(1.87)	(1.46)	(1.55)
Size	0.149[a]	0.099[a]	0.049[a]	0.048[a]	0.046[a]
	(6.83)	(7.25)	(5.88)	(5.80)	(5.80)
Firmage	-0.130[a]	-0.072[a]	-0.033[b]	-0.030[b]	-0.032[b]
	(-3.94)	(-3.42)	(-2.50)	(-2.39)	(-2.54)
Capx	-1.633[a]	-0.811[b]	-0.591[a]	-0.611[a]	-0.590[a]
	(-2.83)	(-2.24)	(-2.73)	(-2.96)	(-2.87)
Sgrow	0.148[b]	0.140[a]	0.062[a]	0.058[a]	0.058[a]
	(2.49)	(3.87)	(2.66)	(2.58)	(2.60)
ROA	0.254	0.112	0.033	-0.000	0.020
	(1.25)	(0.96)	(0.44)	(-0.01)	(0.29)
MTB	0.000	0.003	0.001	0.001	0.001
	(0.10)	(0.82)	(0.65)	(0.47)	(0.67)
LEV	0.042	0.096	0.068	0.075[c]	0.072
	(0.34)	(1.26)	(1.46)	(1.65)	(1.63)
Vol_Mon	-1.322[a]	-0.968[a]	-0.623[a]	-0.657[a]	-0.695[a]
	(-5.44)	(-6.68)	(-6.66)	(-7.26)	(-7.83)
Equ_Iss	0.551[a]	0.312[a]	0.106[a]	0.103[a]	0.094[a]
	(12.40)	(11.34)	(6.41)	(6.32)	(5.92)
LTDebt_Iss	0.260[a]	0.158[a]	0.076[a]	0.074[a]	0.073[a]
	(8.29)	(7.94)	(6.15)	(6.14)	(6.20)
LitRisk	-2.825[a]	-1.604[a]	-1.147[a]	-1.141[a]	-0.990[a]
	(-3.98)	(-3.63)	(-4.37)	(-4.41)	(-3.86)
Loss	-0.234[a]	-0.160[a]	-0.105[a]	-0.102[a]	-0.093[a]
	(-5.69)	(-6.51)	(-6.75)	(-6.68)	(-6.26)
AF02	0.153[a]	0.098[a]	0.060[a]	0.059[a]	0.055[a]
	(6.61)	(6.67)	(6.51)	(6.53)	(6.17)
Ind Fix	Yes	Yes	Yes	Yes	Yes
Year Fix	Yes	Yes	Yes	Yes	Yes
Const	-1.054	0.447	0.229	0.277	0.378
	(-1.43)	(0.93)	(0.80)	(0.99)	(1.30)
N	25,168	25,168	25,168	25,168	25,168
R^2 or Pseudo R^2	0.220	0.291	0.232	0.231	0.228

Panel B: Percentage of volatility increasing forecasts

	(1) *%_5dRVolInc_MF*	(2) *%_10dRVolInc_MF*	(3) *%_15dRVolInc_MF*
Vega_CEO	0.111[a]	0.108[a]	0.105[a]

	(5.56)	(5.62)	(5.57)
Delta_CEO	-0.045[a]	-0.042[a]	-0.040[a]
	(-5.59)	(-5.44)	(-5.10)
CashComp_CEO	0.001	0.001	-0.000
	(0.45)	(0.21)	(-0.01)
Age_CEO	-0.016	-0.017	-0.022
	(-0.71)	(-0.81)	(-1.05)
Tenure_CEO	0.006	0.003	0.006
	(1.14)	(0.63)	(1.15)
Size	0.006[b]	0.006[b]	0.006[b]
	(2.15)	(2.07)	(2.02)
Firmage	-0.014[a]	-0.011[b]	-0.013[a]
	(-2.90)	(-2.45)	(-2.88)
Capx	-0.178[b]	-0.186[a]	-0.169[b]
	(-2.35)	(-2.61)	(-2.41)
Sgrow	0.026[b]	0.025[b]	0.022[b]
	(2.41)	(2.34)	(2.10)
ROA	0.018	-0.012	0.007
	(0.56)	(-0.37)	(0.24)
MTB	-0.000	-0.000	-0.000
	(-0.13)	(-0.21)	(-0.01)
LEV	0.027	0.021	0.020
	(1.49)	(1.26)	(1.19)
Vol_Mon	-0.216[a]	-0.222[a]	-0.229[a]
	(-5.08)	(-5.62)	(-5.82)
Equ_Iss	-0.073[a]	-0.072[a]	-0.072[a]
	(-7.82)	(-7.91)	(-8.12)
LTDebt_Iss	-0.012[b]	-0.010[b]	-0.009[c]
	(-2.46)	(-2.10)	(-1.92)
LitRisk	-0.251[b]	-0.258[b]	-0.206[c]
	(-2.35)	(-2.45)	(-1.93)
Loss	-0.039[a]	-0.040[a]	-0.034[a]
	(-5.35)	(-5.78)	(-4.99)
AF02	0.021[a]	0.021[a]	0.019[a]
	(5.62)	(5.86)	(5.43)
Ind Fix	Yes	Yes	Yes
Year Fix	Yes	Yes	Yes
Const	0.169[c]	0.185[b]	0.219[b]
	(1.76)	(1.97)	(2.33)
N	25,168	25,168	25,168
R^2	0.103	0.107	0.104

Panel A shows the results of frequency of volatility-increasing forecasts. Column (1) (Column (2)) shows the result from the regression of likelihood (frequency) of management earnings forecasts on CEO vega (*Vega_CEO*). Columns (3) - (5) of Panel A present the regression results of the frequency of volatility-increasing management earnings forecast (*Freq_5dRVolInc_MF, Freq_10dRVolInc_MF, Freq_15dRVolInc_MF*) on CEO vega (*Vega_CEO*). Panel B displays the results from the regression of the percentage of volatility-increasing management earnings forecast (*%_5dRVolInc_MF, %_10dRVolInc_MF, %_15dRVolInc_MF*) on CEO vega (*Vega_CEO*). The variables are defined in Appendix A. Standard errors are clustered within the firm level. T-statistics (or Z-statistics) for regressions are in parentheses. Superscripts a, b, and c indicate the significance of parameter estimates at the 1, 5, and 10 % (two-sided) significance levels, respectively.

Table 7. Risk Taking Incentives (Vega) and Certain Types of Management Earnings Forecasts

	(1) *Sporadic_MF*	(2) *NegSurp_MF*	(3) *Badnews_MF*	(4) *NotPoint_MF*	(5) *ShortHR_MF*
Vega_CEO	0.240[b]	0.321[a]	0.201[b]	0.328[a]	0.537[a]
	(2.35)	(3.10)	(2.24)	(2.59)	(3.91)
Delta_CEO	-0.116[a]	-0.225[a]	-0.182[a]	-0.298[a]	-0.312[a]
	(-2.83)	(-4.89)	(-4.47)	(-5.35)	(-5.27)
CashComp_CEO	0.017	-0.010	-0.006	0.019	0.022
	(1.10)	(-0.56)	(-0.40)	(0.99)	(1.00)
Age_CEO	0.102	-0.101	-0.131	-0.258[c]	-0.262[c]
	(0.89)	(-0.86)	(-1.19)	(-1.75)	(-1.68)
Tenure_CEO	0.012	0.045[c]	0.059[b]	0.083[b]	0.089[b]
	(0.46)	(1.67)	(2.37)	(2.50)	(2.55)
Size	0.039[b]	0.096[a]	0.080[a]	0.130[a]	0.136[a]
	(2.50)	(5.91)	(5.37)	(6.30)	(6.33)
Firmage	-0.051[b]	-0.083[a]	-0.080[a]	-0.110[a]	-0.123[a]
	(-2.29)	(-3.50)	(-3.72)	(-3.55)	(-3.79)
Capx	-0.823[b]	-0.990[b]	-0.824[b]	-1.420[a]	-1.532[a]
	(-2.11)	(-2.24)	(-2.01)	(-2.62)	(-2.70)
Sgrow	-0.036	0.090[c]	0.046	0.068	0.160[a]
	(-0.65)	(1.74)	(0.88)	(1.18)	(2.72)
ROA	0.139	0.197	0.323[c]	0.173	0.265
	(0.88)	(1.18)	(1.93)	(0.89)	(1.32)
MTB	0.001	-0.003	0.000	-0.002	0.001
	(0.20)	(-0.92)	(0.02)	(-0.44)	(0.14)
LEV	0.026	-0.016	-0.076	-0.014	0.029
	(0.31)	(-0.18)	(-0.90)	(-0.12)	(0.24)
Vol_Mon	0.615[a]	-0.911[a]	-0.560[b]	-1.488[a]	-1.429[a]
	(2.69)	(-4.23)	(-2.55)	(-6.07)	(-5.83)
Equ_Iss	0.245[a]	0.407[a]	0.325[a]	0.504[a]	0.546[a]
	(6.54)	(11.25)	(9.32)	(11.85)	(12.26)
LTDebt_Iss	0.122[a]	0.160[a]	0.157[a]	0.234[a]	0.243[a]
	(4.77)	(6.42)	(6.65)	(7.87)	(7.78)
LitRisk	-1.136[b]	-2.038[a]	-1.506[a]	-2.931[a]	-2.685[a]
	(-2.22)	(-3.64)	(-2.86)	(-4.41)	(-3.81)
Loss	-0.061	-0.152[a]	-0.181[a]	-0.225[a]	-0.231[a]
	(-1.50)	(-4.00)	(-4.95)	(-5.74)	(-5.65)
AF02	0.170[a]	0.088[a]	0.096[a]	0.126[a]	0.151[a]
	(9.26)	(4.93)	(5.64)	(5.87)	(6.64)
Ind Fix	Yes	Yes	Yes	Yes	Yes
Year Fix	Yes	Yes	Yes	Yes	Yes
Const	-2.522[a]	-1.453[a]	-1.822[a]	-0.968	-0.971
	(-4.04)	(-2.62)	(-3.53)	(-1.40)	(-1.33)
N	25,168	25,168	25,168	25,168	25,168
pseudo R^2	0.106	0.113	0.100	0.179	0.213

This table presents the results from the Probit regression of the likelihood of certain types of management earnings forecast (*Sporadic_MF, NegSurp_MF, Badnews_MF, NotPoint_MF, or ShortHR_MF*) on CEO vega (*Vega_CEO*). The variables are defined in Appendix A. Standard errors are clustered within the firm level. Z-statistics are in parentheses. Superscripts a, b, and c indicate the significance of parameter estimates at the 1, 5, and 10 % (two-sided) significance levels, respectively.

Table 8. Path Analysis - Direct and Indirect Effects of CEO Equity Risk Incentives (Vega) on Annual Average Volatility Changes surrounding Management Earnings Forecasts

Panel A Mediator variable: *Sporadic_MF* (Likelihood of Sporadic Forecast)						
	(1)		(2)		(3)	
DV: ΔVol variables	*AnnΔ5dRVol*		*AnnΔ10dRVol*		*AnnΔ15dRVol*	
Direct path						
p[Vega_CEO, ΔVol]	0.039[a]	(2.66)	0.023[b]	(2.18)	0.019[b]	(2.02)
CV	Yes		Yes		Yes	
Percentage	86.67%		85.19%		86.36%	
Indirect path						
p[Vega_CEO, Mediator]	0.071[a]	(3.78)	0.071[a]	(3.78)	0.071[a]	(3.78)
CV	Yes		Yes		Yes	
p[Mediator, ΔVol]	0.082[a]	(15.81)	0.052[a]	(13.43)	0.042[a]	(12.14)
CV	Yes		Yes		Yes	
Total mediated path	0.006[a]	(3.68)	0.004[a]	(3.64)	0.003[a]	(3.61)
Percentage	13.33%		14.82%		13.64%	
Total effect (direct + indirect)						
p[Vega_CEO, ΔVol]	0.044[a]	(3.04)	0.027[b]	(2.52)	0.022[b]	(2.33)
Percentage	100%		100%		100%	
# of obs (N)	25,168		25,168		25,168	
Panel B Mediator variable: *NegSurp_MF* (Likelihood of Negative Surprise Forecast)						
	(1)		(2)		(3)	
DV: ΔVol variables	*AnnΔ5dRVol*		*AnnΔ10dRVol*		*AnnΔ15dRVol*	
Direct path						
p[Vega_CEO, ΔVol]	0.033[b]	(2.31)	0.021[c]	(1.92)	0.017[c]	(1.81)
CV	Yes		Yes		Yes	
Percentage	71.74%		72.41%		73.91%	
Indirect path						
p[Vega_CEO, Mediator]	0.114[a]	(4.88)	0.114[a]	(4.88)	0.114[a]	(4.88)
CV	Yes		Yes		Yes	
p[Mediator, ΔVol]	0.116[a]	(26.13)	0.072[a]	(21.54)	0.057[a]	(18.92)
CV	Yes		Yes		Yes	
Total mediated path	0.013[a]	(4.79)	0.008[a]	(4.76)	0.006[a]	(4.72)
Percentage	28.26%		27.59%		26.09%	
Total effect (direct + indirect)						
p[Vega_CEO, ΔVol]	0.046[a]	(3.17)	0.029[a]	(2.66)	0.024[a]	(2.47)
Percentage	100%		100%		100%	
# of obs (N)	25,168		25,168		25,168	
Panel C Mediator variable: *Badnews_MF* (Likelihood of Bad News Forecast)						
	(1)		(2)		(3)	
DV: ΔVol variables	*AnnΔ5dRVol*		*AnnΔ10dRVol*		*AnnΔ15dRVol*	
Direct path						
p[Vega_CEO, ΔVol]	0.038[a]	(2.63)	0.023[b]	(2.16)	0.019[b]	(2.02)
CV	Yes		Yes		Yes	
Percentage	82.61%		82.14%		82.61%	
Indirect path						
p[Vega_CEO, Mediator]	0.072[a]	(3.18)	0.072[a]	(3.18)	0.072[a]	(3.18)
CV	Yes		Yes		Yes	
p[Mediator, ΔVol]	0.107[a]	(24.21)	0.073[a]	(22.02)	0.056[a]	(18.98)

CV	Yes		Yes		Yes	
Total mediated path	0.008[a]	(3.15)	0.005[a]	(3.15)	0.004[a]	(3.14)
Percentage	17.39%		17.86%		17.39%	
Total effect (direct + indirect)						
p[Vega_CEO, ΔVol]	0.046[a]	(3.12)	0.028[a]	(2.62)	0.023[b]	(2.43)
Percentage	100%		100%		100%	
# of obs (N)	25,168		25,168		25,168	
Panel D Mediator variable: *NotPoint_MF* (Likelihood of Range (or open-ended) Forecast)						
	(1)		(2)		(3)	
DV: ΔVol variables	*AnnΔ5dRVol*		*AnnΔ10dRVol*		*AnnΔ15dRVol*	
Direct Path						
p[Vega_CEO, ΔVol]	0.028[b]	(1.97)	0.019[c]	(1.80)	0.017[c]	(1.77)
CV	Yes		Yes		Yes	
Percentage	56.00%		61.29%		68.00%	
Indirect path						
p[Vega_CEO, Mediator]	0.117[a]	(5.06)	0.117[a]	(5.06)	0.117[a]	(5.06)
CV	Yes		Yes		Yes	
p[Mediator, ΔVol]	0.189[a]	(38.25)	0.101[a]	(26.55)	0.072[a]	(20.97)
CV	Yes		Yes		Yes	
Total mediated path	0.022[a]	(5.02)	0.012[a]	(4.97)	0.008[a]	(4.92)
Percentage	44.00%		38.71%		32.00%	
Total effect (direct + indirect)						
p[Vega_CEO, ΔVol]	0.050[a]	(3.37)	0.031[a]	(2.84)	0.025[a]	(2.61)
Percentage	100%		100%		100%	
# of obs (N)	25,168		25,168		25,168	
Panel E Mediator variable: *ShortHR_MF* (Likelihood of Short Horizon Forecast)						
	(1)		(2)		(3)	
DV: ΔVol variables	*AnnΔ5dRVol*		*AnnΔ10dRVol*		*AnnΔ15dRVol*	
Direct path						
p[Vega_CEO, ΔVol]	0.009	(0.65)	0.008	(0.74)	0.009	(0.90)
CV	Yes		Yes		Yes	
Percentage	16.67%		22.86%		31.03%	
Indirect path						
p[Vega_CEO, Mediator]	0.166[a]	(7.37)	0.166[a]	(7.37)	0.166[a]	(7.37)
CV	Yes		Yes		Yes	
p[Mediator, ΔVol]	0.273[a]	(48.93)	0.164[a]	(37.27)	0.122[a]	(30.61)
CV	Yes		Yes		Yes	
Total mediated path	0.045[a]	(7.29)	0.027[a]	(7.23)	0.020[a]	(7.16)
Percentage	83.33%		77.14%		68.97%	
Total effect (direct + indirect)						
p[Vega_CEO, ΔVol]	0.054[a]	(3.57)	0.035[a]	(3.13)	0.029[a]	(2.93)
Percentage	100%		100%		100%	
# of obs (N)	25,168		25,168		25,168	

This table reports the path analysis results for the direct and indirect effects of CEO vega (*Vega_CEO*) on the composite annual average volatility changes surrounding management forecasts. The relation is mediated by likelihood of sporadic (*Sporadic_MF*), negative surprise (*NegSurp_MF*), bad news (*Badnews_MF*), range or open-end (*NotPoint_MF*), and short horizon (*ShortHR_MF*) management earnings forecasts in Panels A, B, C, D and E, respectively. The source variable is CEO vega (*Vega_CEO*). Z-statistics are in parentheses. Superscripts a, b, and c represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

Table 9. Equity Risk Incentives of Top Executives and Volatility Changes after Management Earnings Forecasts

	(1) *Δ5d_RealVol*	(2) *Δ10d_RealVol*	(3) *Δ15d_RealVol*
Vega_CEOCFO	0.052[b]	0.055[a]	0.054[a]
	(2.42)	(3.22)	(3.59)
Delta_CEOCFO	0.022[b]	0.017[b]	0.018[b]
	(2.23)	(2.27)	(2.49)
CashComp_CEOCFO	-0.007	-0.010[c]	-0.010[b]
	(-1.00)	(-1.75)	(-2.03)
Age_CEOCFO	-0.056[c]	-0.038	-0.020
	(-1.80)	(-1.55)	(-0.87)
Tenure_CEOCFO	-0.026[a]	-0.026[a]	-0.029[a]
	(-3.69)	(-4.58)	(-5.57)
Size	-0.056[a]	-0.049[a]	-0.045[a]
	(-13.28)	(-14.47)	(-14.63)
Firmage	-0.012[b]	-0.008[c]	-0.008[b]
	(-2.43)	(-1.78)	(-2.13)
Capx	0.354[a]	0.209[b]	0.225[a]
	(3.15)	(2.48)	(2.92)
Sgrow	0.051[b]	0.055[a]	0.052[a]
	(2.44)	(3.25)	(3.38)
ROA	-0.286[a]	-0.249[a]	-0.244[a]
	(-4.97)	(-5.72)	(-6.15)
MTB	0.003[a]	0.003[a]	0.002[a]
	(2.92)	(3.96)	(3.90)
LEV	-0.014	-0.005	-0.011
	(-0.59)	(-0.26)	(-0.64)
Vol_Mon	1.632[a]	1.419[a]	1.258[a]
	(18.55)	(20.60)	(19.53)
Equ_Iss	-0.034[a]	-0.024[a]	-0.021[a]
	(-3.46)	(-3.10)	(-2.84)
LTDebt_Iss	0.012[c]	0.010[b]	0.003
	(1.94)	(2.00)	(0.81)
LitRisk	0.355[b]	0.331[b]	0.428[a]
	(2.26)	(2.58)	(3.55)
AnnMF	-0.037[a]	-0.044[a]	-0.047[a]
	(-4.53)	(-6.74)	(-7.90)
LongHR	-0.024	-0.068[a]	-0.054[a]
	(-1.03)	(-3.91)	(-3.33)
LossMF	0.141[a]	0.141[a]	0.139[a]
	(6.25)	(8.16)	(8.73)
NegSurp	0.011[b]	0.012[a]	0.010[a]
	(2.01)	(2.86)	(2.66)
Abs_MFSurp	1.334[a]	1.169[a]	1.075[a]
	(3.15)	(3.43)	(3.12)
Bundle	0.038[a]	0.001	-0.011[b]
	(5.93)	(0.23)	(-2.31)
SUE	-0.869	-1.654[c]	-2.029[b]
	(-0.68)	(-1.71)	(-2.38)

AF01	0.003	-0.000	-0.003
	(0.46)	(-0.11)	(-0.67)
AD	6.031[a]	4.842[a]	4.088[a]
	(6.23)	(6.25)	(5.66)
Pre_5dRVol	-35.216[a]		
	(-74.31)		
Pre_10dRVol		-28.963[a]	
		(-70.83)	
Pre_15dRVol			-26.200[a]
			(-66.26)
Ind Fix	Yes	Yes	Yes
Year Fix	Yes	Yes	Yes
Const	1.397[a]	1.138[a]	1.013[a]
	(10.33)	(10.48)	(10.02)
N	54,828	54,795	54,760
R^2	0.283	0.278	0.264

Panel B. Incentives of Top Five Executives Team (*Vega_TOP5)* and Volatility Changes after Management Earnings Forecasts

	(1)	(2)	(3)
	Δ5d_RealVol	*Δ10d_RealVol*	*Δ15d_RealVol*
Vega_TOP5	0.033[b]	0.034[a]	0.033[a]
	(2.09)	(2.73)	(2.97)
Delta_TOP5	0.023[a]	0.018[a]	0.020[a]
	(2.72)	(2.75)	(3.07)
CashComp_TOP5	0.000	-0.007	-0.004
	(0.02)	(-0.94)	(-0.64)
Age_TOP5	-0.039	-0.024	-0.016
	(-0.98)	(-0.76)	(-0.54)
Tenure_TOP5	-0.049[a]	-0.042[a]	-0.041[a]
	(-5.17)	(-5.48)	(-5.78)
Size	-0.059[a]	-0.051[a]	-0.048[a]
	(-13.51)	(-14.24)	(-14.48)
Firmage	-0.009[c]	-0.005	-0.007[c]
	(-1.74)	(-1.26)	(-1.69)
Capx	0.322[a]	0.186[b]	0.203[a]
	(2.90)	(2.25)	(2.66)
Sgrow	0.051[b]	0.055[a]	0.051[a]
	(2.44)	(3.27)	(3.35)
ROA	-0.282[a]	-0.252[a]	-0.245[a]
	(-4.98)	(-5.88)	(-6.26)
MTB	0.003[a]	0.003[a]	0.003[a]
	(2.95)	(4.03)	(4.11)
LEV	-0.019	-0.010	-0.016
	(-0.82)	(-0.52)	(-0.91)
Vol_Mon	1.623[a]	1.414[a]	1.260[a]
	(18.66)	(20.71)	(19.79)
Equ_Iss	-0.033[a]	-0.023[a]	-0.020[a]
	(-3.45)	(-2.97)	(-2.68)
LTDebt_Iss	0.012[c]	0.010[b]	0.003

	(1.83)	(1.98)	(0.76)
LitRisk	0.351[b]	0.329[b]	0.420[a]
	(2.25)	(2.58)	(3.47)
AnnMF	-0.038[a]	-0.045[a]	-0.048[a]
	(-4.66)	(-6.87)	(-8.06)
LongHR	-0.025	-0.069[a]	-0.054[a]
	(-1.12)	(-3.99)	(-3.39)
LossMF	0.140[a]	0.143[a]	0.141[a]
	(6.21)	(8.19)	(8.82)
NegSurp	0.010[c]	0.011[a]	0.009[b]
	(1.91)	(2.76)	(2.54)
Abs_MFSurp	1.383[a]	1.200[a]	1.104[a]
	(3.17)	(3.43)	(3.13)
Bundle	0.037[a]	0.001	-0.011[b]
	(5.86)	(0.22)	(-2.35)
SUE	-0.838	-1.623[c]	-2.014[b]
	(-0.66)	(-1.70)	(-2.39)
AF01	0.003	0.000	-0.002
	(0.60)	(0.05)	(-0.42)
AD	5.847[a]	4.705[a]	3.969[a]
	(6.05)	(6.06)	(5.48)
Pre_5dRVol	-35.188[a]		
	(-73.98)		
Pre_10dRVol		-28.932[a]	
		(-70.96)	
Pre_15dRVol			-26.208[a]
			(-66.29)
Ind Fix	Yes	Yes	Yes
Year Fix	Yes	Yes	Yes
Const	1.342[a]	1.102[a]	0.996[a]
	(8.24)	(8.51)	(8.24)
N	55,508	55,475	55,440
R^2	0.283	0.278	0.264

This table presents the regression results from replicating the previous tests in Table 2 with the incentives of CEO and CFO's (*Vega_CEOCFO*), or top five executives (*Vega_TOP5*) in Panel A, or Panel B, respectively. Other variables are defined in Appendix A. Standard errors are heteroscedasticity-adjusted in all models and clustered within firm level. T-statistics are in parentheses. Superscripts a, b, and c indicate the significance of parameter estimates at the 1, 5, and 10 % (two-sided) significance levels, respectively.

Table 10. CEO's likelihood of Selling Options after Management Earnings Forecasts

	(1) *Sell*	(2) *Sell*	(3) *Sell*
D_Vega	-0.033	0.010	-0.074
	(-0.49)	(0.11)	(-0.67)
D_Δ5dRVol	-0.073		
	(-1.25)		
D_Δ5dRVol×D_Vega	0.025[a]		
	(3.07)		
D_Δ10dRVol		-0.227[a]	
		(-3.09)	
D_Δ10dRVol×D_Vega		0.027[a]	
		(2.64)	
D_Δ15dRVol			-0.202[a]
			(-2.67)
D_Δ15dRVol×D_Vega			0.035[a]
			(2.62)
Delta_CEO	0.923[a]	0.985[a]	0.891[a]
	(4.05)	(3.86)	(3.19)
CashComp_CEO	-0.653[a]	-0.654[a]	-0.561[a]
	(-3.50)	(-2.93)	(-2.94)
Age_CEO	1.015	1.267	1.331
	(1.10)	(1.26)	(1.25)
Tenure_CEO	-0.292	-0.270	-0.271
	(-1.08)	(-1.04)	(-1.04)
Size	-0.478[a]	-0.464[a]	-0.402[b]
	(-3.27)	(-2.75)	(-2.57)
Firmage	0.812[a]	0.870[a]	0.811[a]
	(4.38)	(4.44)	(4.04)
Capx	-9.709[c]	-6.151	-7.763[c]
	(-1.82)	(-1.28)	(-1.73)
Sgrow	-1.143[b]	-1.939[a]	-1.416[a]
	(-2.33)	(-3.58)	(-3.08)
ROA	-1.920	-1.828	-1.928
	(-1.14)	(-1.17)	(-1.34)
MTB	-0.002	-0.026	-0.020
	(-0.12)	(-1.04)	(-0.92)
LEV	1.829[b]	2.250[b]	2.019[a]
	(2.25)	(2.56)	(2.66)
Equ_Iss	-1.058[b]	-1.068[c]	-1.072[b]
	(-1.97)	(-1.72)	(-2.09)
LTDebt_Iss	0.672[b]	0.626[b]	0.641[b]
	(2.35)	(1.97)	(2.21)
LitRisk	16.007[a]	16.671[a]	15.802[a]
	(3.33)	(3.32)	(3.77)
LossMF	-3.762[a]	-4.197[a]	-4.833[a]
	(-6.74)	(-7.38)	(-7.37)
NegSurp	0.144	0.101	0.119
	(0.67)	(0.46)	(0.56)
Abs_MFSurp	-25.508[a]	-25.907[a]	-24.585[a]

	(-3.11)	(-2.96)	(-2.90)
AF01	0.293	0.282	0.241
	(1.22)	(1.19)	(1.04)
AD	11.569	9.017	9.580
	(0.75)	(0.66)	(0.62)
Pre_5dRVol	4.466		
	(0.49)		
Pre_10dRVol		17.900	
		(1.52)	
Pre_15dRVol			13.729
			(1.21)
Ind Fix	Yes	Yes	Yes
Year Fix	Yes	Yes	Yes
Const	-2.406	-3.374	-4.308
	(-0.78)	(-0.73)	(-0.00)
N	56,900	56,897	56,895
pseudo R^2	0.585	0.600	0.593

This table presents the results from the Probit regression of CEO selling options within 15 days after the management forecasts (*Sell*) on the interaction of the decile ranking of various volatility changes measures (*D_Δ5dRVol*, *D_Δ10dRVol*, *D_Δ15dRVol)* and the decile ranking of CEO vega (*D_Vega*). Other variables are defined in Appendix A. Standard errors are heteroscedasticity-adjusted in all models and clustered within firm level. Z-statistics are in parentheses. Superscripts a, b, and c indicate the significance of parameter estimates at the 1, 5, and 10 % (two-sided) significance levels, respectively.

Table 11 Equity risk Incentives (*Vega_CEO*) and the Effect of Management Earnings Forecasts on Conditional Variance (N=5,392,700)

Panel A: Conditional variances and CEO equity incentives

Panel A	Mean	Std Dev	Q1	Median	Q3
β_1	0.0002	0.0644	-0.0172	0.0005	0.0193
δ_1	0.4581	1.1310	0.0000	0.0000	0.0359
Vega_CEO	0.1457	0.1929	0.0184	0.0700	0.19102
Delta_CEO	0.3978	0.4334	0.1069	0.2469	0.5303

Panel B: The effect of management earnings forecasts on conditional variance

	(1) δ_1	(2) δ_1	(3) δ_1	(4) δ_1
Vega_CEO	0.050[a]	0.010[a]	0.022[a]	0.020[a]
	(15.45)	(2.91)	(5.88)	(5.28)
Delta_CEO	0.007[a]	0.005[a]	-0.006[a]	-0.007[a]
	(4.83)	(3.28)	(-3.85)	(-4.37)
CashComp_CEO	-0.089[a]	-0.036[a]	-0.037[a]	-0.036[a]
	(-90.48)	(-32.11)	(-31.31)	(-29.82)
Age_CEO	-0.198[a]	-0.177[a]	-0.174[a]	-0.169[a]
	(-44.08)	(-38.63)	(-36.58)	(-35.29)
Tenure_CEO	0.010[a]	-0.002[c]	0.013[a]	0.014[a]
	(10.55)	(-1.65)	(11.68)	(12.72)
Size	-0.034[a]	-0.035[a]	-0.035[a]	-0.036[a]
	(-78.94)	(-68.38)	(-60.75)	(-53.74)
ROA	-0.023[a]	0.048[a]	-0.147[a]	-0.019
	(-2.88)	(5.64)	(-12.50)	(-1.30)
MTB	0.006[a]	0.001[a]	0.000	0.000
	(39.27)	(3.24)	(1.28)	(0.60)
LEV	-0.233[a]	-0.130[a]	-0.139[a]	-0.120[a]
	(-74.67)	(-35.77)	(-32.84)	(-27.03)
Vol_Mon			-0.022	-0.171[a]
			(-1.55)	(-11.30)
Firmage			-0.014[a]	-0.015[a]
			(-18.15)	(-17.74)
Capx			0.190[a]	0.194[a]
			(10.21)	(10.27)
Sgrow			0.098[a]	0.100[a]
			(27.59)	(27.75)
Loss				0.031[a]
				(12.43)
Bundle				-0.003
				(-0.83)
AF02				-0.014[a]
				(-17.34)
Equ_Iss				0.022[a]
				(13.36)
LTDebt_Iss				-0.012[a]
				(-9.77)
LitRisk				0.674[a]

				(24.61)
Ind. Fix	No	Yes	Yes	Yes
Year Fix	No	Yes	Yes	Yes
Const	2.140[a]	1.256[a]	1.247[a]	1.222[a]
	(118.31)	(65.60)	(60.87)	(58.60)
N	5,263,813	5,263,084	4,896,766	4,836,735
R^2	0.009	0.026	0.026	0.026

This table presents results of how CEO vega (*Vega_CEO*) affects the influence of management earnings forecasts on conditional variance of daily market-adjusted returns (δ_1). Panel A shows the descriptive statistics of the variables obtained from the coefficient estimates of EGARCH model as described in Section 5.3, and CEO vega (*Vega_CEO*) and delta (*Delta_CEO*), where δ_1 indicates the influence of management earnings forecasts on conditional variance of daily market-adjusted returns. Panel B displays the second stage results of regressions from δ_1 on CEO vega (*Vega_CEO*). Other variables are defined in Appendix A. Standard errors are heteroscedasticity-adjusted to White standard errors. T-statistics are in parentheses. Superscripts a, b, and c indicate the significance of parameter estimates at the 1, 5, and 10 % (two-sided) significance levels, respectively.