Management Earnings Guidance and Crash Risk

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April 9, 2012

Preliminary Draft
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Abstract

Hutton, Marcus, and Tehranian (*JFE*, 2009) show that more transparent financial reporting of earnings is related to lower crash risk. We extend their work by documenting a positive association between the frequency of management earnings guidance and crash risk. This result contrasts with the general notion that more guidance would enhance transparency and reduce crash risk. We find this perverse effect of guidance is intensified when firms have a higher executive stock ownership, but is attenuated when they have higher dedicated institutional holdings or litigation risk. We also show that the positive association between opacity in reported earnings and crash risk in Hutton et al. (2009) is stronger when opacity is coupled with frequent earnings guidance. Overall, our results indicate that the practice of providing guidance can exacerbate agency problems when self-interested managers use guidance to distort investors' perception.

Keywords: Crash risk, management earnings guidance, opacity

Data Availability: The data used in this study are available from the public sources identified in the paper.

1. Introduction

A series of catastrophic events in the recent decade, including corporate scandals (e.g., Enron, WorldCom) and the financial crisis, have led regulators, practitioners, and researchers to investigate the cause of extreme price declines. In her testimony before the Financial Crisis Inquiry Commission on January 14, 2010, the SEC chairman Mary Schapiro contended that "[a] central question ... is whether investors received timely and accurate disclosure concerning deteriorating business conditions." In an important recent study, Hutton, Marcus, and Tehranian (2009, hereafter HMT) document that opaque earnings are associated with higher stock price crash risk, and conclude that transparency in reported earnings is important for the stability in capital markets.[1] Apart from mandatory earnings reports, many firms also provide management earnings guidance. Beyer et al. (2010), in assessing the relative importance of various corporate disclosures on stock return variance, estimate that earnings guidance provides 66% of accounting-based information, compared to 12% delivered by mandatory disclosures such as earnings announcements and SEC filings. Hence, a natural extension of HMT is to examine how earnings guidance is related to future stock price crash.

The literature typically regards firms that provide guidance as being more transparent. For example, Ajinkya and Gift (1984) find that guidance helps move investor expectation closer to management beliefs. Skinner (1994), Kasznik and Lev (1995) and Matsumoto (2002) further show that managers issue forecasts to guide down market expectations when they privately learn about forthcoming bad news. As a result, issuance of guidance helps reduce information asymmetry (Coller and Yohn, 1997) and cost of capital (Frankel et al., 1995). In addition, guidance allows for better monitoring and reduces managers' incentives to shirk or engage in

[1] While recent research has focused on the agency problems that lead to extreme price declines, early literature has examined a few equity market based explanations for price crashes (e.g., French et al., 1987; Hong and Stein, 2003; Romer, 1993).

value-destroying behaviors (Bushman and Smith, 2001; Healy and Palepu, 2001; Nagar et al. 2003). Hence, one might expect more guidance to reduce the likelihood of stock price crash, as does more transparent financial reporting in HMT.

However, an important presumption underlying this typical view is that managers' disclosure incentives are aligned with shareholders' and managers truthfully reveal private information through guidance. In recent years many practitioners have begun to cast doubt on this assumption. For instance, McKinsey (2006) contends that the practice of earnings guidance has become "misguided" as there is excessive focus on short-term "number games" rather than long-term firm health and future business conditions. This myopic focus could induce managers to sugarcoat poor business conditions with misleading guidance (Deloitte and FERF, 2009), which leads to further opportunistic behaviors such as earnings management to meet or beat the earlier guidance (CFA institute, 2006; Lev, 2011). A few academic studies echo the criticism by showing that managers use earnings guidance to manipulate the beliefs of analysts (Cotter, Tuna, and Wysocki, 2006) and exploit shareholders (Noe, 1999; Aboody and Kasznik, 2000, Cheng and Lo, 2006; Rees et al., 2008). In particular, Cheng and Lo (2006) provide evidence that managers strategically time guidance to maximize their insider trading profits.

While analytical studies on crash risk (e.g., Jin and Myers, 2006; Bleck and Liu, 2007; Benmelech et al., 2010) recognize bad news hoarding as the key factor in the formation of price crash, they are silent on the precise nature of the process. Given the importance of management guidance in firms' information environment (Beyer et al., 2010), simply withholding guidance in declining business conditions is unlikely for managers to stockpile bad news because that would cause investors to rationally revise their beliefs about firm value downwards (Akerlof, 1970; Milgrom and Roberts, 1986). On the contrary, issuing (biased) guidance to actively camouflage

firm prospects would better serve the opportunistic purpose because prior research indicates that investors cannot completely see through forecast biases and will inadvisably accept guidance as more concrete than warranted (Rogers and Stocken, 2005; Young, 2006). Related, Hermalin and Weisbach (2012) develop a model predicting that, with career concerns (i.e., job security or compensation), self-interested managers exploit disclosures to opportunistically distort investors' perception about firm value and inflate short-term stock prices. By doing so, managers create an illusion of stability and gamble that future events will work in their favor so that they can bury the bad news (Graham et al., 2005; Kothari et al., 2009). Subsequently, when the costs of hoarding become prohibitive after a run of sufficiently bad news, all of the hitherto accumulated negative information becomes public at once, resulting in a crash. Therefore, it is also plausible that more guidance is related to higher crash risk.

Taken together, the relation between management earnings guidance and stock price crash appears to be an empirical issue. On one hand, guidance might reduce crash risk because it conveys useful information that could forewarn the capital markets of firm-specific declining business conditions. On the other hand, to the extent that guidance is used to disguise fading business prospects and/or encourages managers' short-termist behaviors, one might expect guidance to increase the likelihood of price crash.

We use a sample of 36,781 firm years from 1998 to 2009 to examine the relation between earnings guidance and future stock price crash. Following prior studies, we measure firm-specific crash risk as the likelihood of the occurrence of future extreme negative returns. After controlling for factors that could affect crash risk, including accrual quality (HMT) and investor heterogeneity (Chen et al., 2001), we find a significant and positive association between

management guidance frequency and crash risk.[2] Given the endogeneity of disclosure decisions, we further control for the determinants of the frequency of guidance identified in Nagar et al. (2003), and find similar results.

To examine whether agency problems give rise to the positive association between management guidance frequency and crash risk, we investigate whether the association varies systematically with the severity of the agency problem which is affected by management incentives, the quality of external monitoring, and litigation risk. We find the relation between the management guidance and crash risk is stronger for firms with a higher CEO stock ownership, indicating that more stock-based compensation induces managers to engage in more short-termist behaviors (Benmelech et al., 2010). In addition, we show that the positive association between guidance and crash risk is diminished for firms with higher dedicated institutional holdings. This result is in alignment with the monitoring role played by dedicated institutions in curbing managers' myopic behaviors (Bushee, 1998; 2001). Furthermore, we find evidence that the positive association is weaker for firms with higher litigation risk, indicating that fears for litigation attenuate managers' incentive to use guidance to mislead investors (Skinner, 1994).

Next we investigate how crash risk is influenced by the interaction between financial reporting opacity and earnings guidance. To do so, we include the interaction between HMT's opacity measure and our guidance measure, and find a significantly positive coefficient on this interaction term. The result suggests that the effect of financial statement opacity on crash risk is exacerbated when the financial statement opacity is accompanied by frequent management guidance. This evidence reinforces the idea that providing misleading guidance in addition to

[2] However, we do not find any relation between guidance and future stock price jumps (i.e., extreme positive returns). These findings suggest that we identify an underlying relation between management guidance and future price crashes rather than an idiosyncratic variability of future returns.

opaque financial reports is important for self-interested managers to successfully stockpile negative information.

A limitation of the above analyses is that they only provide indirect evidence on the perverse effect of management guidance. To provide more direct evidence, we examine whether firms that provide more guidance tend to issue less accurate forecasts to disguise firms' prospects. We find that (1) more frequent guiders issue more upward biased forecasts and the forecasts tend to be imprecise; and (2) the magnitude of the bias and imprecision are positively associated with crash risk.

Our study fills a gap in the stock price crash risk and management forecast literature by providing evidence that more frequent guidance could be associated with higher crash risk due to exacerbated agency problems. While there is evidence that more opaque financial reports are associated with higher crash risk it is unclear how a voluntary disclosure mechanism such as earnings guidance is associated with such risk. A review of the prior management forecast literature reveals that even though some studies document agency problems arising from earnings guidance, studies that focus on capital market consequences typically find that more guidance is associated with improved stock liquidity and lower cost of capital. Our evidence of a perverse effect of earnings guidance on crash risk supports the prediction of Hermalin and Weisbach (2012) that more disclosure does not necessarily lead to higher transparency that mitigates the agency problem; it could exacerbate the agency problem. A better understanding of the tail risk associated with disclosure is important for regulators, practitioners and academics to understand the crisis in the recent decades. Our analyses of this tail risk shed light on an important capital markets consequence of opportunistic behaviors by managers who provide management forecasts.

The rest of the paper is organized as follows. In the next section we describe the research design and the sample that we use in our empirical analyses. In section 3 we present our empirical results. We then conclude in section 4.

2. Research design

We rely on firms' weekly stock return data from the Center for Research in Security Prices (CRSP) to compute the crash and jump risk for each calendar year. We then combine annual measures with management earnings guidance in the prior calendar year. We obtain the guidance from the First Call Company Issued Guidance database. Our sample uses all guidance from 1998, which is the first year of which the database provides comprehensive guidance coverage. The sample period extends up to 2009 because we have only data up to 2010 which is the last year for which we have the CRSP data to compute crash risk. We then obtain various control variables from the Compustat Annual, I/B/E/S, and Thomson Reuters Insiders Data and Institutional (13f) Holdings databases. The final sample, constructed using (non-missing values of) variables constructed from the above databases, consists of 36,778 firm-year observations.

To examine the association between crash risk and forecast frequency, we estimate the following logistic regression:

$$\begin{aligned} Crash_{t+1} \,/\, Jump_{t+1} = {} & \beta_0 + \beta_1\, ROE_t + \beta_2\, Size_t + \beta_3\, Market\text{-}to\text{-}book_t + \beta_4\, Leverage_t \\ & + \beta_5\, Abn\_accruals_t + \beta_6\, Business\_segments_t + \beta_7\, Mean\_return_t + \beta_8\, Std\_return_t \\ & + \beta_9\, Analyst\_coverage_t + \beta_{10}\, Insider\_trading_t + \beta_{11}\, Opacity_t + \beta_{12}\, Opacity^2_t \\ & + \beta_{13}\, Forecast_t + \varepsilon_{t+1} \end{aligned} \tag{1}$$

where *Crash* and *Jump* measures the risk of a stock price crash and jump, respectively, in year *t+1*. In particular, for each firm-year that has at least 26 weekly stock returns in the year, we estimate the following firm-specific regression:

$$r_{i,w} = \beta_0 + \beta_1 r_{mkt,w-1} + \beta_2 r_{mkt,w} + \beta_3 r_{mkt,w+1} + \beta_4 r_{ind,w-1} + \beta_5 r_{ind,w} + \beta_6 r_{ind,w+1} + \varepsilon_{i,w} \quad (2)$$

where $r_{i,w}$ is the current weekly return for firm *i*, $r_{mkt,w}$ ($r_{mkt,w-1}$, $r_{mkt,w+1}$) is the weekly market return in the current (prior, next) week , and $r_{ind,w}$ ($r_{ind,w-1}$, $r_{ind,w+1}$) is the weekly industry return in the current (prior, next) week.[3] The abnormal weekly return $W_{i,w}$, which is the natural logarithm of one plus the residual return $\varepsilon_{i,w}$ from estimation of Eq. (1), is assumed to follow the normal distribution. *Crash* is a dummy variable set to one if there is at least one very low $W_{i,w}$ which is likely to occur only at 0.01% level, or to put it differently, if $W_{i,w}$ is smaller than [Mean ($W_{i,w}$) – 3.09 × Std Dev ($W_{i,w}$)]. Similarly, *Jump* is set to one if there is at least one very high $W_{i,w}$ that exceeds [Mean ($W_{i,w}$) + 3.09 × Std Dev ($W_{i,w}$)], and zero otherwise. *Crash* (*Jump*) is designed to capture the likelihood of a stock price crash (jump) in any given week, captured by the actual occurrences of extreme-negative (positive) events in the year.[4]

Forecast as the key independent variable of interest. *Forecast* is the number of management earnings forecasts during year *t*, constructed from the First Call Company Issued Guidance database; we include all annual and quarterly point and close-range forecasts of earnings-per-share. A positive (negative) coefficient on this variable indicates that more forecasts are associated with a higher (lower) likelihood of an extreme stock price movement. In untabulated sensitivity analyses, we find qualitatively similar results with two variations of

[3] The weekly stock (market) returns are computed using daily stock (value-weighted market) returns from CRSP. The weekly value-weighted Fama-French industry returns are computed using the daily industry returns available from Kenneth French's website: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

[4] The only difference between our measures of *Crash* and the one used in HMT is that we use calendar years instead of fiscal years. Nevertheless, we see the virtually same descriptive statistics on the measure over the sample period. Our results from estimation of the regression of *Crash* on *Opacity* and other controls resemble those in HMT.

Forecast: i) *Forecast_day*, which is the number of days with at least one forecast in the year and ii) *Forecast_dummy*, which is a dummy variable equaling one if the firm has issued at least one forecast in the year. Results are also similar when we construct *Forecast* by including open-range and qualitative forecasts in the determination of the number of management forecasts in each year.

We include two sets of control variables, all of which are measured as of year *t*. The first set of variables is based on HMT. *ROE* is the net income before extraordinary items over the total shareholders' equity. *Size* is a log of the market value, and *Market-to-Book* is the ratio of the market value and the total shareholders' equity. *Leverage* is the ratio of total liability over the total asset. *Opacity*, which is the key independent variable of interest in HMT, is the sum of the absolute abnormal accruals from year t-2 to year t, where abnormal accruals are estimated based on the cross-sectional modified Jones model (Jones, 1991; Dechow et al., 1995). *Opacity* captures how the accruals map poorly into fundamentals, and therefore is supposed to proxy for manager's opportunistic behaviors of manipulating earnings. As an alternative measure of opaque financial reporting, we use *Accruals_quality* which is the standard deviation of five firm-specific residuals from a cross-sectional regression of accruals on prior, current, and future cash flow from operations, as well as the changes in revenue and PPE (Dechow and Dichev, 2002; McNichols, 2002; Francis et al., 2005). Unlike *Opacity* which requires three years of data to compute, *Accruals_quality* requires seven years (two of the years are due to the need for prior and future cash flow from operations).

In addition, we control for another set of variables that could potentially lead to a bias in the coefficient on *Forecast*.[5] First, given that guidance may be related to the level of earnings management (Kasznik, 1999), we control for upwards earnings managements with abnormal

[5] Our results are robust to limiting the set of control variables to the variables used in HMT.

accruals (*Abn_Accruals)* which is the residual of year t from the estimation of the cross-sectional Jones (1991) accrual model.[6] Next, to mitigate concerns about the endogenous nature of guidance, we further include a number of determinants of forecast frequency identified by Nagar et al. (2003). *Business_segments* is the number of business segments. We define *Mean_return* and *Std_return* as the mean and standard deviation of the weekly returns in year t. *Analyst_coverage* is the number of analysts following a firm reported in I/B/E/S. *Insider_trading* is the volume of insider trades divided by the number of shares outstanding.

Finally, to deal with potentially inflated t-statistics due to cross-sectional and time-series dependence of the residuals in a panel dataset, we cluster the standard errors by firm and by year (Petersen, 2009).

3. Empirical results

3.1 Sample description

Table 1 provides a breakdown of our data over the sample period. In Panel A, we find that 11,704 of the total of 36,778 firm-years have at least one forecast issued during the year, and there is an upward trend of the percentage of forecasters. This trend is consistent with findings in prior research (e.g., Rogers et al, 2009). We find that the number of firms with stock price crash in the next year increases over time to reach its peak value of 738 in 2007 before taking a plunge. The trend largely coincides with that of the number of forecast firms, suggesting a potentially positive correlation between guidance and the incidence of future price crash. In contrast, the number of jump firms appears to decreases over time. Panel B further presents the timing of price crashes and jumps over the years. The percentage of firm-weeks with price crashes

[6] This is a regression model of accruals on sales growth and plant, property and equity by industry in each year; we impose a requirement of at least 20 firms within each industry-year.

coinciding with earnings announcements rises from 0.7% in 1999 to consistently over 2% after 2004. The gap between earnings announcement period and non-earnings announcements period widens over time. This pattern is consistent with the notion that if the revelation of prior attempts to distort the truth were to occur, it is likely to occur during an earnings announcement, compared to other times.

Table 2 provides descriptive statistics. Approximately 20% (26%) of our firm-years exhibit at least one crash (jump) in the next year. The average number of forecasts (*Forecast*) per year is 1.551; note that for firms without any forecast in the year, we set the number of forecasts to zero. The upward bias (*Up_bias*) and precision (*Precision*) in the management forecasts are calculated only for forecasting firms, i.e., firms with at least one forecast in the year. The percentage of firm-years with on average an upward bias in the forecasts is 42.2%, suggesting that there is considerable upward bias in forecasting. The mean *Precision* of 23.1% indicates that point forecasts are more common than closed-range forecasts. There are less observations with *Accruals_quality,* an alternative measure of *Opacity,* because the computation of *Accruals_quality* requires a longer time-series of data.

3.2 Management earnings guidance and crash risk

Table 3 reports the results from estimating Eq. (2). The first and fourth columns present our baseline regression without HMT's opacity measure. We find a significantly positive coefficient on *Forecast,* which indicates frequent forecasters are more likely to experience stock price crashes in the future. On the other hand, the likelihood of extremely high returns (*Jump*) is not associated with forecast frequency, suggesting that there is asymmetry in the way more earnings guidance is associated with crash risk. On average, crash risk is lower for firms that are

less profitable, of smaller size, with higher market-to-book ratios, and have less leverage. More earnings management has a weak positive association with crash risk.

The next two columns present that the main finding of HMT holds; two opacity measures (*Opacity* and *Accruals_quality*) are positively associated with *Crash* but not with *Jump.* At the same time, *Forecast* continues to increase the likelihood of *Crash,* after we control for opaque disclosure practices. *Jump* again exhibits no association with *Forecast.* These findings suggest that the positive association between *Forecast* and *Crash* is incremental to the findings of HMT.

In sum, the results presented in Tables 3 indicate that frequent forecasts are associated with a higher likelihood of future stock price crash. The findings in HMT suggest that delayed revelation of bad news due to opaque financial reports contributes to higher crash risk. While one might consider more earnings guidance as one mechanism via which a firm can be voluntarily more transparent to reduce the risk of a stock price crash, our results suggest that this is not the case. Instead, firms that provide more guidance are more likely to experience a future stock price crash.

To further investigate this somewhat controversial finding, we examine the characteristics of forecasts provided by these frequent forecasters. In particular, for the sample of forecasting firms, we construct two additional measures of forecast characteristics: i) *Up_bias*, which is a dummy variable equaling one if on average, the management forecasts are upward-biased; the upward bias in each forecast is measured as management forecast minus actual earnings, scaled by stock price on the day before the forecast and ii) *Precision*, which is the ratio of the number of point forecasts to the total number of point and closed-range forecasts. We then run the following logistic (ordinary least squares) regression with *Up_bias* (*Precision*) as the dependent variable:

$$Up\_bias_t \,/\, Precision_t = \beta_0 + \beta_1\, ROE_t + \beta_2\, Size_t + \beta_3\, Market\text{-}to\text{-}book_t + \beta_4\, Leverage_t + \beta_5\, Forecast_t + \varepsilon_{t+1} \quad (3)$$

All the independent variables are defined in Eq. (1). To deal with potentially inflated t-statistics due to cross-sectional and time-series dependence of the residuals in a panel dataset, we cluster the standard errors by firm and by year (Petersen, 2009).

Table 4 reports how management forecast frequency is associated with upward bias and precision. Note that the sample size is significantly smaller than that in Table 3. It is because estimates of *Up_bias* and *Precision* are only available for forecasting firms and the computation of *Up_bias* requires the actual earnings that correspond to the forecast. In the first column, we find that highly frequent forecasts are positively associated with upward-biased forecasts. In the second column, frequent forecasts are shown to be less precise. The results suggest that, conditional of making at least one forecast, frequent forecasting is associated with forecasts that are more upward biased and less precise.

Next, we examine how the cross-sectional variation in upward bias and precision affects the relation between management forecast frequency and stock price crash. The objective of the analysis is to determine how forecast bias and precision affects the relation between management forecast frequency and stock price crash risk.

In Table 5, we show that the positive association between *Forecast* and *Crash* is even stronger when forecasts are upwardly biased. However, we do not find this interactive effect for *Precision*, which implies that the non-directional inaccuracy is of less concern than the directional bias. These findings offer insights on the underlying mechanism through which frequent guidance affects crash risk; the upwardly biased forecasts play a significant role by allowing managers to opportunistically mislead investors and hoard more bad news. The

majority of forecasts in our sample are relatively short-term. Therefore, upwardly biased forecasts on earnings announced this year must have been met with negative earnings surprises and market reactions in this year. Nevertheless, we find that these upwardly biased forecasts result in crashes next year, which indicates that this year's frequent upward biases in earnings forecasts do not get fully resolved this year. We suspect that these biases are accompanied by longer-term bad news withholding or upward biases in longer-term information. Even if the short-term earnings bias itself could be corrected rather quickly, the frequently issued and upwardly biased forecasts have a lingering adverse effect on stock prices.

Taken together, our results support the notion that more guidance, unlike more transparent financial reporting, may not be the type of transparent disclosure that results in lower crash risk. Further analyses based on a subsample of forecasting firms provide some preliminary evidence that more frequent forecasting might be associated upward bias and imprecision. In addition, the positive association between management forecast frequency and stock price crash risk is exacerbated when there is an upward bias in the forecasts. To the extent that providing upward biased forecasts is an indicator of agency problems, the results suggest that agency problems might be one reason for the crash caused by seemingly more disclosure. In the next section, we rely on further cross-sectional analyses to explore whether the positive association between guidance and crash risk varies systematically with several variables related to the severity of agency problems.

3.3 The role of institutional and CEO share ownership

In this section, we investigate whether the association between frequent forecasts and crash risk varies with the share ownership structure. First, we examine the monitoring efficiency

of two types of institutional owners; dedicated investors and transient investors. The classification of institutional investors was first developed by Bushee (1998) and subsequently used in many studies (Bushee, 2001; Bushee and Noe, 2000; Elliott et al., 2010; Ke and Ramalingegowda, 2005; Matsumoto, 2002; Ramalingegowda and Yu, 2011). According to Bushee (1998), dedicated institutional investors hold highly concentrated portfolios and do not trade often especially on periodic earnings. Dedicated investors are more interested in, and play more significant roles in, curbing management short-termism such as cutting R&D expenditures to boost earnings (Bushee, 1998; Bushee, 2001). This type of investors can monitor firms' reporting behavior. Ramalingegowda and Yu (2011), for example, document that dedicated investors demand more conservative accounting because they are good external monitors and they believe conservative accounting -facilitates their monitoring. We predict that frequent forecasts issued by firms with a high dedicated ownership would be less plagued by the bad news hoarding, because of the focus on long-term performance and the better monitoring provided by the investors.

Contrary to the dedicated investors, transient investors are interested in quickly buying and selling on news adopting the momentum strategy, which results in high turnover and low concentration. Because transient investors have a strong preference for high short-term earnings, firms may have an incentive to engage in myopic activities out of the fear of losing these investors (Bushee, 1998). Callen and Fang (2011) find a positive association between a high transient ownership and crash risk, and attribute it to weaker monitoring and short-term focus of those investors.

How transient investors affect firms' disclosing behaviors that ultimately lead to crash, however, is not obvious. Transient investors may not have strong incentives to monitor

management opportunism and sometimes even induce management short-termism in disclosure practice, exacerbating the adverse effect of frequent forecasts on crash risk. On the other hand, transient investors may encourage downwardly biased forecasts so that firms can meet or beat expectations (Matsumoto, 2002), and play a role of correcting mispricing quickly (Ke and Ramalingegowda, 2006). In conjunction with disclosure transparency and transient investors' role as arbitrage traders, Bushee and Noe (2000) show that firms that provide qualitatively (as well as quantitatively) better disclosure tend to attract transient investors. Elliott et al. (2010) document that the higher transient ownership combined with more transparent disclosure leads to expectation of a greater momentum-type mispricing. Therefore, it is an empirical question whether a high transient investor-base is associated with upward or downward biased disclosure or with more transparent or opaque disclosure, and whether the momentum strategy adopted by the transient investors leads to a quicker adjustment of mispricing reducing crash risk, or a severer overpricing increasing crash risk.

Second, we predict that the CEO stock ownership is associated with the opportunistic use of earnings guidance. In principle, granting equity to managers mitigates agency problems by aligning shareholders' and managers' interests (Jensen and Meckling, 1976; Jensen and Murphy, 1990). However, equity ownership can give a manger an incentive to behave not in the best interest of all investors, but in the interest of investors with the similar investment horizon at the cost of the rest of investors (Benmelech et al., 2010; Bolton et al., 2006). For this reason, it would be hard to identify the average relation between CEO ownerships and crash risk.[7] However, given the evidence we present in the previous section that frequent forecasts represent an opportunistic behavior, a high CEO ownership combined with frequent forecasts is predicted

[7] Kim et al. (2011) fail to find the association between CEO ownerships and crash risk, although they find a positive one for CFOs.

to yield undesirable outcomes. Therefore, we predict that the association between frequent forecast and a high crash risk would be stronger when CEO stock ownership is high.

To examine the role of share ownership, we extend Eq. (1) as follows:

$$Crash_{t+1} / Jump_{t+1} = \beta_0 + \beta_1 ROE_t + \beta_2 Size_t + \beta_3 Market\text{-}to\text{-}Book_t + \beta_4 Leverage_t$$
$$+ \beta_5 Abn\_accruals_t + \beta_6 Business\_segments_t + \beta_7 Mean\_return_t + \beta_8 Std\_return_t$$
$$+ \beta_9 Analyst\_coverage_t + \beta_{10} Insider\_trading_t + \beta_{11} Opacity_t + \beta_{12} Opacity2_t$$
$$+ \beta_{13} Forecast_t + \beta_{14} Ded\_Own_t + \beta_{15} Tra\_Own_t + \beta_{16} CEO\_Own_t$$
$$+ \beta_{17} Forecast_t \text{ x } Ded\_Own_t + \beta_{18} Forecast_t \text{ x } Tra\_Own_t$$
$$+ \beta_{19} Forecast_t \text{ x } CEO\_Own_t + \varepsilon_{t+1} \quad (4)$$

where *Ded_Own* (*Tra_Own*, *CEO_Own*) is a dummy variable equaling one if the percentage of shares own by dedicated institutional investors (transient institutional investors, a CEO) is above the median for the year, and zero otherwise. The determination of the type of institutional ownership holdings is based on Bushee (1997) who uses data from Thomson Financial. For CEO ownership, we rely on the number of CEO-owned shares from Execucomp and the number of shares outstanding from CRSP. Because Execucomp only covers the S&P 1500 firms, we are able to compute the percentage of CEO ownership only for the subset of our sample (14,042 firm-year observations.) All other variables have been defined in Eq. (1).

Table 6 reports the results of estimation of Eq. (3). In the first column, we find that our previous finding of the positive association between *Forecast* and *Crash* is mitigated for firms with more dedicated institutional holdings. In contrast, we report no role played by transient investors in curving frequent forecasts which eventually lead to crash.[8] This result suggests that

[8] Our results are somewhat similar to, but different in its implication from ones documented by Callen and Fang (2011). They show that transient institutional holdings increases crash risk but do not find a significant role played by dedicated institutions. We find the same results for the main effects of institutional ownerships but only the dedicated holders play the role of curving opportunistic earnings guidance.

firms with higher transient ownerships may not be under as strict monitoring as ones with higher dedicated investors. In the third column, we find that in the presence of the higher CEO ownership, the positive association between *Forecast* and *Crash* is more pronounced. This result holds when we estimate the regression with these three different types of ownership together.

The results presented in Table 6 shed lights on the incentive of a manager to issue frequent forecasts. We document that managers with high equity interests have an incentive to engage in this myopic behavior of upwardly biasing forecasts, and dedicated investors provide some level of monitoring.

3.4 The role of litigation risk

SEC Rule 10b-5 makes it unlawful for firms to either omit disclosure or make an untrue statement of material facts. Firms that experience large negative returns are likely to be sued by investors if investors believe that managers knowingly withhold bad news. Skinner (1994) indicates that firms have incentives to disclose bad news through guidance before the earnings announcement to reduce future litigation risk. Providing guidance not only reduces the likelihood of getting sued (Field et al., 2005) and the aggregate recoverable damage (Skinner, 1997), it also limits managers' personal liability in such suits.

However, the Private Securities Litigation Reform Act (PSLRA) of 1995 provides a statutory safe-harbor for forward-looking disclosures that are not realized later. As a result, the litigation risk for managers issuing optimistic forecasts was significantly reduced. As Young (2006) states, "[i]f plaintiff attorneys look at the reasons for the stock drop and determine that it is a result of missing guidance, they frequently won't take the case." Nevertheless, Rogers and Stocken (2005) find that managers of firms that face higher litigation risk tend to be less

optimistic or more pessimistic, indicating that litigation risk can still attenuate managers' incentives to engage in opportunistic earnings guidance. Therefore, we expect managers in firms with higher litigation risk to be less likely to distort guidance. Consequently, the positive association between the frequency of guidance and crash risk will be weaker when the litigation risk is high. To examine the effect of litigation risk, we extend Eq. (1) as follows:

$$Crash_{t+1} / Jump_{t+1}\ \beta_0 + \beta_1\ ROE_t + \beta_2\ Size_t + \beta_3\ Market\text{-}to\text{-}Book_t + \beta_4\ Leverage_t$$
$$+ \beta_5\ Abn\_accruals_t + \beta_6\ Business\_segments_t + \beta_7\ Mean\_return_t + \beta_8\ Std\_return_t$$
$$+ \beta_9\ Analyst\_coverage_t + \beta_{10}\ Insider\_trading_t + \beta_{11}\ Opacity_t + \beta_{12}\ Opacity2_t$$
$$+ \beta_{13}\ Forecast_t + \beta_{14}\ Litigation_t + \beta_{15} Forecast \times Litigation_t + \varepsilon_{t+1} \quad (5)$$

where *Litigation* is measured in two ways; *Lit_industry and Lit_risk*. *Lit_industry* is a dummy variable indicating whether the firm is in the biotech, computer, electronics, or retail industry. *Lit_risk* is a firm-level litigation probability estimate predicted with the model developed by Kim and Skinner (2011). Appendix offers more details on this measure. All other variables have been defined in Eq. (2).

Table 7 presents the regression results. We find that the main effects for litigation risks are highly associated with *Crash*, which is not surprising given that litigations are generally associated with significant price declines. However, for the firms facing high litigation risk, frequent forecasts are less likely to lead to future crash. This result is particularly interesting. On one hand, the results suggest that litigations are effectively discouraging managers from issuing upwardly biased and imprecise frequent forecasts. On the other hand, it provides a strong support to our conjecture of frequent forecasts being used as an opportunistic disclosure mechanism.

3.5 The interaction between opaque financial reporting and management earnings guidance

The prediction of HMT is based on the assumption that opaque earnings are in general upwardly managed earnings.. However, the opacity measure by construction is non-directional. We further examine whether opacity of reported earnings is interactively associated with firms' forecasting behaviors and crash risk by estimating the following equation:

$$Crash_{t+1} / Jump_{t+1}\ \beta_0 + \beta_1\ ROE_t + \beta_2\ Size_t + \beta_3\ Market\text{-}to\text{-}Book_t + \beta_4\ Leverage_t$$
$$+ \beta_5\ Abn\_accruals_t + \beta_6\ Business\_segments_t + \beta_7\ Mean\_return_t + \beta_8\ Std\_return_t$$
$$+ \beta_9\ Analyst\_coverage_t + \beta_{10}\ Insider\_trading_t + \beta_{11}\ Opacity_t + \beta_{12}\ Opacity2_t$$
$$+ \beta_{13}\ Forecast_t + \beta_{14}\ Forecast \times Opacity_t + \beta_{15} Forecast \times Opacity2_t + \varepsilon_{t+1} \qquad (6)$$

Table 8 reports the results of the regression. The coefficient on the interaction term between *Forecast* and *Opacity* is 0.173 and statistically significant. This suggests that when there is more opaque financial reporting, the positive association between earnings guidance and crash risk is exacerbated. One interpretation of this result is that more transparent financial reporting is important for investors to see through any opportunism in management forecasting. Financial reports provide important context to the management forecasts. In particular, it helps investors determine whether the management forecasts are achievable. It is likely to be harder for investors to detect upward biases in management forecasts because the forecasts are likely to look more reasonable given opacity in the financial reports. Another interpretation is that opacity in financial reporting alone is not enough for bad news hoarding. Only when opacity is accompanied by camouflaging guidance that helps sustain investors' (unwarrantedly high) expectation, managers are able to accumulate more bad news, which leads to price crash.

4. Conclusion

The relation between transparency and financial stability is an important issue and has attracted significant attention from academics and practitioners. The evidence in HMT indicates that more transparent financial reporting of earnings is associated with lower stock price crash risk. This mandatory reporting of earnings, however, is just one of the many disclosure mechanisms. In this paper, we study the relation between management earnings guidance, an important type of voluntary disclosure, and crash risk. The earlier literature on earnings guidance typically considers firms that provide more guidance as being more transparent. Recent literature, however, focuses on how managers make use of earnings guidance opportunistically (that is, in a self-serving way) within an agency theory framework. Related literature has also highlighted investors' concerns about the credibility of earnings guidance because of the voluntary, non-audited nature of earnings guidance. Hence, how earnings guidance is related to stock price crash risk is an empirical question.

We find that more earnings guidance is associated with higher stock price crash risk. While this finding might appear surprising, further analyses point to agency problems associated with earnings guidance as one explanation. In particular, we find that managers that provide more earnings guidance tend to provide more over-optimistic guidance. These managers also appear to provide less precise forecasts. We also find that the perverse effect of guidance in increasing crash risk is more pronounced when firms have a higher executive stock ownership, but is attenuated when there are higher dedicated institutional holdings or higher litigation risk.

A key implication of our paper is that it is important to recognize the agency problem in corporate disclosure, especially if the disclosures are voluntary and/or non-audited. In particular, managers have incentives to distort the disclosures as long as recipients are unable to completely

unravel the distortions and when the managers are compensated by the outcome of the disclosure. Suggested solutions to address the potential financial instability arising from frequent earnings guidance would be to reduce the pressure on managers to provide frequent management forecasts, to make it more costly for managers to lie (e.g., increase the litigation exposure of the managers), and to let investors more aware of existence and consequences of the distortions.

Appendix Variable definitions

Outcomes (t+1)	
Crash	Crash in stock price measured following Hutton et al. (2009)
Jump	Jump in stock price measured following Hutton et al. (2009)
Transparency variables (t)	
Forecast	Number of forecasts issued in the year
Forecast_day	Number of days with at least one forecast in a year
Forecast_dummy	Dummy variable equaling one if the firm has made at least one forecast in the year
Opacity	Opacity measured following Hutton et al. (2009)
Opacity2	Square of *Opacity*
Accruals_quality	Accruals quality measured following Francis et al. (2005)
Accruals_quality2	Square of *Accruals_quality*
Control variables (t)	
ROE	Return-on-assets
Size	Market value of equity at fiscal year end
Market-to-Book	Ratio of market value of equity to book value of equity at fiscal year end
Leverage	Ratio of total debt to total assets
Abn_Accruals	Abnormal accruals measured using the cross-sectional Jones (1991) model by industry
Business_segments	Number of business segments the firm operates in
Mean_return	Average of weekly returns
Std_return	Standard deviation of weekly returns
Analyst_coverage	Number of analysts issuing one-year-ahead EPS at the end of the year
Insider_trading	Shares traded by insiders as a percentage of total shares outstanding
Other forecast characteristics (t)	
Up_bias	Dummy variable equaling one if on average, the management forecasts are upward biased. Management forecast bias measured as management forecast minus actual earnings, scaled by stock price on the day before the forecast.
Precision	Point forecasts as a proportion of total point and range forecasts
Partitioning variables (t)	
Ded_own	Dummy variable equaling one if the percentage of shares owned by dedicated institutional investors is above the median for the year, zero otherwise

Tra_own	Dummy variable equaling one if the percentage of shares owned by transient institutional investors is above the median for the year, zero otherwise
CEO_own	Dummy variable equaling one if the beginning-of-the-year percentage of shares owned by the CEO is above the median for the year, zero otherwise.
Lit_industry	Dummy variable indicating whether the firm is in the biotech, computer, electronics, or retail industry.
Lit_risk	*Lit_Risk* is a measure of litigation risk estimated from the probit model by Kim and Skinner (2012): $Sued_t = \beta_0 + \beta_1\ Lit\_industry_t + \beta_2\ Lnasets_{t-1} + \beta_3\ SalesGrowth_{t-1} + \beta_4\ Return_{t-1} + \beta_5\ ReturnSkewness_{t-1} + \beta_6\ ReturnStd_{t-1} + \beta_7\ Turnover_{t-1} + \varepsilon,$ where *Sued* is a dummy variable indicating whether a class-action lawsuit was filed against the firm during the fiscal year. Lawsuits are retrieved from the Stanford Litigation Database; any IPO, mutual fund, or analyst-related cases are excluded. *Lit_Industry*is defined above. *LnAssets* is the natural logarithm of total assets. *SalesGrowth* is the change in annual sales deflated by lagged total assets. *Return* is the market-adjusted annual return. ReturnSkewness is the skewness of the firms' 12-month returns. *ReturnStd* is the standard deviation of the firm's 12-month returns. *Turnover* is the annual trading volume deflated by beginning of the year shares outstanding. *Lit_Risk* is the predicted value from the probit regression.

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Table 1 Sample description

Panel A: Distribution of firms

Year	Number of firms	Number of firms with at least one forecast in the year	Number of firms with at least one stock price crash in the next year	Number of firms with at least one stock price jump in the next year
1998	3,521	624	519	1,054
1999	3,495	623	661	881
2000	3,370	816	647	844
2001	3,277	1,180	733	717
2002	3,244	1,200	586	892
2003	3,271	1,158	703	878
2004	3,122	1,196	734	864
2005	2,946	1,071	692	809
2006	2,756	1,043	649	745
2007	2,669	1,007	738	555
2008	2,590	956	457	696
2009	2,517	830	418	638
	36,778	11,704	7,537	9,573

Panel A presents the distribution of firms across the years for the sample period from 1998 to 2009. For these firms, the following information is provided: i) the number of firms issuing management forecasts of EPS in each year, ii) the number of firms with at least one stock price crash in the next year, and iii) the number of firms with at least one stock price jump.

Panel B: Comparison of crashes and jumps between earnings announcement and non-earnings announcement weeks

Year	Number of firm-weeks	Stock price move	Earnings announcements	Non-earnings announcements	Difference
1999	182,988	Crash	0.70%	0.03%	0.67%
		Jump	1.28%	0.50%	0.78%
2000	181,556	Crash	0.97%	0.32%	0.65%
		Jump	0.94%	0.46%	0.48%
2001	178,507	Crash	1.39%	0.29%	1.10%
		Jump	1.11%	0.44%	0.67%
2002	170,321	Crash	1.62%	0.35%	1.27%
		Jump	1.46%	0.35%	1.11%
2003	168,496	Crash	0.70%	0.03%	0.67%
		Jump	1.75%	0.50%	1.25%
2004	170,035	Crash	2.23%	0.28%	1.95%
		Jump	2.25%	0.40%	1.85%
2005	162,326	Crash	3.03%	0.25%	2.78%
		Jump	2.68%	0.38%	2.30%
2006	153,188	Crash	3.37%	0.34%	3.03%
		Jump	2.74%	0.37%	2.37%
2007	146,085	Crash	3.01%	0.25%	2.76%
		Jump	2.84%	0.34%	2.50%
2008	138,746	Crash	2.74%	0.38%	2.36%
		Jump	1.90%	0.31%	1.59%
2009	134,659	Crash	2.35%	0.22%	2.13%
		Jump	2.44%	0.38%	2.06%
2010	128,362	Crash	2.17%	0.17%	2.00%
		Jump	2.44%	0.34%	2.10%

Panel B presents a comparison of the occurrences of stock price crashes and jumps between earnings announcement and non-earnings announcement weeks. For each week type, the firm-weeks with crashes or jumps are provided as a percentage of total number of firm-weeks in the year.

Table 2 Descriptive statistics

Variable	N	Mean	Std Dev	P25	Median	P75
Outcomes						
Crash	36,778	0.205	0.404	0.000	0.000	0.000
Jump	36,778	0.260	0.439	0.000	0.000	1.000
Up_bias	11,448	0.422	0.494	0.000	0.000	1.000
Precision	11,704	0.231	0.366	0.000	0.000	0.375
Transparency variables						
Forecast	36,778	1.551	3.167	0.000	0.000	2.000
Opacity	36,778	0.234	0.330	0.099	0.169	0.289
Accruals_quality	22,684	0.047	0.038	0.021	0.036	0.061
Control variables						
ROE	36,778	-0.302	47.853	-0.057	0.078	0.153
Size	36,778	5.721	2.161	4.139	5.698	7.179
Market-to-book	36,778	3.190	52.499	1.123	1.879	3.293
Leverage	36,778	0.219	0.234	0.019	0.173	0.343
Abn_acccruals	36,778	0.007	0.190	-0.029	0.017	0.060
Business_segments	36,778	5.720	4.365	3.000	3.000	9.000
Mean_return	36,778	0.004	0.013	-0.003	0.003	0.009
Std_return	36,778	0.081	0.051	0.048	0.069	0.101
Analyst_coverage	36,778	5.431	6.583	0.000	3.000	8.000
Insider_trading	36,778	0.813	3.166	0.000	0.040	0.500

Crash is a dummy for the extreme drop of stock price measured following HMT. ***Jump*** is a dummy for the extreme stock price increase measured following HMT. ***Up_bias*** is a dummy equaling one if, on average, the management forecasts are upward biased. Management forecast bias is measured as management forecast minus actual earnings, scaled by stock price on the day before the forecast. ***Precision*** is a proportion of total point and range forecasts. ***Forecast*** is the number of forecasts issued in the year. ***Opacity*** is the sum of three year absolute abnormal accruals from the modified Jones model as in HMT. ***Opacity2*** is a square of ***Opacity. Accruals_quality*** is the accrual quality measured from DD model. ***Accruals_quality2*** is a square of ***Accruals_quality. ROE*** is return on assets. ***Size*** is the year-end market value. ***Market-to-book*** is the ratio of market value to book value of equity. ***Leverage*** is the ratio of total debt to total assets. ***Abn_accrual*** is the residual of the cross-sectional Jones (1991) model estimated by industry. ***Business_segments*** is the number of business segments the firm operates in the year. ***Mean_return*** is the average of weekly returns. ***Std_return*** is the standard deviation of weekly returns. ***Analyst_coverage*** is the number of analysts issuing one-year-ahead EPS at the end of the year. ***Insider_trading*** is the number of shares traded by insiders as a percentage of total shares outstanding. ***Ded_own*** is a dummy equaling one if the percentage of shares owned by dedicated institutional investors is above the median for the year. ***Tra_own*** is a dummy variable equaling one if the percentage of shares owned by transient institutional investors is above the median for the year. ***CEO_own*** is a dummy variable equaling one if the beginning-of-the-year percentage of shares owned by the CEO is above the median for the year. ***Lit_industry*** is a dummy variable indicating whether the firm is in the biotech, computer, electronics, or retail industry. ***Lit_risk*** is the predicted lawsuits estimated from the probit model by Kim and Skinner (2011).

Table 3 Stock price crash and management forecast frequency

	Crash			*Jump*		
Intercept	-1.869***	-1.938***	-2.257***	-0.185	-0.187	-0.147
	(-17.38)	(-17.08)	(-18.53)	(-1.61)	(-1.56)	(-1.19)
ROE	0.010***	0.010***	0.014**	0.000	0.000	-0.016**
	(4.10)	(4.14)	(2.57)	(0.67)	(0.67)	(-2.03)
Size	0.059***	0.063***	0.087***	-0.159***	-0.159***	-0.167***
	(2.87)	(3.02)	(3.73)	(-6.46)	(-6.41)	(-6.19)
Market-to-book	0.003***	0.003***	0.003***	0.000	0.000	-0.001
	(4.00)	(4.14)	(2.74)	(0.44)	(0.44)	(-0.84)
Leverage	-0.179***	-0.168***	-0.093	0.106	0.107	0.010
	(-3.71)	(-3.58)	(-1.39)	(1.63)	(1.62)	(0.14)
Abn_accruals	0.244**	0.216*	0.106	0.016	0.030	0.096
	(2.19)	(1.76)	(0.59)	(0.36)	(0.63)	(1.03)
Business_segments	-0.014***	-0.014***	-0.012***	-0.002	-0.002	-0.001
	(-4.57)	(-4.54)	(-2.61)	(-0.44)	(-0.44)	(-0.14)
Mean_return	6.650***	6.783***	7.912***	-12.003***	-12.013***	-11.178***
	(5.05)	(5.07)	(4.06)	(-5.68)	(-5.66)	(-4.77)
Std_return	-1.416***	-1.608***	-1.879***	2.086***	2.083***	2.222***
	(-4.00)	(-4.75)	(-4.28)	(4.69)	(4.72)	(3.83)
Analyst_coverage	-0.002	-0.002	-0.009*	-0.014*	-0.014*	-0.012
	(-0.70)	(-0.75)	(-1.93)	(-1.76)	(-1.75)	(-1.57)
Insider_trading	0.006*	0.006*	0.011*	-0.008*	-0.008*	-0.007
	(1.79)	(1.73)	(1.65)	(-1.94)	(-1.93)	(-0.96)
Opacity		0.375***			0.006	
		(2.83)			(0.08)	
Opacity2		-0.255***			0.001	
		(-3.24)			(0.29)	
Accruals_quality			6.689***			-1.052
			(4.84)			(-0.90)
Accruals_quality2			-30.352***			6.378
			(-4.09)			(1.20)
Forecast	**0.022*** **	**0.022*** **	**0.021*** **	**0.004**	**0.004**	**0.007**
	(6.61)	**(6.87)**	**(4.79)**	**(0.79)**	**(0.79)**	**(1.03)**
Observations	42,915	36,778	22,684	42,915	36,778	22,684
Pseudo R-square (%)	1.44%	1.46%	1.71%	3.63%	3.63%	3.85%

Crash is a dummy for the extreme drop of stock price measured following HMT. ***Jump*** is a dummy for the extreme stock price increase measured following HMT. ***ROE*** is return on assets. ***Size*** is the year-end market value. ***Market-to-book*** is the ratio of market value to book value of equity. ***Leverage*** is the ratio of total debt to total assets. ***Abn_accrual*** is the residual of the cross-sectional Jones (1991) model estimated by industry. ***Business_segments*** is the number of business segments the firm operates in the year. ***Mean_return*** is the average of weekly returns. ***Std_return*** is the standard deviation of weekly returns. ***Analyst_coverage*** is the number of analysts issuing one-year-ahead EPS at the end of the year. ***Insider_trading*** is the number of shares traded by insiders as a percentage of total shares outstanding. ***Opacity*** is the sum of three year absolute abnormal accruals from the modified Jones model as in HMT. ***Opacity2*** is a square of ***Opacity. Accruals_quality*** is the accrual quality measured from DD model. ***Accruals_quality2*** is a square of ***Accruals_quality. Forecast*** is the number of forecasts issued in the year.

Table 4 Forecast frequency, upward forecast bias, and forecast precision

	Up_bias	*Precision*
Intercept	0.301	0.413***
	(1.52)	(14.17)
ROE	0.000	0.001***
	(0.03)	(8.21)
Size	-0.141***	0.020***
	(-4.32)	(4.23)
Market-to-book	0.001	0.000
	(1.20)	(0.09)
Leverage	0.684***	-0.001
	(4.42)	(-0.03)
Forecast	**0.055*** **	**-0.009*** **
	(5.06)	**(-6.36)**
Observations	11,448	11,704
Pseudo R-square (%)	3.41%	
Adjusted R-square (%)		12.27%

Up_bias is a dummy equaling one if, on average, the management forecasts are upward biased. Management forecast bias is measured as management forecast minus actual earnings, scaled by stock price on the day before the forecast. ***Precision*** is a proportion of total point and range forecasts. ***ROE*** is return on assets. ***Size*** is the year-end market value. ***Market-to-book*** is the ratio of market value to book value of equity. ***Leverage*** is the ratio of total debt to total assets. ***Forecast*** is the number of forecasts issued in the year.

Table 5 Stock price crash and upward forecast bias – conditional on having at least one forecast

	Crash			
Intercept	-1.603***	-1.622***	-1.564***	-1.506***
	(-7.11)	(-7.24)	(-6.60)	(-6.27)
ROE	0.016***	0.016***	0.009	0.009
	(2.90)	(2.81)	(1.15)	(1.14)
Size	0.032	0.036	0.033	0.034
	(0.76)	(0.89)	(0.75)	(0.78)
Market-to-book	0.004***	0.004***	0.002	0.002
	(3.72)	(3.67)	(0.62)	(0.61)
Leverage	-0.423***	-0.453***	-0.391***	-0.388***
	(-3.10)	(-3.35)	(-2.90)	(-2.87)
Abn_accruals	0.501**	0.489*	0.517**	0.518**
	(2.01)	(1.94)	(2.18)	(2.18)
Business_segments	-0.013**	-0.014**	-0.014**	-0.014**
	(-2.05)	(-2.17)	(-2.19)	(-2.20)
Mean_return	6.672***	10.297***	6.884***	7.167***
	(3.53)	(4.48)	(4.05)	(4.12)
Std_return	-1.419	-1.810*	-1.396	-1.400
	(-1.41)	(-1.83)	(-1.39)	(-1.41)
Analyst_coverage	-0.005	-0.005	-0.004	-0.004
	(-0.79)	(-0.68)	(-0.58)	(-0.58)
Insider_trading	0.011	0.012	0.010	0.010
	(1.49)	(1.59)	(1.35)	(1.42)
Opacity	0.272	0.274	0.320	0.324
	(1.04)	(1.06)	(1.13)	(1.14)
Opacity2	0.155	0.169	0.078	0.078
	(0.69)	(0.76)	(0.34)	(0.34)
Forecast	0.013***	-0.004	0.012**	0.007
	(2.70)	(-0.61)	(2.35)	(1.25)
Up_bias		0.068		
		(0.95)		
Forecast × Up_bias		**0.030****		
		(2.13)		
Precision				-0.160**
				(-2.25)
Forecast × Precision				**0.023**
				(1.01)
Observations	11,448	11,448	11,704	11,704
Pseudo R-square (%)	1.15%	1.38%	1.09%	1.11%

Crash is a dummy for the extreme drop of stock price measured following HMT. ***ROE*** is return on assets. ***Size*** is the year-end market value. ***Market-to-book*** is the ratio of market value to book value of equity. ***Leverage*** is the ratio of total debt to total assets. ***Abn_accrual*** is the residual of the cross-sectional Jones (1991) model estimated by industry. ***Business_segments*** is the number of business segments the firm operates in the year. ***Mean_return*** is the average of weekly returns. ***Std_return*** is the standard deviation of weekly returns. ***Analyst_coverage*** is the number of analysts issuing one-year-ahead EPS at the end of the year. ***Insider_trading*** is the number of shares traded by insiders as a percentage of total shares outstanding. ***Opacity*** is the sum of three year absolute abnormal accruals from the modified Jones model as in HMT. ***Opacity2*** is a square of ***Opacity. Forecast*** is the number of forecasts issued in the year. ***Up_bias*** is a dummy equaling one if, on average, the management forecasts are upward biased. ***Precision*** is a proportion of total point and range forecasts.

Table 6 Cross-sectional analyses with institutional and CEO share ownership

	Crash			
Intercept	-1.962***	-1.955***	-1.267***	-1.468***
	(-17.24)	(-17.81)	(-7.26)	(-7.86)
ROE	0.010***	0.010***	0.020**	0.020**
	(4.13)	(4.11)	(2.00)	(2.09)
Size	0.061***	0.040**	-0.011	0.003
	(3.02)	(2.06)	(-0.37)	(0.10)
Market-to-book	0.003***	0.003***	0.005***	0.005***
	(4.09)	(4.02)	(2.77)	(2.83)
Leverage	-0.165***	-0.166***	-0.380***	-0.364***
	(-3.57)	(-3.70)	(-3.65)	(-3.58)
Abn_accruals	0.219*	0.226*	0.243	0.253
	(1.78)	(1.84)	(0.74)	(0.76)
Business_segments	-0.014***	-0.013***	-0.011*	-0.010*
	(-4.42)	(-4.05)	(-1.91)	(-1.81)
Mean_return	6.807***	8.108***	5.455*	5.442*
	(5.13)	(6.46)	(1.71)	(1.72)
Std_return	-1.588***	-1.720***	-1.111	-1.119
	(-4.72)	(-5.50)	(-1.11)	(-1.13)
Analyst_coverage	-0.002	-0.005	-0.004	-0.006
	(-0.63)	(-1.49)	(-0.97)	(-1.55)
Insider_trading	0.586*	0.534	0.468	0.358
	(1.66)	(1.62)	(0.71)	(0.56)
Opacity	0.375***	0.353***	0.003	-0.044
	(2.82)	(2.64)	(0.01)	(-0.18)
Opacity2	-0.250***	-0.215***	-0.015	0.039
	(-3.19)	(-2.77)	(-0.06)	(0.16)
Forecast	0.041***	0.025***	0.008	0.015
	(8.65)	(2.68)	(1.20)	(1.23)
Ded_own	0.052			-0.089*
	(1.29)			(-1.66)
Forecast × Ded_own	**-0.031*** **			**-0.002**
	(-6.13)			**(-0.26)**
Tra_own		0.285***		0.241***
		(7.24)		(5.52)
Forecast × Tra_own		**-0.008**		**-0.009**
		(-0.81)		**(-0.81)**
CEO_own			-0.069	-0.073
			(-1.11)	(-1.15)
Forecast × CEO_own			**0.027*** **	**0.025*** **
			(2.87)	**(2.70)**
Observations	36,778	36,778	14,042	14,042
Pseudo R-square (%)	1.50%	1.71%	1.01%	1.17%

Crash is a dummy for the extreme drop of stock price measured following HMT. ***ROE*** is return on assets. ***Size*** is the year-end market value. ***Market-to-book*** is the ratio of market value to book value of equity. ***Leverage*** is the ratio of total debt to total assets. ***Abn_accrual*** is the residual of the cross-sectional Jones (1991) model estimated by industry. ***Business_segments*** is the number of business segments the firm operates in the year. ***Mean_return*** is the average of weekly returns. ***Std_return*** is the standard deviation of weekly returns. ***Analyst_coverage*** is the number of analysts issuing one-year-ahead EPS at the end of the year. ***Insider_trading*** is the number of shares traded by insiders as a percentage of total shares outstanding. ***Opacity*** is the sum of three year absolute abnormal accruals from the modified Jones model as in HMT. ***Opacity2*** is a square of ***Opacity. Forecast*** is the number of forecasts issued in the year. ***Ded_own*** is a dummy equaling one if the percentage of shares owned by dedicated institutional investors is above the median for the year. ***Tra_own*** is a dummy variable equaling one if the percentage of shares owned by transient institutional investors is above the median for the year. ***CEO_own*** is a dummy variable equaling one if the beginning-of-the-year percentage of shares owned by the CEO is above the median for the year.

Table 7 Cross-sectional analyses with litigation risk

	Crash	
Intercept	-1.995***	-1.895***
	(-17.71)	(-14.50)
ROE	0.010***	0.010***
	(3.84)	(3.47)
Size	0.068***	0.037
	(3.25)	(1.62)
Market-to-book	0.003***	0.003***
	(4.03)	(3.80)
Leverage	-0.136***	-0.255***
	(-2.91)	(-5.07)
Abn_accruals	0.206	0.175
	(1.62)	(1.50)
Business_segments	-0.012***	-0.014***
	(-3.86)	(-4.00)
Mean_return	7.920***	5.275***
	(5.17)	(3.31)
Std_return	-2.108***	-2.286***
	(-5.58)	(-6.48)
Analyst_coverage	-0.004	-0.008**
	(-1.45)	(-2.29)
Insider_trading	0.007**	0.006*
	(2.06)	(1.76)
Opacity	0.391***	0.445***
	(2.90)	(3.30)
Opacity2	-0.299***	-0.327***
	(-3.45)	(-3.49)
Forecast	0.030***	0.046***
	(6.33)	(4.80)
Lit_industry	0.162***	
	(4.47)	
Forecast × Lit_industry	**-0.022****	
	(-2.11)	
Lit_risk		0.322***
		(10.45)
Forecast × Lit_risk		**-0.034*****
		(-2.69)
Observations	35,691	34,143
Pseudo R-square (%)	1.62%	1.79%

Crash is a dummy for the extreme drop of stock price measured following HMT. ***ROE*** is return on assets. ***Size*** is the year-end market value. ***Market-to-book*** is the ratio of market value to book value of equity. ***Leverage*** is the ratio of total debt to total assets. ***Abn_accrual*** is the residual of the cross-sectional Jones (1991) model estimated by industry. ***Business_segments*** is the number of business segments the firm operates in the year. ***Mean_return*** is the average of weekly returns. ***Std_return*** is the standard deviation of weekly returns. ***Analyst_coverage*** is the number of analysts issuing one-year-ahead EPS at the end of the year. ***Insider_trading*** is the number of shares traded by insiders as a percentage of total shares outstanding. ***Opacity*** is the sum of three year absolute abnormal accruals from the modified Jones model as in HMT. ***Opacity2*** is a square of ***Opacity. Forecast*** is the number of forecasts issued in the year. ***Lit_industry*** is a dummy variable indicating whether the firm is in the biotech, computer, electronics, or retail industry. ***Lit_risk*** is the predicted lawsuits estimated from the probit model by Kim and Skinner (2011).

Table 8 Interaction between financial reporting opacity and management forecast frequency

	Crash
Intercept	-1.908***
	(-17.09)
ROE	0.010***
	(4.17)
Size	0.063***
	(3.05)
Market-to-book	0.003***
	(4.09)
Leverage	-0.165***
	(-3.55)
Abn_accruals	0.208*
	(1.70)
Business_segments	-0.014***
	(-4.43)
Mean_return	6.839***
	(5.19)
Std_return	-1.563***
	(-4.65)
Analyst_coverage	-0.003
	(-0.81)
Insider_trading	0.006*
	(1.67)
Opacity	0.168
	(1.54)
Opacity2	-0.141**
	(-2.44)
Forecast	-0.003
	(-0.43)
Forecast × Opacity	**0.173*** **
	(4.45)
Forecast × Opacity2	-0.093*
	(-1.67)
Observations	36,778
Pseudo R-square (%)	1.51%

Crash is a dummy for the extreme drop of stock price measured following HMT. ***ROE*** is return on assets. ***Size*** is the year-end market value. ***Market-to-book*** is the ratio of market value to book value of equity. ***Leverage*** is the ratio of total debt to total assets. ***Abn_accrual*** is the residual of the cross-sectional Jones (1991) model estimated by industry. ***Business_segments*** is the number of business segments the firm operates in the year. ***Mean_return*** is the average of weekly returns. ***Std_return*** is the standard deviation of weekly returns. ***Analyst_coverage*** is the number of analysts issuing one-year-ahead EPS at the end of the year. ***Insider_trading*** is the number of shares traded by insiders as a percentage of total shares outstanding. ***Opacity*** is the sum of three year absolute abnormal accruals from the modified Jones model as in HMT. ***Opacity2*** is a square of ***Opacity. Forecast*** is the number of forecasts issued in the year.