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Managers' Pay Duration and Voluntary Disclosures*

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Abstract

In this paper, we examine the effect of managers' pay duration on firms' voluntary disclosures. Pay duration refers to the average period that it takes for managers' annual compensation to vest. We hypothesize and find that pay duration can incentivize managers to provide more bad news earnings forecasts. This result holds after controlling for the level of stock-based compensation and the endogeneity of pay duration. In addition, we find that the effect of pay duration is more pronounced for firms with weaker governance and for firms with a more opaque information environment, where the marginal benefits of additional disclosures are higher. Our additional analyses indicate that managers with a longer pay duration issue more accurate earnings forecasts. Overall, our paper contributes to the literature by documenting that lengthening the vesting periods of managers' compensation can induce managers to be more forthcoming with bad news.

Key words: Voluntary disclosures, management forecasts, executive compensation, pay duration

JEL classification: G39, J33, M41

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1. Introduction

In this study, we examine the effect of managers' pay duration on firms' voluntary disclosures. Pay duration refers to the average period that it takes for managers' annual compensation to vest. Using management earnings forecasts to capture voluntary disclosures, we investigate whether managers with long pay durations are more likely to issue bad news earnings forecasts and issue them more frequently than those with short pay durations. We focus on bad news forecasts because managers generally disclose good news in a timely fashion, but are reluctant to disclose bad news (Kothari et al. 2009).[1]

Our study is motivated by the observation that the provision of stock-based compensation may fail to align managers' interests with those of the shareholders if the vesting period is short. A growing number of studies document that stock-based compensation can motivate managers to pursue short-term gains at the expense of long-term firm value (e.g., Cheng and Warfield 2005; Bergstresser and Philippon 2006; Bolton et al. 2006; Efendi et al. 2007). In the disclosure setting, while Nagar et al. (2003) find that managers' equity incentives can mitigate disclosure-related agency conflicts and increase voluntary disclosures, the findings in Kothari et al. (2009) suggest that stock-based compensation can motivate managers to withhold bad news due to their concerns about short-term stock price drops.

Some researchers argue that to address managerial short-termism, executive compensation should be linked to long-term performance. For example, Bebchuk and Fried (2010) argue that short-term pay arrangements are likely to have driven the excessive risk taking behavior exhibited by bank executives before the financial crisis and suggest that increasing the horizon of executive compensation is critical to addressing managerial myopia. A number of executives and

[1] As discussed below, in an additional analysis, we also examine the effect of pay duration on good news forecasts for the sake of completeness.

government officials share the same view. For example, former Treasury Secretary Timothy Geithner (2009) argued that "Companies should seek to pay top executives in ways that are tightly aligned with the long-term value and soundness of the firm."[2]

However, despite the widespread recognition of the importance of linking executives' pay to long-term firm performance, little research has examined the effect of the pay horizon on corporate decisions. In this study, we focus on voluntary disclosures, particularly of bad news. A longer pay duration can motivate managers to disclose bad news for several reasons. First, a longer pay duration can improve the interest alignment between shareholders and managers (Gopalan et al. 2013). To the extent that a lack of disclosure of bad news is a manifestation of disclosure-related agency problems (Nagar et al. 2003; Kothari et al. 2009), a longer pay duration can induce managers to be more forthcoming with bad news. Second, disclosures of bad news can help firms improve their investment efficiency, thereby benefiting managers in the long run, although not necessarily in the short run (Kumar et al. 2012). As the welfare of managers with longer pay durations is linked to the long-term value of their firms, they thus have a stronger incentive to disclose bad news. Third, the litigation concerns of withholding bad news are higher for managers who have long-term stakes in their firms (Chen et al. 2008). As such, the incentive to withhold bad news can be reduced by extending the vesting period of the manager's stock-based compensation. Lastly, because of the long vesting period, managers with longer pay durations are less likely to exercise their options and sell their shares in the near future. Accordingly, these managers are less sensitive to short-term stock price drops, motivating them to be more forthcoming with bad news.

[2] Former Federal Reserve Chairman Ben Bernanke (2009) made a similar remark, "Management compensation policies should be aligned with the long-term prudential interests of the institutions … and [should] avoid short-term payments for transactions with long-term horizons." In addition, Goldman Sachs's CEO Lloyd Blankfein (2009) urged that "An individual's performance should be evaluated over time so as to avoid excessive risk-taking. To ensure this, all equity awards need to be subject to future delivery and/or deferred exercise."

This line of reasoning suggests that managers with longer pay durations tend to be more forthcoming with bad news. In addition, long pay durations motivate managers to disclose information to address agency problems and to reduce the information asymmetry between managers and investors. Therefore, the effect of pay duration is expected to be stronger when the monitoring of a manager is weaker and when there is a high level of information asymmetry. We thus expect the effect of pay duration on bad news disclosures to be more pronounced for firms with weaker governance (proxied for by lower board independence and lower institutional ownership) and firms with a poor information environment (proxied for by lower analyst coverage and a higher probability of informed trade).

Following Gopalan et al. (2013), we measure pay duration as the weighted average of the vesting periods of the four components of CEO compensation: salary, bonus, restricted stock grants, and stock option grants, with the weight being the relative size of each component. (The vesting period for salaries and cash bonuses is naturally zero.) The stock-based compensation measure used in prior studies implicitly assumes that restricted stock grants and stock option grants have equal vesting periods. In contrast, the measure of pay duration explicitly incorporates the length of the vesting schedules of different stock or option grants.

Based on a sample of 7,686 firm-year observations from Russell 3000 firms between 2006 and 2010, our analyses yield the following main findings. First, we find that after controlling for the level of stock-based compensation and other potential determinants of voluntary disclosures, pay duration is significantly positively correlated with the likelihood and frequency of bad news earnings forecasts. This result indicates that managers with longer pay durations are more likely to disclose bad news forecasts and to disclose bad news forecasts more frequently.

Second, consistent with our prediction, we find that the effect of pay duration on the

disclosure of bad news is more pronounced for firms with weaker governance and firms with a more opaque information environment. Specifically, we find that pay duration has a stronger effect on bad news disclosure for firms with lower board independence, lower institutional ownership, lower analyst coverage, and a higher probability of informed trade (*PIN*).

We conduct several additional tests to ensure the robustness of our results and to provide additional insights. First, to address the potential endogeneity of pay duration, we control for firm fixed effects and perform a two-stage analysis using CEO tenure as the instrumental variable for pay duration. Both analyses lead to similar results. Second, we construct an alternative measure of pay duration that incorporates the equity grants awarded in previous years in addition to those awarded in the current year. The inferences from the analysis using the alternative measure remain the same. We do not use this measure in the main analyses because the calculation of this measure requires additional assumptions, which are likely to lead to measurement errors. Third, using forecast accuracy to capture the quality of voluntary disclosure, we find that pay duration is positively correlated with the accuracy of bad news earnings forecasts, suggesting that pay duration improves both the quantity and quality of voluntary disclosures. Fourth, we investigate the effect of pay duration on the disclosure of good news and fail to find evidence that a longer pay duration is significantly associated with a greater likelihood or frequency of good news disclosure.[3] Lastly, additional analyses indicate that our results are not driven by the following alternative explanations: (1) managers with long pay durations strategically disclose bad news earlier and withhold bad news in the future, and (2) the

[3] For the sake of completeness and to reconcile our findings with those of Nagar et al. (2003), we also examine the effect of pay duration on total management forecasts (including both good and bad news forecasts). Given the results based on bad news forecasts, not surprisingly, we find a significant coefficient on pay duration. In addition, consistent with Nagar et al. (2003), we find that the level of stock-based compensation has a significantly positive effect on the total management forecasts when we exclude pay duration or when we use the residual of pay duration (obtained from a regression of pay duration on the size of stock-based compensation) in place of pay duration in our regressions, although the coefficient on this variable is insignificant when pay duration is included in the analyses.

effect of pay duration captures a non-linear relationship between stock-based compensation and disclosure.

Our study makes the following contributions to the literature. First, our findings add to the voluntary disclosure literature that links executive compensation to management earnings forecasts. While prior research (e.g., Nagar et al. 2003) has established that the level of stock-based compensation influences the incentive alignment between managers and shareholders in the setting of voluntary disclosures, we extend this line of research by examining another important and distinctive feature of stock-based compensation, namely, the length of the vesting period. Given the recent evidence that stock-based compensation can induce managers to focus only on short-term performance at the expense of long-term firm value, it is important to understand whether and how increasing managers' pay duration can improve the effectiveness of stock-based compensation in addressing disclosure-related agency problems. Our study sheds light on this issue by providing evidence that given the same level of stock-based compensation, a longer duration can induce managers to be more forthcoming with bad news. Note that unlike Nagar et al. (2003), who do not distinguish between good news and bad news forecasts, we focus on bad news earnings forecasts. Such a focus is important because managers generally provide good news in a timely fashion but are reluctant to disclose bad news (Kothari et al. 2009). Thus, it is important to understand how managers can be induced to disclose bad news (Kumar et al. 2012).

Second, our study contributes to the extant literature on executive compensation by focusing on the time horizon of stock-based compensation, which has received little attention. Gopalan et al. (2013) examine the determinants of pay duration and its effect on abnormal accruals. Cadman et al. (2012) study the determinants of the vesting terms of option grants. Our

study complements these studies by examining how pay duration affects voluntary disclosures. Our finding that a longer pay duration can induce managers to increase bad news disclosures should be of interest to shareholders and Boards of Directors given the importance of disclosures for corporate governance (e.g., Beyer et al. 2010).[4]

The remainder of this paper is organized as follows. Section 2 reviews the related prior research and develops the hypotheses. Section 3 discusses the sample and the variable measurement. Section 4 provides the main empirical results and Section 5 reports additional tests. Section 6 concludes the paper.

2. Literature Review and Hypothesis Development

2.1 Prior Research on Stock-based Compensation and Voluntary Disclosure

Through their involvement in their firms' operations, managers enjoy an information advantage over shareholders with respect to firm profitability. Managers' disclosures of such information can reduce the information asymmetry between managers and shareholders, thereby increasing stock liquidity, decreasing the cost of capital, and enhancing firm value (e.g., Glosten and Milgrom 1985; Diamond and Verrecchia 1991). Disclosures also enable shareholders to better monitor managers, again leading to an increase in firm value (e.g., Shleifer and Vishny 1989; Bushman and Smith 2001).

While disclosures can benefit shareholders, they are costly to managers. Disclosures decrease managers' information advantage and thus potentially reduce insider trading profits

[4] Note that we document an important benefit of increasing pay duration and we do not investigate the optimality of pay duration. One potential cost of increasing pay duration is the additional risk premium for which firms have to compensate managers. Gopalan et al. (2013) provide some insights on this issue in their analysis of the determinants of pay duration. Specifically, they find that pay duration is longer for firms with more growth opportunities, long-term assets, high R&D intensity, lower operating risk, and better recent stock performance. Cadman et al. (2012) study the determinants of the vesting terms of option grants and arrive at similar conclusions. Note that we control for these determinants in the main analyses and/or in sensitivity tests, and we also conduct additional analyses to further address the potential endogeneity of pay duration.

(Baiman and Verrecchia 1996). Because disclosures can enhance investors' monitoring of managers, they can reduce managers' consumption of perks and their control over the firm. As a result, managers prefer to make fewer disclosures, particularly disclosures of bad news, because the shareholders might act on such information (Shleifer and Vishny 1989). In addition, because disclosures can help the labor market to better assess the talent and capabilities of managers, managers are reluctant to disclose information if they are uncertain how the market will respond to their disclosures (Nagar 1999). The reluctance to reveal information to shareholders is referred to as disclosure-related agency problems and such problems arise when the managers' interests are not aligned with those of the shareholders (Nagar et al. 2003).

Prior research suggests that stock-based compensation can align the interests of managers with those of the shareholders, thus reducing agency problems in general (Jensen and Meckling 1976; Morck et al. 1988) and disclosure-related agency problems in particular (Nagar et al. 2003). While stock-based compensation can increase the disclosure of good news because it provides managers with an incentive to boost the stock price, its effect on the disclosure of bad news is less clear. Stock-based compensation may elicit the disclosure of bad news if the stock market interprets non-disclosure to be a worse signal (Milgrom 1981; Verrecchia 1983). However, Kothari et al. (2009) find that managers tend to withhold bad news and that this tendency is stronger when the managers' personal wealth is more closely tied to their firms' stock price. This suggests that stock-based compensation may actually dampen the issuance of bad news disclosures. Moreover, the results of Kothari et al. (2009) are consistent with recent findings that managers with stock-based compensation tend to focus more on the current stock price, rather than the long-term value of the firm, and that these managers may engage in value-

destroying activities in pursuit of short-term gains.[5]

As discussed above, researchers and practitioners suggest that the excessive focus on short-term stock prices induced by stock-based compensation can be mitigated by lengthening the vesting period of the stock-based compensation. When the vesting period is longer, the manager will care more about the long-term value of the firm and less about its short-term stock price. Consistent with this notion, Gopalan et al. (2013) find a negative relationship between managers' pay duration and abnormal accruals (their proxy for managers' propensity to engage in myopic behavior to boost short-term earnings performance). This result suggests that longer pay durations improve the incentive alignment between shareholders and managers. It thus follows that given the same level of stock-based compensation, the effect of stock-based compensation may vary with its duration. In this study, we examine whether long pay durations can mitigate disclosure-related agency problems and improve the voluntary disclosure of bad news.

2.2 Hypothesis Development

In this section, we develop our hypotheses by discussing the costs and benefits of voluntary disclosure and how such costs and benefits vary with pay duration. Prior analytical and empirical research has documented the costs and benefits of disclosure. While some costs and benefits, such as increased liquidity and lower cost of capital, may affect both short-term and long-term focused managers, other costs and benefits may vary with the horizon of the managers' interests. If managers with long pay durations enjoy greater benefits from enhanced disclosures and/or if disclosures are less costly for them, then they will be more forthcoming than those with short pay

[5] For example, Cheng and Warfield (2005) and Bergstresser and Philippon (2006) find that managers with higher equity incentives are more likely to engage in earnings management. Burns and Kedia (2006) and Efendi et al. (2007) document that the likelihood of accounting restatements is positively related to managers' in-the-money option holdings. These studies argue that because the managers who receive stock/option grants tend to sell their shares and thus benefit from higher stock prices, stock-based compensation can induce managers to inflate short-term earnings and stock prices. However, some recent studies have found that managers' equity incentives are not related to the incidence of accounting fraud or accounting irregularities (e.g., Erickson et al. 2006; Armstrong et al. 2010).

durations. In the following paragraphs, we discuss why managers with long pay durations are more likely to disclose bad news than those with short pay durations.

First, prior research suggests that a lack of disclosure, particularly that of bad news, is a manifestation of agency problems (Nagar et al. 2003; Kothari et al. 2009). Specifically, disclosing bad news can increase shareholders' monitoring and potentially lead to adverse consequences for managers. As discussed above, Gopalan et al. (2013) argue that longer pay durations can reduce agency problems. It thus follows that longer pay durations can reduce disclosure-related agency problems and that managers with long pay durations are more likely to disclose forward-looking bad news than those with short pay durations.

Second, Kumar et al. (2012) analytically show that bad news disclosures can improve investment efficiency and ultimately firm value in the long-run. They also show that relative to managers with short horizons, those with long-term stakes in their firms have a greater propensity to disclose bad news in order to improve investment efficiency because they can benefit from the improved investment efficiency and the higher firm value in the long-run.[6] Given that managers with long pay durations have long-term stakes in their firms and benefit more from efficient long-term investments, they have greater incentives to provide more timely disclosures of bad news to avoid investment distortions.[7]

Third, prior research argues that withholding bad news can increase litigation costs (e.g.,

[6] Kumar et al. (2012) argue that bad news disclosures improve the efficiency of shareholders' capital allocations and, therefore, investment efficiency. Although disclosures of bad news entail short-term stock price drops, for managers with long-term stakes in their firms, the long-term gains from the enhanced firm value (as a result of improved efficiency in investment) outweigh the costs of the short-term stock price drops. This is not the case for managers with short-term stakes because the effect of short-term price drops is likely to dominate. We acknowledge that some of the assumptions in Kumar et al. (2012) may be stylized, such as the one that shareholders have a substantial influence on corporate investment decisions. However, in their model, shareholders can be interpreted as the board, whose mandate is to approve all important investment decisions. In addition, we note that their conclusion applies more to extreme news. As a result, when we analyze good news and bad news disclosures, we treat news with a small magnitude as neutral news.

[7] In contrast, if managers with short pay durations are more likely to engage in myopic investments (Gopalan et al. 2013), they will prefer less disclosure so that they can limit shareholders' ability to monitor them (e.g., Edlin and Stigliz 1995).

Skinner 1994; Field et al. 2005). The cost of the non-disclosure of bad news should be greater for managers with long pay durations, whose welfare is tied to firm value in the long run, just as it is for family owners (Chen et al. 2008). Facing higher litigation costs in relation to withholding bad news, managers with longer pay durations are expected to be more forthcoming with bad news.

Lastly, due to the longer vesting period of option/stock grants, managers with long pay durations are less likely to exercise the options and sell their shares in the short term. To substantiate this statement, in an untabulated analysis, we find that managers' stock and option grants are significantly positively correlated with the net sales of the shares in the next year when the pay duration is short, but not when the pay duration is long. That is, the positive association between managers' stock/option grants and their tendency to sell shares, as documented in prior research (e.g., Ofek and Yermack 2000), is dampened when the pay duration is longer. As such, managers with long pay durations are less sensitive to short-term stock price drops and have weaker incentives to withhold bad news than those with short pay durations.[8]

The above discussion suggests that managers with long pay durations are more likely to disclose bad news than those with short pay durations. In this study, we use management earnings forecasts to capture voluntary disclosures. Thus, the first hypothesis (in the alternative form) is as follows:

H1: Ceteris paribus, managers with long pay durations are more likely to issue bad news forecasts and issue bad news forecasts more frequently than managers with short pay durations.

The discussion thus far does not imply whether there is any difference in the good news disclosures between managers with long and those with short pay durations. The literature

[8] We acknowledge that withholding bad news before insider sales is subject to litigation risk (Cheng and Lo 2006). However, we reason that when the potential benefits of this strategy are higher, managers will be more likely to engage in such behavior than when the benefits are lower. To the extent that the benefits would be higher for managers with short pay durations, as they are more likely to sell shares in the near future than those with long pay durations, we expect them to be more likely to withhold bad news than those with long pay durations.

generally shows that managers tend to disclose good news and it is unclear whether this tendency varies with pay duration. As such, we do not have a formal hypothesis for good news forecasts. In one of the additional analyses, however, we examine the effect of pay duration on good news forecasts for the sake of completeness.

Our second and third hypotheses relate to the circumstances under which pay duration is likely to be more effective in motivating managers to disclosure bad news. Prior research has found that firms with better governance are more effective in monitoring managers, addressing agency problems and reducing information asymmetry, as they demand more information from their managers. Indeed, prior research has found that firms with more independent boards and firms with higher institutional ownership are more likely to disclose and tend to disclose more frequently (e.g., Ajinkya et al. 2005). Given that long pay durations also motivate managers to disclose bad news to address agency problems and reduce information asymmetry, it thus follows that the marginal effect of pay duration is likely to be lower for firms with better governance. In contrast, for firms with poor governance, i.e., less independent boards and lower institutional ownership, the effect of pay duration is expected to be more pronounced.

Similarly, when the information environment of a firm is already rich, further enhancing disclosure arguably has a smaller marginal effect (e.g., Verrecchia 1990).[9] In contrast, for firms with a more opaque information environment, the benefits of enhancing disclosure are greater and, therefore, managers with long pay durations will be more motivated to disclose information. Thus, pay duration has a stronger effect on bad news disclosures in firms with less transparent information environments.

The above discussions lead to the following hypotheses (stated in the alternative form):

[9] As in many prior studies, we take the quality of the existing information environment as a given and consider the incremental effect of additional disclosures.

H2: The effect of pay duration on bad news disclosures, as hypothesized in H1, is stronger for firms with weaker governance than for other firms.

H3: The effect of pay duration on bad news disclosures, as hypothesized in H1, is stronger for firms with more opaque information environments than for other firms.

As discussed below, we consider two proxies for the effectiveness of governance: board independence and institutional ownership. For the transparency of the information environment, we also use two proxies: analyst coverage and the probability of informed trades (*PIN*).

3. Research Design

3.1 Data and Sample Selection

We obtain the required data from various sources. We obtain the executive compensation data from Equilar for a broad set of firms included in the Russell 3000 index. Equilar provides detailed information on executive compensation from 2006 onward. The data coverage in Equilar is comprehensive and includes data items that are not available from ExecuComp, such as the grant date fair value and the vesting schedule of each equity compensation component. Such information is pivotal to the measurement of pay duration. We collect the data on management earnings forecasts from First Call's Company Issued Guidance file. For the control variables, we obtain financial information data from Compustat, stock price/return data from CRSP, analyst forecast data from I/B/E/S, equity offerings data from Security Data Corporation's Global New Issues database, and boards of director data from Corporate Library.

Table 1 describes our sample selection process. Because we analyze how the duration of managers' compensation awarded in year *t* influences the disclosure of earnings forecasts in year *t*+1, we require the CEO of the firm in year *t*+1 to have compensation data in year *t*.[10] This

[10] Cases where the CEO in year *t*+1 was not the CEO in year *t* are included in our sample as long as the executive works in the same firm (e.g., being the CFO).

procedure results in 10,920 firm-year observations in Equilar for the five-year period from 2006 to 2010. Our sample period ends with 2010 because our management forecast data obtained from First Call stop in November 2011.[11] Note that because our research design requires a one-year lag for pay duration, our analyses focus on management earnings forecasts issued during the period beginning with 2007. Of these observations, 150 firm-years are excluded because we are unable to find actual reported earnings figures and earnings announcement dates from First Call. In addition, 3,084 firm-years are excluded because of missing values on the control variables. This procedure leaves us with a sample of 7,686 firm-year observations.

3.2 Measurement of Pay Duration

Pay duration is the main variable of interest in our study. It captures the time horizon of managers' incentives arising from a mix of short-term and long-term CEO compensation. Following Gopalan et al. (2013), we measure pay duration (*P_DURATION*) as the weighted average of the vesting periods of the four CEO compensation components in a given year: salary, bonus, restricted stock grants, and stock option grants, with the weight being the relative size of each compensation component. Specifically, pay duration is calculated as follows:

$$P\_DURATION = \frac{\sum_{i=1}^{n_1} Restricted\ Stock_i \times t_i + \sum_{j=1}^{n_2} Option_j \times t_j}{Salary + Bonus + \sum_{i=1}^{n_1} Restricted\ Stock_i + \sum_{j=1}^{n_2} Option_j},$$

where *Salary* is the dollar value of annual salary, *Bonus* the dollar value of annual bonus, *Restricted Stock*$_i$ the grant date fair value of restricted stock grant *i* with a vesting period t_i (measured in the number of years), and *Option*$_j$ the grant date fair value of stock option grant *j* with a vesting period t_j (measured in the number of years). n_1 (n_2) is the total number of restricted

[11] We include observations from fiscal year 2010 (and corresponding management forecast data in 2011) to increase the sample size and the power of the test, but this data restriction introduces two complications. First, for year 2010, we cannot obtain actual EPS or analyst consensus forecasts from the First Call database. As a result, we obtain such data from I/B/E/S. Second, the management forecast coverage for 2011 is incomplete. These complications do not bias our results, but are likely to introduce noise into the analyses. However, our inference remains the same when we restrict our sample period to 2006 to 2009 (untabulated).

stock grants (stock option grants) in a given year.[12] See Appendix B for an example of the calculation of pay duration. Note that although the vesting period is zero for salary and bonus, it is important to include them in the denominator. Pay duration is constructed to capture managers' horizons induced by their annual compensation. If a manager's compensation is primarily in the form of salary and bonus, granting her a small amount of options and stocks with a very long vesting period will not induce her to act in the interests of long-term shareholders.

One complication with the calculation of *P_DURATION* is that the number of securities and their vesting schedules are sometimes contingent on future performance. For these securities, we follow Gopalan et al. (2013) and make the following assumptions in the calculation. First, when the vesting of a grant is contingent on future performance but the number of securities is fixed, we assume that this grant will vest all at once at the end of the period over which performance is measured. Second, when a grant has a performance-based vesting schedule, we assume that this grant will vest according to the initially specified vesting schedule. Third, when a grant is part of a long-term incentive plan in which the exact number of securities offered is contingent on future performance, we assume that the number of securities offered is the target number of securities and that the vesting begins after the end of the performance period.

There are two limitations with the annual-based pay duration measure. First, it assumes that managers exercise all of the grants once they vest. This is not necessarily true. Some managers may hold the options and stocks for an extended period after they vest. Thus, the horizon of CEO compensation is longer than that indicated by the pay duration measure. However, there is no compelling reason that this issue will introduce a systematic bias. Second, the measure does not incorporate the effects of existing stock and option holdings. It also does not incorporate deferred

[12] When grants of restricted stocks and stock options have a graded vesting schedule, the vesting period t is modified as $(t+1)/2$.

compensation, such as post-retirement benefits, for which the vesting schedules are usually unavailable. Our measure therefore only reflects the incentives arising from the current year's compensation. In a sensitivity test, we calculate an alternative measure of pay duration by including stocks and options that were awarded in previous years. Our inferences based on this alternative measure remain the same. However this measurement has its own limitations. Obtaining similar results from both measures increases our confidence in the results. Please see Section 5.2 for a detailed discussion.

3.3 Management Earnings Forecasts

Figure 1 depicts the timeline of the variable measurement. To test our hypotheses, we focus on managers' forecasts of the current period's earnings, either annual or quarterly, issued after the earnings announcement for fiscal year *t* but before the end of fiscal year *t*+1. We exclude earnings forecasts issued between fiscal period-end and the earnings announcement dates, i.e., pre-announcements, because managers have less discretion in such forecasts.[13]

Among the management forecasts issued during a year, we identify those forecasts that convey bad news to test our hypotheses. Prior studies classify a forecast as a bad news (good news) forecast if the forecasted value is lower (higher) than the most recent consensus analyst forecast (e.g., Anilowski et al. 2007; Cheng et al. 2013). However, when management forecasts are released contemporaneously with earnings announcements, the prevailing consensus analyst forecast is no longer a good proxy for the market's up-to-date expectation of future earnings. To address this problem, we adopt Rogers and Van Buskirk's (2013) procedure to calculate the conditional analyst expectations, which reflect the hypothetical analyst estimates that analysts

[13] We follow previous studies (e.g., Ajinkya et al. 2005; Houston et al. 2010) in excluding pre-announcements because these forecasts are considered part of the earnings announcement strategy, not a voluntary disclosure activity. Our inferences remain the same when we include these pre-announcements in the measurement of forecast issuance and frequency (untabulated).

would have issued immediately following the earnings announcement but without the effect of management forecasts.[14] Our results are similar when we use the traditional approach in defining forecast news (i.e., making no adjustments for bundled forecasts).

We use two variables to capture the level of the voluntary disclosure of bad news: (1) an indicator for the issuance of bad news earnings forecasts (*D_MF*), and (2) the frequency of bad news earnings forecasts (*N_MF*). *D_MF* equals one if a firm issues bad news earnings forecasts at least once in a given year, and zero otherwise. *N_MF* is calculated as the natural logarithm of one plus the number of bad news earnings forecasts issued by the firm in a given year. This variable takes the value of zero if a firm does not issue any forecasts. We conduct a Probit regression when *D_MF* is the dependent variable and an OLS regression when *N_MF* is the dependent variable, to examine the effects of pay duration on the likelihood and frequency of bad news forecasts, respectively.

3.4 Control Variables

To ensure that pay duration does not capture the effect of other variables, we control for a series of variables that prior research suggests affect voluntary disclosures. First, we include the level of stock-based compensation (*EQ_COMP*) and the dollar value of managers' equity holdings (*SHAREHOLDING*) because Nagar et al. (2003) find that these variables are positively associated with the issuance of managers' earnings forecasts. Second, we include corporate governance variables such as institutional ownership (*INST*) and board independence (*BIND*).

[14] For example, suppose a firm discloses earnings, X_t, for period *t*. Prior to the earnings announcement, analysts have expectations of earnings for both period *t*, $E[X_t]$, and for period *t+1*, $E[X_{t+1}]$. If the firm issues an earnings forecast for the period *t+1*, $f[X_{t+1}]$, on the earnings announcement date of the period *t* earnings, this forecast is regarded as a bundled forecast. For this forecast, the traditional approach, which uses the prevailing analyst estimates, measures forecast news as $f[X_{t+1}] - E[X_{t+1}]$. The problem with this approach is that given the earnings announcement, $E[X_{t+1}]$ is stale. To address this problem, Rogers and Van Buskirk (2013) compute forecast news as $f[X_{t+1}] - E[X_{t+1} \mid X_t]$. If the difference between a management forecast and its conditional analyst expectation (in absolute value) is less than 0.1% of the firm's beginning price, we define the forecast news as 'neutral,' and do not consider it either a good news or bad news forecast. See Rogers and Van Buskirk (2013) for details on estimating conditional analyst expectations ($E[X_{t+1} \mid X_t]$).

Ajinkya et al. (2005) and Karamanou and Vefeas (2005) find that corporate governance is positively related to the issuance of management forecasts. Third, following prior literature on voluntary disclosures (e.g., Ajinkya and Gift 1984; Lang and Lundholm 1993; Frankel et al. 1995; Hutton 2005), we control for the number of analysts following (*AC*), analyst forecast dispersion (*DISP*), return volatility (*RVOL*), litigation (*LIT*), firm size (*SIZE*), market-to-book (*MTB*), equity issuance (*EQ_ISS*), and stock performance (*RET*).[15] Finally, we include industry and year fixed effects in our regressions to control for the potential variation in disclosure activities over time and across industries. The measurement of these variables is explained in more detail in Appendix A.

3.5 Descriptive Statistics

Panel A of Table 2 reports the descriptive statistics of the variables used in our analyses. The mean of *D_MF* is 0.3505, suggesting that 35% of firm-years in our sample provide bad news earnings forecasts at least once in the year. The mean of *N_MF* (before log transformation) is 0.8999, indicating that our sample firms on average issue just under one bad news earnings forecast a year.[16] The mean of *P_DURATION* is 1.4633, suggesting that managers' total compensation in our sample on average vests in approximately one and a half years. More importantly, we observe a large variation in pay duration: the average pay duration is 0.1985 for the bottom 25% of the sample and 2.5361 for the top 25% of the sample (not tabulated). The mean of *EQ_COMP* is 0.3897, implying that 39% of total annual compensation is in the form of options and restricted stocks. The mean of *SHAREHOLDING* is $74 million. In addition, our sample firms on average have institutional ownership of 74% and nine analysts following, and

[15] In the main analyses, *LIT* is measured as a dummy variable for highly litigious industries. In an untabulated analysis, we use an alternative measure based on the litigation risk model developed in Kim and Skinner (2012) and the inferences remain the same.

[16] Untabulated tests show that 38% of the firm-years in our sample provide good news earnings forecasts at least once in a year and on average firms issue one good news forecast a year.

75% of the firms have board independence of 60% or higher. The distributions of these and other firm characteristics in our sample are similar to those in recent studies on management forecasts (e.g., Chen et al. 2008; Feng et al. 2009).

Panel B reports the Pearson correlation coefficients among the variables. Consistent with hypothesis H1, *P_DURATION* is positively correlated with *D_MF* and *N_MF*. Not surprisingly, *P_DURATION* is highly correlated with the level of stock-based compensation, *EQ_COMP* (correlation coefficient=0.71). This strong correlation indicates that it is important to distinguish between the effect of the vesting period and that of the level of stock-based compensation *per se*. When both *P_DURATION* and *EQ_COMP* are included in the regressions, the coefficient on *P_DURATION* captures only the incremental effect of pay duration over the magnitude of the equity incentives. The correlation coefficients among the control variables are small, except those for analyst coverage and managers' equity holdings (0.39) and firm size (0.46).

4. Empirical Results

4.1 Pay Duration and Management Forecasts: Test of H1

We use the following regression to test H1:

$$\begin{aligned} MF_{i,t+1} = {} & \alpha_0 + \alpha_1 P\_DURATION_{i,t} + \alpha_2 EQ\_COMP_{i,t} + \alpha_3 SHAREHOLDING_{i,t} + \alpha_4 INST_{i,t} \\ & + \alpha_5 AC_{i,t} + \alpha_6 DISP_{i,t} + \alpha_7 RVOL_{i,t+1} + \alpha_8 BIND_{i,t} + \alpha_9 LIT_{i,t} + \alpha_{10} SIZE_{i,t} \\ & + \alpha_{11} MTB_{i,t} + \alpha_{12} EQ\_ISS_{i,t+1} + \alpha_{13} RET_{i,t+1} + Industry\ Dummies \\ & + Year\ Dummies \end{aligned} \quad (1)$$

where $MF_{i,t+1}$ is the probability of issuing a bad news earnings forecast, $Prob(D\_MF_{i,t+1} = 1)$, or the natural logarithm of one plus the number of bad news forecast issued, $N\_MF_{i,t+1}$. As noted above, we use the Probit regression for the former and OLS regression for the latter. All p-values are based on standard errors adjusted for firm-clustering and year-clustering to address the

potential correlation across observations (within the same firm or within the same year).[17] The p-values are one-sided for the variable of interest (for hypothesis testing) and two-sided otherwise.

Table 3 presents the regression results. As reported in Column (1), the coefficient on *P_DURATION* in the Probit regression is significantly positive (p=0.001), suggesting that CEOs with longer pay durations are more likely to issue bad news earnings forecasts. The marginal effect is 4.4% when the pay duration increases from the first to the third quartile of the sample distribution while holding other independent variables at their respective means. This marginal effect is economically significant given that only 35% of the firm-years have bad news earnings forecasts. Only one variable has a higher marginal effect than *P_DURATION*: *INST* (7.4%). The inferences based on the OLS regression, as reported in Column (2), are the same. The coefficient on *P_DURATION* is significantly positive (p=0.001). A change in *P_DURATION* from the first to the third quartile of the sample distribution increases the number of bad news forecasts by 4%. These results are consistent with H1 that managers with long pay durations are more likely to issue bad news forecasts and issue bad news forecasts more frequently than those with short pay durations.

The results for the control variables are largely consistent with those in previous studies (e.g., Ajinkya et al. 2005; Feng et al. 2009). We find that the likelihood and frequency of bad news management forecasts are positively correlated with institutional ownership (*INST*), analyst coverage (*AC*), board independence (*BIND*), and firm size (*SIZE*), and are negatively correlated with forecast dispersion (*DISP*), return volatility (*RVOL*), market-to-book ratio (*MTB*), and

[17] In an untabulated analysis, we adopt an alternative design to control for the correlation of error terms for observations from the same firm: we estimate the regressions using the average of the variables over the sample period, with the exception of *D_MF*. *D_MF* is one if the firm issues at least one bad news management earnings forecast during the sample period and zero otherwise. The inferences are the same.

equity issuance (*EQ_ISS*).[18] We find that the coefficient on *EQ_COMP* is insignificant. While this result may appear to be inconsistent with what is reported in Nagar et al. (2003), Nagar et al. (2003) do not separately examine bad news forecasts. We reconcile our results with those of Nagar et al. (2003) when we examine the likelihood and frequency of total management forecasts (including both good and bad news forecasts) in Section 5.4.

4.2 Cross-Sectional Variation of the Effect of Pay Duration: Tests of H2 and H3

H2 and H3 imply that the effect of pay duration on bad news earnings forecasts is stronger for firms with weaker governance and for firms with a more opaque information environment, respectively, than for other firms. To test H2 (H3), we construct an indicator variable for firms with weaker governance (a more opaque information environment) and then add the indicator variable and its interaction with pay duration to Equation (1).

We use two variables to capture the effectiveness of corporate monitoring: board independence and institutional ownership. Both variables are widely used in the literature to capture the effectiveness of the monitoring of managers (e.g., Ajinkya et al. 2005). Specifically, we follow Chen et al. (2008) and construct an indicator variable, *LOW_BIND*, for firms with less independent boards, which equals one if less than 60% of the firm's directors are independent, and zero otherwise. Similarly, we construct another indicator variable, *LOW_INST*, for firms with lower institutional ownership, which equals one if the firm's institutional ownership (*INST*) is below the sample median, and zero otherwise. We then add an interaction term between these indicator variables and *P_DURATION* to Equation (1).[19] Table 4 reports the regression results, with the results for board independence presented in Panel A and those for institutional

[18] The coefficient on *EQ_ISS* should be interpreted with caution as only 8% of the firm-years have equity issuance.
[19] Because we include the indicator variable for lower levels of board independence (*LOW_BIND*) in the cross-sectional analysis, we drop the original control variable of *BIND* from the regression model. We do the same for institutional ownership (*INST*) and analyst coverage (*AC*) in the respective cross-sectional test.

ownership presented in Panel B. As Table 4 shows, the coefficient on the interaction of *P_DURATION* with *LOW_BIND* is significantly positive (p=0.005 and 0.007, respectively), suggesting that the effect of pay duration on the management forecasts of bad news is more pronounced for firms with lower board independence. Similarly, the coefficient on the interaction of *P_DURATION* with *LOW_INST* is positive, although it is only significant in the analysis of the likelihood of bad news forecasts (p=0.002).

Overall, these results suggest that if the monitoring by independent boards and/or institutional investors is not sufficiently strong to induce managers to provide more disclosures of bad news, the effect of long pay duration on bad news disclosure is greater.

To test H3, we construct two indicator variables for firms with a more opaque information environment: one based on the level of analyst coverage (*LOW_AC*) and the other based on the probability of informed trade (*HIGH_PIN*). It is well-established in the literature that analyst coverage is positively correlated with the richness of the information environment, as financial analysts tend to follow firms with rich information environments, and they also help to increase the amount of information available to investors (e.g., Healy and Palepu 2001). Similarly, a large numbers of studies have used PIN to measure the extent of the information asymmetry among investors (Brown et al. 2004). *LOW_AC* equals one if a firm's analyst coverage (*AC*) is below the sample median, and zero otherwise, and *HIGH_PIN* equals one if a firm's probability of informed trade (*PIN*) over the previous eight quarters is above the sample median, and zero otherwise.[20]

Table 5 reports the results of the testing of H3, with Panel A presenting the results based on analyst coverage and Panel B the results based on the probability of informed trade. As Table 5

[20] We thank Stephen Brown for sharing the data on the probability of informed trade (http://www.rhsmith.umd.edu/faculty/sbrown/).

shows, the coefficient on the interaction of *P_DURATION* with *LOW_AC* is significantly positive (p=0.002 and 0.036, respectively). The coefficient on the interaction of *P_DURATION* with *HIGH_PIN* is also positive, although only significant in explaining the likelihood of bad news forecasts (p=0.030). These results suggest that the effect of pay duration on bad news earnings forecasts is stronger for firms with lower levels of analyst coverage or a higher likelihood of informed trading, which indicate a less transparent information environment.

In sum, our results are consistent with H2 and H3 that the effect of pay duration on bad news disclosures is greater for firms with weaker governance and for firms with a more opaque information environment.

5. Additional Analyses

5.1 Controlling for the Endogeneity of Pay Duration

As with previous studies on executive compensation, our study is subject to a potential endogeneity issue if pay duration and disclosure are both affected by common firm characteristics (e.g., Nagar et al. 2003). Note that in the above regressions, we control for the determinants of voluntary disclosure as suggested by prior research.[21] To further address this potential endogeneity concern, we conduct two additional tests. In the first, we control for firm-fixed effects. To the extent that both pay duration and disclosure are affected by unobservable (time-invariant) factors, the inclusion of firm-fixed effects can alleviate such a concern. (To the extent that our sample period is relatively short, the omitted variables are more likely to be time-invariant.) Table 6 reports the regression results of this test. (Industry fixed effects are no longer included as they are subsumed by firm fixed effects.) Consistent with the results reported in Table 3, the coefficient on *P_DURATION* is positively correlated with the probability (p=0.099)

[21] Our control variables also include the determinants of pay duration identified by Gopalan et al. (2013).

and frequency of the issuance of bad news (p=0.024).[22]

In the second, untabulated, test, we use CEO tenure as an instrument variable and conduct a two-stage regression analysis. While Gopalan et al. (2013) report a negative relationship between CEO tenure and pay duration, there is no documented link between CEO tenure and the issuance of management earnings forecasts. The diagnostic tests, as suggested in Larcker and Rusticus (2010), indicate that CEO tenure is a valid instrument variable. The inferences from this analysis remain the same.

In sum, these analyses indicate that our results are robust to controlling for the potential endogeneity of pay duration.

5.2 Cumulative Measure of Pay Duration

The pay duration measure used above focuses on the stock and option grants awarded in the current year and overlooks the duration of the stock and option grants awarded in the previous years. In this section, we estimate Equation (1) by using an alternative pay duration measure that incorporates the stock and option grants awarded in the current year as well as those awarded previously. Because Equilar provides detailed information about individual stock and option grants starting from 2006 when the new regulations on executive compensation became effective, we can only incorporate stock and option grants awarded in previous years from 2006 onwards.[23] For example, the cumulative measure for a CEO in 2008 includes options and stocks

[22] We would like to caution the readers in regard to the fixed effect results from the Probit regression because the number of observations that are actually used in the estimation is reduced significantly to 2,776. To contribute to the estimation, a firm should have a variation in the issuance of bad news forecasts over time (i.e., having forecasts in some years and not having in other years). Firms that consistently have or consistently do not have forecasts throughout the sample period do not contribute to the estimation. Similar logic applies to the fixed effect OLS regression, but the sample size drops by a much smaller scale due to the variation in the frequency of bad news forecasts over the sample period.

[23] When constructing this measure, the values of previously awarded unvested stocks and options grants are re-estimated at the end of each year. Stock values are calculated as (the closing price × the number of shares), and option values are calculated using the Black-Sholes formula. However, Equilar does not provide the exercise price and expiration date of the options awarded as part of long-term incentive plans. Therefore, for those options, we

granted in 2006, 2007, and 2008 that are still held by the CEO. Note that this cumulative measure is based on more years' option and stock grants in the later part of the sample period (i.e., 2009 and 2010) than in the earlier part of the sample period (i.e., 2007 and 2008). In an untabulated analysis, we find that the main measure and this cumulative measure of pay duration are highly correlated in the later years of our sample period (correlation coefficient=0.87 in 2009 and 0.85 in 2010), suggesting that the pay duration variable based on annual compensation can be used as a proxy for the overall pay duration.

Table 7 reports the regression results. We find that the coefficient on the cumulative measure of *P_DURATION* is significantly positive in both the Probit and OLS regressions (p=0.004). These results suggest that the duration of total equity incentives has a positive effect on the likelihood and frequency of bad news earnings forecasts. We also obtain consistent results for other analyses when using the cumulative measure of pay duration and do not tabulate the results for the sake of space.

5.3 The Effect of Pay Duration on Forecast Accuracy

The analyses thus far have focused on the effect of pay duration on the quantity of management earnings forecasts. However, pay duration can also affect the quality of management forecasts if longer pay duration motivates managers to exert more effort in discovering high quality information and/or to spend more time analyzing and interpreting the newly acquired information. To investigate whether this is the case, we examine the effect of pay duration on the accuracy of management earnings forecasts. We define *MF_Accuracy* as negative one times the average forecast error of bad news earnings forecasts issued in a given year. Forecast error is calculated as the absolute value of the difference between forecasted

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assume that their values stay the same as their grant date present value, as provided in Equilar, throughout the vesting period. Excluding those options does not affect our inference.

earnings and actual earnings, scaled by the stock price at the beginning of the fiscal year. We then regress *MF_Accuracy* on pay duration and the control variables using the following specification:

$$\begin{aligned} MF\_Accuracy_{i,t+1} = {} & \gamma_0 + \gamma_1 P\_DURATION_{i,t} + \gamma_2 EQ\_COMP_{i,t} + \gamma_3 SHAREHOLDING_{i,t} + \gamma_4 INST_{i,t} \\ & + \gamma_5 AC_{i,t} + \gamma_6 DISP_{i,t} + \gamma_7 RVOL_{i,t+1} + \gamma_8 BIND_{i,t} + \gamma_9 LIT_{i,t} + \gamma_{10} SIZE_{i,t} \\ & + \gamma_{11} MTB_{i,t} + \gamma_{12} EQ\_ISS_{i,t} + \gamma_{13} RET_{i,t+1} + \gamma_{14} LOSS_{i,t+1} + \gamma_{15} ABSCHG\_ROA_{i,t+1} \\ & + \gamma_{16} MF\_HORIZON_{i,t+1} + \gamma_{17} MF\_SURPRISE_{i,t+1} + \gamma_{18} IMR_{i,t+1} \\ & + Industry\ Dummies + Year\ Dummies + \mu_{i,t+1} \end{aligned} \quad (2)$$

Because *MF_Accuracy* is available only for firms that issue management earnings forecasts, the analysis is based on the 2,758 firm-year observations that issue management earnings forecasts (in the form of either point or range estimates). To address the potential selection bias, we include the inverse Mills ratio (*IMR*) calculated from Equation (1) as an additional control variable. In addition to the control variables included in Equation (1), we follow prior studies and control for firm performance in the year (*LOSS*, *ABSCHG_ROA*), managers' forecast horizon (*MF_HORIZON*), and forecast surprise (*MF_SURPRIZE*). See the note to Table 8 for the measurement of these variables.

Table 8 reports the regression results. As the table shows, the coefficient on *P_DURATION* is significantly positive (p=0.013), suggesting that managers with longer pay duration provide more accurate bad news earnings forecasts. Overall, the results suggest that longer pay durations improve not only the quantity but also the quality of bad news forecasts.

5.4 The Effect of Pay Duration on Good News Forecasts and Total Management Forecasts

In this section, we first explore the effect of pay duration on good news forecasts for the sake of completeness. Unlike for bad news forecasts, the expected effect of pay duration on good news forecasts is unclear. To the extent that long pay durations can lessen disclosure-related agency problems in general and not disclosing good news in a timely fashion is a manifestation of agency problems, one would expect managers with longer pay durations to be more likely to

issue good news forecasts. However, issuing forward-looking good news forecasts is subject to litigation risk because such forecasts may turn out to be wrong (Cheng and Lo 2006; Cheng et al. 2013). Given that managers with long pay durations are more susceptible to litigation risks, these managers may be less likely to provide good news forecasts than those with short pay durations. In addition, unlike those with short pay durations, managers with long pay durations are less likely to enjoy the benefits of disclosing good news earlier. Therefore, whether pay duration affects the disclosure of good news is an empirical question.

Table 9 reports the results of estimating Equation (1) by replacing the dependent variable with an indicator variable for the issuance of good news forecasts (Column 1) and the natural logarithm of one plus the number of good news forecasts (Column 2). As Table 9 shows, the coefficient on *P_DURATION* is not statistically significant at the conventional levels. That is, we fail to find evidence that pay duration has a significant effect on the likelihood and frequency of good news forecasts.

Next, for the sake of completeness and to reconcile our findings with those of Nagar et al. (2003), Table 9 also reports the results for total management forecasts (including both good news and bad news earnings forecasts), where the dependent variable is an indicator variable for the issuance (Column 3) and the natural logarithm of one plus the number (Column 4) of total management forecasts. Given the results for bad news forecasts, it is not surprising to find a significant coefficient on pay duration. However, the coefficient on *EQ_COMP* is insignificant. This result may appear to be inconsistent with what is reported in Nagar et al. (2003). Because *P_DURATUION* and *EQ_COMP* are highly correlated with each other and the common effect is not captured by either variable when both are included in the regression, the insignificant coefficient on *EQ_COMP* does not imply that *EQ_COMP* has no effect on disclosure. In an

untabulated analysis, we find that the coefficient on *EQ_COMP* is significantly positive when we drop *P_DURATUION* from the regression, as documented in Nagar et al. (2003), or when we use the residual pay duration obtained from a regression of *P_DURATUION* on *EQ_COMP*.

5.5 Alternative Explanations for the Effect of Pay Duration on Bad News Disclosure

One alternative explanation for the positive effect of pay duration on bad news disclosure is that managers with long pay durations *opportunistically* issue bad news earnings forecasts earlier when they are constrained to sell their newly awarded stock options/shares but later issue good news and/or withhold bad news when the previously awarded stock options/shares are vested. We do not believe that this alternative explanation is applicable. First, we obtain the same inferences when we use the cumulative measure of pay duration that includes the stock and option grants awarded in previous years, as discussed in Section 5.2. If the current options/stock grants are positively associated with bad news forecasts in the next year, but negatively associated with bad news forecasts in the following years, we would not have observed the strong results for the effect of options/stock granted in the past few years on the issuance of bad news forecasts. Second, in an untabulated analysis, we do not find that the cumulative measure of pay duration has a significant effect on good news forecasts, which is inconsistent with the argument that the duration of the stock and option grants awarded in the prior periods affect managers' disclosure of good news in future periods.

Another alternative explanation for our main results is that the effect of pay duration captures a non-linear relation between equity-based compensation and disclosure. To address this concern, in an untabulated analysis, we re-estimate Equation (1) after including the squared term of *EQ_COMP* and find that the coefficient on *P_DURATION* is still significantly positive. That is, even after controlling for the non-linear relationship between the magnitude of equity-based

compensation and disclosure, our inferences on pay duration remain the same.

In sum, our results are not consistent with the opportunistic view that managers with long pay durations strategically provide more bad news forecasts or with the possibility that pay duration captures the non-linear relationship between equity-based compensation and disclosure.

6. Conclusion

In this study, we investigate the effect of managers' pay duration on voluntary disclosures. We hypothesize that managers with longer pay durations are more likely to issue bad news earnings forecasts because their welfare is less sensitive to short-term stock price drops and they benefit more from enhanced disclosures. Consistent with our hypothesis, we find that managers with long pay durations are more likely to issue bad news earnings forecasts and issue bad news forecasts more frequently than those with short pay durations.

We further find that the positive effect of pay duration on disclosure is more pronounced for firms with weaker governance, such as when board independence or institutional ownership is low, and for firms with a more opaque information environment, such as when analyst coverage is low and the probability of informed trade is high. These results suggest that pay duration plays a more important role in inducing managers to disclose bad news when firms have relatively weak corporate governance and an opaque information environment, where the marginal benefits of additional disclosure are greater.

In the additional analyses, we find that (1) our results are robust to the endogeneity of pay duration, (2) the results hold when pay duration is calculated using stock and option grants awarded in the current and past years, (3) forecasts issued by managers with longer pay durations are more accurate than those issued by others, (4) pay duration is not significantly associated

with the disclosure of good news, and (5) the results are not driven by the alternative explanations that managers with long pay durations strategically disclose bad news earlier and withhold bad news later and that pay duration captures a non-linear relationship between equity-based compensation and disclosure.

Overall, our results indicate that increasing pay duration, i.e., increasing the vesting period of stock-based compensation, can effectively mitigate disclosure-related agency problems and motivate managers to convey bad news. The importance of increasing pay duration is particularly salient for firms in which there is a greater need to improve voluntary disclosures.

References

Ajinkya, B. B., and M. J. Gift. 1984. Corporate managers' earnings forecasts and symmetrical adjustments of market expectations. *Journal of Accounting Research* 22 (2): 425-444.

Ajinkya, B., S. Bhojraj, and P. Sengupta. 2005. The association between outside directors, institutional investors, and the properties of management earnings forecasts. *Journal of Accounting Research* 43 (3): 343-376.

Anilowski, C., M. Feng, and D. J. Skinner. 2007. Does earnings guidance affect market returns? The nature and information content of aggregate earnings guidance. *Journal of Accounting and Economics* 44 (1-2): 36-63.

Armstrong, C. S., A. D. Jagolinzer, and D. F. Larcker. 2010. Chief executive officer equity incentive and accounting irregularities. *Journal of Accounting Research* 48 (2): 225-271.

Baiman, S., and R. Verrecchia. 1996. The relation among capital markets, financial disclosure, production efficiency, and insider trading. *Journal of Accounting Research* 34 (1): 1-22.

Bebchuk, L.A., and J.M. Fried. 2010. Paying for long-term performance. *University of Pennsylvania Law Review* 158: 1915-60.

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

Bernanke, S. 2009. Speech at the Independent Community Bankers of America's National Convention and Techworld (March 20), Board of Governors of the Federal Reserve System, available at http://www.federalreserve.gov/newsevents/speech/bernanke20090320a.htm

Beyer, A., D. Cohen, T. Z. Lys, and B. R. Walter. 2010. The financial reporting environment: Review of the recent literature. *Journal of Accounting and Economics* 50 (2-3): 296-343.

Blankfein, L. 2009. Do not destroy the essential catalyst of risk. *Financial Times* (February 9), available at http://www.ft.com/intl/cms/s/0/0a0f1132-f600-11dd-a9ed-0000779fd2ac.html#axzz2GJZjeM2J

Bolton, P., J. Scheinkman, and W. Xiong. 2006. Executive compensation and short-termist behavior in speculative markets. *Review of Economic Studies* 73 (3): 577-610.

Brown, S., S. A. Hillegeist, and K. Lo. 2004. Conference calls and information asymmetry. *Journal of Accounting and Economics* 37 (3): 343-66.

Burns, N., and S. Kedia. 2006. The impact of performance-based compensation on misreporting. *Journal of Financial Economics* 79 (1): 35-67.

Bushman, R., and A. Smith. 2001. Financial accounting information and corporate governance. *Journal of Accounting and Economics* 32 (1-3): 237-333.

Cadman, B. D., T. O. Rusticus, and J. Sunder. 2012. Stock option grant vesting terms: Economic and financial reporting determinants. *Review of Accounting Studies*, forthcoming.

Chen, S., X. Chen, and Q. Cheng. 2008. Do family firms provide more or less voluntary disclosure? *Journal of Accounting Research* 46 (3): 499-536.

Cheng, Q., and K. Lo. 2006. Insider trading and voluntary disclosures. *Journal of Accounting Research* 44 (4): 815-848.

Cheng, Q., T. Luo, and H. Yue. 2013. Managerial incentives and management forecast precision. *The Accounting Review*, 88 (5): 1575-1602.

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

Diamond, D., and R.Verrecchia. 1991. Disclosure, liquidity and the cost of capital. *Journal of Finance* 46 (4): 392-413.

Edlin, A., and J. Stiglitz. 1995. Discouraging rivals: Managerial rent-seeking and economic inefficiencies. *The American Economic Review* 85 (5): 1301-1312.

Efendi, J., A. Srivastava, and E. P. Swanson. 2007. Why do corporate managers misstate financial statements? The role of option compensation and other factors. *Journal of Financial Economics* 85 (3): 667-708.

Erickson, M., M. Hanlon, and E. L. Maydew. 2006. Is there a link between executive equity incentives and accounting fraud? *Journal of Accounting Research* 44 (1): 113-143.

Feng, M., C. Li, and S. McVay. 2009. Internal control and management guidance. *Journal of Accounting and Economics* 48 (2-3): 190-209.

Field, L., M. Lowry, and S. Shu. 2005. Does disclosure deter or trigger litigation? *Journal of Accounting and Economics* 39 (3): 487-507.

Frankel, R., M. McNichols, and G. P. Wilson. 1995. Discretionary disclosure and external financing. *The Accounting Review* 70 (1): 135-150.

Geithner, T. 2009. Statement by Treasury Secretary Timothy Geithner on compensation (June 10, 2009), *Press Release,* U.S. Department of the Treasury, available at http://www.treasury.gov/press-center/press-releases/Pages/tg163.aspx

Glosten, L., and P. Milgrom. 1985. Bid, ask, and transaction prices in a specialist market with heterogeneously informed traders. *Journal of Financial Economics* 14 (1): 71-100.

Gopalan, R., T. Milbourn, F. Song, and A. Thakor. 2013. Duration of executive compensation. *Journal of Finance*, Forthcoming.

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(1-3): 405-440.

Houston, J. F., B. Lev, and J. W. Tucker. 2010. To guide or not to guide? Causes and consequences of stopping quarterly earnings guidance. *Contemporary Accounting Research* 27(1): 143-185.

Hutton, A. P. 2005. Determinants of firm managerial earnings guidance prior to Regulation Fair Disclosure and bias in analysts' earnings forecasts. *Contemporary Accounting Research* 22 (4): 867-914.

Jensen, M. C., and W. H. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics* 3 (4): 305-360.

Karamanou, K., and N. Vafeas. 2005. The association between corporate boards, audit committees, and management forecasts: An empirical analysis. *Journal of Accounting Research* 43 (3): 453-486.

Kim, I., and D. J. Skinner. 2012. Measuring securities litigation risk. *Journal of Accounting and Economics* 53: 290-310.

Kothari, S. P., S. Shu, P. Wysocki. 2009. Do managers withhold bad news? *Journal of Accounting Research* 47 (1): 241-276.

Kumar, P., N. Langberg, and K. Sivaramakrishnan. 2012. Voluntary disclosures, corporate control, and investment. *Journal of Accounting Research* 50 (4): 1041-1076.

Lang, M., and R. Lundholm. 1993. Cross-sectional determinants of analyst ratings of corporate disclosures. *Journal of Accounting Research* 31 (2): 246-271.

Larcker, D. F., and T. O. Rusticus. 2010. On the use of instrumental variables in accounting research. *Journal of Accounting and Economics* 49 (3): 186-205.

Milgrom, P. 1981. Good news and bad news: Representation theorems and applications. *Bell Journal of Economics* 12 (2): 380-391.

Morck, R., A. Shleifer, and R. W. Vishny. 1988. Management ownership and market valuation: An empirical analysis. *Journal of Financial Economics* 20 (1-2): 293-315.

Nagar, V. 1999. The role of the manager's human capital in discretionary disclosure. *Journal of Accounting Research* 37 (Suppl.), 167-181.

Nagar, V., D. Nanda, and P. Wysocki. 2003. Discretionary disclosure and stock-based incentives. *Journal of Accounting and Economics* 34 (1-3): 283-309.

Ofek, E., and D. Yermack. 2000. Taking stock: Equity-based compensation and the evolution of managerial ownership. *Journal of Finance* 55 (3), 1367-1384.

Rogers, J. L., and A. Van Buskirk. 2013. Bundled forecasts in empirical accounting research. *Journal of Accounting and Economics* 55 (1): 43-65.

Shleifer, A., and R. Vishny. 1989. Management entrenchment: The case of manager-specific investments. *Journal of Financial Economics* 25 (1): 123-139.

Skinner, D. 1994. Why firms voluntarily disclose bad news. *Journal of Accounting Research* 32 (1): 38-60.

Verrecchia, R. 1983. Discretionary disclosure. *Journal of Accounting and Economics* 5: 179-194.

Verrecchia, R. 1990. Information quality and discretionary disclosure. *Journal of Accounting and Economics* 12 (4): 365-380.

Appendix A Variable Description

Variable		Definition
D_MF	=	Indicator variable that equals one if the firm issues bad news earnings forecasts at least once in the year, and zero otherwise.
N_MF	=	The natural logarithm of one plus the number of bad news management earnings forecasts issued in the year.
MF_Accuracy	=	Negative one times the absolute value of the difference between the management earnings forecast and actual earnings, divided by the stock price at the beginning of the year.
P_DURATION	=	Pay duration, measured as the weighted average of the vesting periods of the four components of executive compensation, i.e., salary, bonus, restricted stock grants, and stock option grants, with the weight being the relative size of each compensation component. The vesting periods of salary and bonus are set to be zero.
EQ_COMP	=	The sum of the value of stock option grants and the value of restricted stock grants, divided by total compensation, where the value of option grants and restricted stock grants is the grant-date fair value.
SHAREHOLDING	=	Natural logarithm of the dollar value of the CEO's shareholdings (i.e., the number of shares held by the CEO multiplied by the firm's closing stock price).
INST	=	Institutional ownership, measured as the fraction of total outstanding shares held by institutional investors.
AC	=	Analyst coverage, defined as the number of analysts who issue annual earnings forecasts for the firm.
DISP	=	Analyst forecast dispersion, defined as the standard deviation of analyst earnings forecasts divided by the absolute value of the mean analyst forecast (using the summary statistics calculated last before the fiscal-year end in IBES).
RVOL	=	Return volatility, measured as the standard deviation of the firm's daily stock returns measured over the fiscal year.
BIND	=	Board independence, which equals one if more than 60% of the firm's directors are independent, and zero otherwise.
LIT	=	Indicator variable for high litigation industries. This variable takes a value of one if the SIC code is within 2844-2836, 3570-3577, 7370-7374, 3600-3674, 5200-5961, and 8731-8734, and zero otherwise.
SIZE	=	Firm size, measured as the natural logarithm of total assets.

MTB	=	Market-to-book ratio, measured as the firm's market value of common equity divided by the book value of common equity.
EQ_ISS	=	Indicator variable that equals one if the firm issues any equity offering during the year, and zero otherwise.
RET	=	Market-adjusted annual stock returns, measured as the annual stock returns minus the value-weighted annual market returns.

Appendix B Example of the Calculation of Pay Duration

To illustrate the computation of the pay duration variable, let us suppose that in a year, two CEOs are awarded compensation packages with identical dollar amounts but different vesting requirements, as described in the following table. It is further assumed that there is no other type of compensation. Note that these numbers are used only for illustration purposes. We assume that the total amount of compensation is the same for the two CEOs to show that we control for the level of compensation in the regression analyses.

	CEO A	CEO B
1. Salary ($)	730,000	730,000
2. Bonus ($)	320,000	320,000
3. Restricted Stocks ($)	1,700,000	1,700,000
- Vesting Schedule	(i) $850,000 will vest immediately	(i) $850,000 will vest after three years
	(ii) $850,000 will vest after one year	(ii) $850,000 will vest after five years
4. Stock Options ($)	1,250,000	1,250,000
- Vesting Schedule	(i) $500,000 will vest after one year	(i) $500,000 will vest after three years
	(ii) $750,000 will vest after three years	(ii) $750,000 will vest after five years
Total Pay ($)	4,000,000	4,000,000

The two compensation packages have the same dollar value of total pay at $4,000,000. The level of the stock-based compensation (i.e., restricted stocks and stock options) scaled by the total compensation is also the same for both packages, 74%, as calculated below:

$$= \frac{1{,}700{,}000 + 1{,}250{,}000}{730{,}000 + 320{,}000 + 1{,}700{,}000 + 1{,}250{,}000} = 0.74$$

However, the two compensation packages have different vesting schedules. Specifically, CEO B's restricted stock and option grants have longer vesting periods than CEO A's. As shown below, CEO A's pay duration is 0.90 years, while CEO B's pay duration is 3.01 years.

(i) CEO A's pay duration is

$$= \frac{(850{,}000 \times 0 + 850{,}000 \times 1) + (500{,}000 \times 1 + 750{,}000 \times 3)}{730{,}000 + 320{,}000 + 1{,}700{,}000 + 1{,}250{,}000} = 0.90$$

(ii) CEO B's pay duration is

$$= \frac{(850{,}000 \times 1 + 850{,}000 \times 3) + (500{,}000 \times 3 + 750{,}000 \times 5)}{730{,}000 + 320{,}000 + 1{,}700{,}000 + 1{,}250{,}000} = 3.01$$

Figure 1 Timeline of Compensation Award and Earnings Forecasts

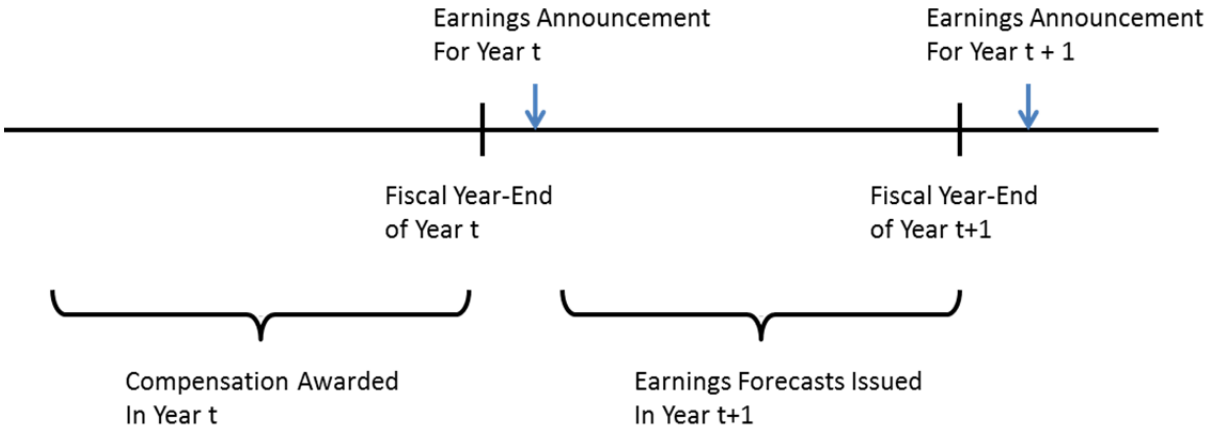

Table 1 Sample Selection

This table reports the sample selection process.

Criteria		Number of Observations
Number of firm-years in Equilar in the period 2006-2010		10,920
Less:		
Number of firm-years without earnings data on the Actual files form from First Call	150	
Number of firm-years without data from I/B/E/S, 13F, Corporate Library, SDC, Compustat, or CRSP	3,084	
Sample used in the analysis of the likelihood and frequency of management forecasts		7,686
Sample used in the analysis of management forecast accuracy		2,758

Table 2 Descriptive Statistics

This table reports the descriptive statistics for the variables used in the analyses. See Appendix A for the variable definitions. All continuous variables are winsorized at the 1% and 99% levels.

Panel A: Descriptive Statistics on Management Forecasts and Firm Characteristics

Variable	N	Mean	STD	Q1	Median	Q3
D_MF	7,686	0.3505	0.4772	0.0000	0.0000	1.0000
N_MF *	7,686	0.8999	1.6350	0.0000	0.0000	1.0000
P_DURATION	7,686	1.4633	0.9125	0.8279	1.5926	2.0654
EQ_COMP	7,686	0.3897	0.2690	0.1979	0.3877	0.5794
SHAREHOLDING (in thousand) *	7,686	74,200	181,000	6,792	18,900	55,000
INST	7,686	0.7449	0.2235	0.6380	0.7940	0.9127
AC	7,686	9.4346	6.4583	4.0000	8.0000	13.0000
DISP	7,686	0.0725	0.1874	0.0101	0.0208	0.0517
RVOL	7,686	3.1295	1.4759	2.0769	2.7909	3.8037
BIND	7,686	0.7532	0.4312	1.0000	1.0000	1.0000
LIT	7,686	0.2852	0.4515	0.0000	0.0000	1.0000
SIZE (in million) *	7,686	9,239	23,202	632	2,030	6,437
MTB	7,686	2.9709	3.1555	1.3203	2.0191	3.2946
EQ_ISS	7,686	0.0882	0.2836	0.0000	0.0000	0.0000
RET	7,686	0.0379	0.4044	-0.2105	-0.0138	0.2032

* We use the natural logarithm of these variables in the correlation table and regression analyses.

Table 2 (Cont'd)

Panel B: Person Correlation Coefficients

Correlation coefficients significant at the 5% level or lower are in boldface.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)	*D_MF*														
(2)	*N_MF*	**0.75**													
(3)	*P_DURATION*	**0.14**	**0.12**												
(4)	*EQ_COMP*	**0.09**	**0.07**	**0.71**											
(5)	*SHAREHOLDING*	**0.10**	**0.12**	**0.11**	**0.04**										
(6)	*INST*	**0.17**	**0.13**	**0.19**	**0.21**	**0.09**									
(7)	*AC*	**0.14**	**0.14**	**0.28**	**0.23**	**0.39**	**0.14**								
(8)	*DISP*	**-0.15**	**-0.11**	**-0.07**	-0.01	**-0.14**	**-0.08**	**-0.12**							
(9)	*RVOL*	**-0.14**	**-0.11**	**-0.11**	0.01	**-0.22**	**-0.07**	**-0.19**	**0.18**						
(10)	*BIND*	**0.09**	**0.07**	**0.15**	**0.10**	**-0.03**	**0.14**	**0.07**	**-0.02**	0.00					
(11)	*LIT*	**0.11**	**0.09**	**0.04**	**0.12**	**0.07**	**0.07**	**0.17**	-0.02	0.02	-0.02				
(12)	*SIZE*	**0.03**	**0.06**	**0.26**	**0.12**	**0.33**	**-0.03**	**0.46**	**-0.06**	**-0.21**	**0.13**	**-0.22**			
(13)	*MTB*	0.02	0.02	**0.07**	**0.06**	**0.18**	**0.03**	**0.15**	**-0.05**	**-0.04**	-0.01	**0.16**	**-0.16**		
(14)	*EQ_ISS*	**-0.12**	**-0.09**	-0.01	0.00	**-0.07**	**-0.08**	**-0.08**	**0.07**	**0.15**	**-0.03**	**-0.07**	**0.03**	-0.01	
(15)	*RET*	0.00	0.01	0.01	**0.02**	**-0.05**	0.01	-0.01	**0.03**	**0.04**	-0.01	**0.05**	**-0.06**	**-0.02**	**0.05**

Table 3 Pay Duration and Bad News Management Forecasts

This table reports the results from the Probit regression of the likelihood of the issuance of bad news forecasts and the OLS regression of bad news forecast frequency. See Appendix A for the variable definitions. All continuous variables are winsorized at the 1% and 99% levels. The p-value is one-sided for the coefficient on *P_DURATION* and is two-sided otherwise. P-values are based on the standard errors adjusted for firm and year clustering. The marginal effect is calculated as the change in the probability of issuing a bad news forecast when the variable of interest changes from the 1st to the 3rd quartile (or from 0 to 1 for the dummy variables) and other variables are held at the corresponding means. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	Dep. Var. = *D_MF* (1)			Dep. Var. = *N_MF* (2)	
	Coefficient	p-value	Marginal Effect	Coefficient	p-value
P_DURATION (H1: +)	0.0911***	0.001	0.044	0.0319***	0.000
EQ_COMP	-0.0116	0.886	-0.002	-0.0022	0.938
SHAREHOLDING	0.0262	0.120	0.018	0.0110*	0.080
INST	0.6124***	0.000	0.074	0.1636***	0.000
AC	0.0123***	0.009	0.035	0.0042**	0.021
DISP	-1.0899***	0.000	-0.016	-0.2344***	0.000
RVOL	-0.0686***	0.006	-0.041	-0.0239**	0.013
BIND	0.1108**	0.010	0.034	0.0454***	0.007
LIT	-0.0013	0.991	0.000	-0.0087	0.867
SIZE	0.0439**	0.023	0.033	0.0276***	0.004
MTB	-0.0227***	0.004	-0.014	-0.0065**	0.031
EQ_ISS	-0.1721**	0.015	0.000	-0.0384**	0.029
RET	-0.0524	0.211	-0.007	-0.0138	0.409
Industry Dummies	Included			Included	
Year Dummies	Included			Included	
N	7,686			7,686	
Pseudo / Adjusted R^2	0.1764			0.1760	

Table 4 Cross-Sectional Analysis of the Effect of Pay Duration: Corporate Monitoring

This table reports the results of the cross-sectional variation of the effect of pay duration with the effectiveness of corporate monitoring: the Probit regression of the likelihood of the issuance of bad news forecasts (Column 1) and the OLS regression of bad news forecast frequency (Column 2). Panel A reports the results based on board independence and Panel B on institutional ownership. *LOW_BIND* is an indicator variable for firms with low levels of board independence and is set to one if less than 60% of the firm's directors are independent, and zero otherwise. *LOW_INST* is an indicator variable for firms with low levels of institutional ownership and is set to one if the firm's institutional ownership (*INST*) is below the sample median, and zero otherwise. See Appendix A for the definitions of the other variables. All continuous variables are winsorized at the 1% and 99% levels. The p-value is one-sided for the coefficient on the interaction terms with *P_DURATION* and is two-sided otherwise. P-values are based on standard errors adjusted for firm and year clustering. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Board Independence

	Dep. Var. = *D_MF* (1)		Dep. Var. = *N_MF* (2)	
	Coefficient	p-value	Coefficient	p-value
P_DURATION	0.0547	0.132	0.0187	0.111
LOW_BIND	-0.3098***	0.000	-0.1076***	0.000
P_DURATION × LOW_BIND (H2: +)	0.1442***	0.005	0.0475***	0.007
EQ_COMP	-0.0271	0.730	-0.0074	0.785
SHAREHOLDING	0.0280*	0.089	0.0116*	0.063
INST	0.6071***	0.000	0.1617***	0.000
AC	0.0119***	0.010	0.0041**	0.021
DISP	-1.0931***	0.000	-0.2367***	0.000
RVOL	-0.0680***	0.007	-0.0237**	0.014
LIT	-0.0043	0.969	-0.0096	0.856
SIZE	0.0470**	0.015	0.0288***	0.003
MTB	-0.0226***	0.004	-0.0065**	0.033
EQ_ISS	-0.1716**	0.013	-0.0392**	0.025
RET	-0.0518	0.228	-0.0135	0.428
Industry Dummies	Included		Included	
Year Dummies	Included		Included	
N	7,686		7,686	
Pseudo / Adjusted R^2	0.1776		0.1415	

Table 4 (Cont'd)

Panel B: Institutional Ownership

	Dep. Var. = *D_MF* (1)		Dep. Var. = *N_MF* (2)	
	Coefficient	p-value	Coefficient	p-value
P_DURATION	0.0534	0.115	0.0259**	0.029
LOW_INST	-0.3077***	0.000	-0.0716***	0.003
P_DURATION × LOW_INST (H2: +)	0.0822***	0.002	0.0125	0.218
EQ_COMP	0.0085	0.918	0.0033	0.908
SHAREHOLDING	0.0301*	0.062	0.0123**	0.048
AC	0.0126***	0.006	0.0044**	0.014
DISP	-1.0982***	0.000	-0.2369**	0.000
RVOL	-0.0726***	0.005	-0.0253**	0.011
BIND	0.1267***	0.003	0.0497***	0.004
LIT	0.0026	0.981	-0.0082	0.874
SIZE	0.0403**	0.041	0.0273***	0.005
MTB	-0.0230***	0.003	-0.0068**	0.026
EQ_ISS	-0.1773**	0.014	-0.0391**	0.026
RET	-0.0493	0.227	-0.0121	0.464
Industry Dummies	Included		Included	
Year Dummies	Included		Included	
N	7,686		7,686	
Pseudo / Adjusted R^2	0.1745		0.1747	

Table 5 Cross-Sectional Analysis of the Effect of Pay Duration: Information Environment

This table reports the results of the cross-sectional variation of the effect of pay duration with the quality of the information environment: the Probit regression of the likelihood of the issuance of bad news forecasts (Column 1) and the OLS regression of bad news forecast frequency (Column 2). Panel A reports the results based on analyst coverage and Panel B on the probability of informed trade. *LOW_AC* is an indicator variable for firms with low levels of analyst coverage and is set to one if the firm's analyst coverage (*AC*) is below the sample median, and zero otherwise. *HIGH_PIN* is an indicator variable for firms with a high probability of informed trade and equals one if the firm's median probability of informed trade (*PIN*) over the previous eight quarters is above the sample median, and zero otherwise. See Appendix A for the definition of other variables. All continuous variables are winsorized at the 1% and 99% levels. The p-value is one-sided for the coefficient on the interaction terms with *P_DURATION* and is two-sided otherwise. P-values are based on standard errors adjusted for firm and year clustering. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Analyst Coverage

	Dep. Var. = *D_MF* (1)		Dep. Var. = *N_MF* (2)	
	Coefficient	p-value	Coefficient	p-value
P_DURATION	0.0356	0.254	0.0176*	0.072
LOW_AC	-0.3954***	0.000	-0.1354***	0.000
P_DURATION × LOW_AC (H3: +)	0.1064***	0.002	0.0233**	0.036
EQ_COMP	-0.0308	0.704	-0.0096	0.729
SHAREHOLDING	0.0243	0.132	0.0097	0.114
INST	0.5726***	0.000	0.1477***	0.000
DISP	-1.0994***	0.000	-0.2351***	0.000
RVOL	-0.0691***	0.004	-0.0240**	0.010
BIND	0.1086**	0.013	0.0443***	0.009
LIT	0.0030	0.978	-0.0114	0.825
SIZE	0.0389**	0.034	0.0229**	0.012
MTB	-0.0242***	0.002	-0.0074**	0.015
EQ_ISS	-0.1767***	0.009	-0.0398**	0.017
RET	-0.053	0.196	-0.0139	0.402
Industry Dummies	Included		Included	
Year Dummies	Included		Included	
N	7,686		7,686	
Pseudo / Adjusted R^2	0.1793		0.1794	

Table 5 (Cont'd)

Panel B: Probability of Informed Trade

	Dep. Var. = *D_MF* (1)		Dep. Var. = *N_MF* (2)	
	Coefficient	p-value	Coefficient	p-value
P_DURATION	0.0604**	0.031	0.0269***	0.006
HIGH_PIN	-0.0544	0.515	-0.0201	0.493
P_DURATION × HIGH_PIN (H3: +)	0.0669**	0.030	0.0102	0.223
EQ_COMP	-0.0197	0.808	-0.0041	0.885
SHAREHOLDING	0.0275	0.103	0.0109*	0.081
INST	0.6092***	0.000	0.1602***	0.000
AC	0.0133***	0.005	0.0042**	0.026
DISP	-1.0988***	0.000	-0.2348***	0.000
RVOL	-0.0693***	0.006	-0.0237**	0.012
BIND	0.1145***	0.007	0.0454***	0.006
LIT	-0.003	0.978	-0.0086	0.869
SIZE	0.0491**	0.013	0.0270***	0.004
MTB	-0.0226***	0.004	-0.0066**	0.026
EQ_ISS	-0.1728**	0.013	-0.0384**	0.027
RET	-0.0522	0.211	-0.0138	0.407
Industry Dummies	Included		Included	
Year Dummies	Included		Included	
N	7,685		7,685	
Pseudo / Adjusted R^2	0.1768		0.1758	

Table 6 Pay Duration and Bad News Management Forecasts: Firm-Fixed Effect Approach

This table reports the results from the Probit regression of the likelihood of the issuance of bad news forecasts (Column 1) and the OLS regression of bad news forecast frequency (Column 2) with the inclusion of firm-fixed effects. See Appendix A for the variable definitions. All continuous variables are winsorized at the 1% and 99% levels. The p-value is one-sided for the coefficient on *P_DURATION* and is two-sided otherwise. P-values are based on standard errors adjusted for firm and year clustering. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	Dep. Var. = *D_MF* (1)		Dep. Var. = *N_MF* (2)	
	Coefficient	p-value	Coefficient	p-value
P_DURATION (H1: +)	0.0927*	0.099	0.0182**	0.024
EQ_COMP	-0.1229	0.617	-0.0266	0.472
SHAREHOLDING	0.0863	0.136	0.0107	0.333
INST	0.3646	0.445	0.1083	0.306
AC	0.0308**	0.013	0.0031	0.188
DISP	-1.0191***	0.000	-0.0691**	0.021
RVOL	0.0281	0.745	0.0022	0.842
BIND	-0.2286**	0.031	-0.0434*	0.065
LIT	-0.3678	0.615	0.1123	0.478
SIZE	0.8046***	0.000	0.1308***	0.000
MTB	-0.0548**	0.015	-0.0052*	0.056
EQ_ISS	0.0248	0.856	0.0283**	0.042
RET	-0.3203***	0.001	-0.0402***	0.001
Firm Dummies	Included		Included	
Year Dummies	Included		Included	
N	2,776		7,366	
Pseudo / Adjusted R^2	0.1886		0.5680	

Table 7 Pay Duration and Bad News Management Forecasts: The Cumulative Measure of Pay Duration

This table reports the results from the Probit regression of the likelihood of the issuance of bad news forecasts (Column 1) and the OLS regression of bad news forecast frequency (Column 2) using the cumulative measure of pay duration. This pay duration variable incorporates the stock and option grants awarded in the current and previous years. See Appendix A for the variable definitions. All continuous variables are winsorized at the 1% and 99% levels. The p-value is one-sided for the coefficient on *P_DURATION* and is two-sided otherwise. P-values are based on standard errors adjusted for firm and year clustering. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	Dep. Var. = *D_MF* (1)		Dep. Var. = *N_MF* (2)	
	Coefficient	p-value	Coefficient	p-value
P_DURATION (H1: +)	0.0874***	0.004	0.0269***	0.004
EQ_COMP	0.0383	0.621	0.0209	0.450
SHAREHOLDING	0.0278	0.107	0.0115*	0.071
INST	0.6127***	0.000	0.1635***	0.000
AC	0.0123***	0.009	0.0042**	0.020
DISP	-1.1036***	0.000	-0.2375***	0.000
RVOL	-0.0687***	0.006	-0.0240**	0.013
BIND	0.1152***	0.008	0.0468***	0.005
LIT	0.0000	1.000	-0.0088	0.866
SIZE	0.0465**	0.016	0.0287***	0.002
MTB	-0.0222***	0.005	-0.0064**	0.036
EQ_ISS	-0.1736**	0.015	-0.0391**	0.028
RET	-0.0537	0.209	-0.0143	0.392
Industry Dummies	Included		Included	
Year Dummies	Included		Included	
N	7,686		7,686	
Pseudo / Adjusted R^2	0.1764		0.1757	

Table 8 Pay Duration and Management Forecast Accuracy

This table reports the results from an OLS regression of forecast accuracy (*MF_Accuracy*) on pay duration and control variables:

$$MF\_Accuracy_{i,t+1} = \gamma_0 + \gamma_1 P\_DURATION_{i,t} + \gamma_2 EQ\_COMP_{i,t} + \gamma_3 SHAREHOLDING_{i,t} + \gamma_4 INST_{i,t} + \gamma_5 AC_{i,t} + \gamma_6 DISP_{i,t} + \gamma_7 RVOL_{i,t+1} + \gamma_8 BIND_{i,t} + \gamma_9 LIT_{i,t} + \gamma_{10} SIZE_{i,t} + \gamma_{11} MTB_{i,t} + \gamma_{12} EQ\_ISS_{i,t} + \gamma_{13} RET_{i,t+1} + \gamma_{14} LOSS_{i,t+1} + \gamma_{15} ABSCHG\_ROA_{i,t+1} + \gamma_{16} MF\_HORIZON_{i,t+1} + \gamma_{17} MF\_SURPRISE_{i,t+1} + \gamma_{18} IMR_{i,t+1} + Industry\ Dummies + Year\ Dummies + \mu_{i,t+1} \quad (2)$$

See Appendix A for the variable definitions. The additional variables used in this table are defined as follows:

LOSS	=	An indicator variable that equals one if the firm reports negative income before extraordinary items, and zero otherwise;
ABSCHG_ROA	=	Absolute change in ROA, where ROA is measured as the income before extraordinary items divided by total assets at the beginning of the year;
MF_HORIZON	=	The difference in days between the management forecast date and the earnings announcement date;
MF_SURPRISE	=	Absolute value of the management forecast earnings minus analyst expectation, divided by the stock price at the beginning of the year; analyst expectation is adjusted using Rogers and Buskirk's (2013) procedure for management forecasts issued with earnings announcements.

The sample includes 2,758 firm-years that have at least one bad news management forecast. All continuous variables are winsorized at the 1% and 99% levels. All p-values are two-sided and are based on standard errors adjusted for firm and year clustering. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	Coefficient	p-value
P_DURATION	0.0018**	0.013
EQ_COMP	0.0003	0.735
SHAREHOLDING	0.0008***	0.000
INST	0.0127**	0.016
AC	0.0003***	0.002
DISP	-0.0274**	0.012
RVOL	-0.0034***	0.000
BIND	0.0026**	0.015
LIT	0.0003	0.747
SIZE	0.0001	0.728
MTB	-0.0002	0.167
EQ_ISS	-0.0025	0.133
RET	-0.0048***	0.000
LOSS	-0.0038***	0.000
ABSCHG_ROA	-0.0042	0.129
MF_HORIZON	-0.0000***	0.000
MF_SURPRISE	-0.6393***	0.000
IMR	0.0307***	0.010
Industry Dummies	Included	
Year Dummies	Included	
N	2,758	
Adjusted R^2	0.3382	

Table 9 Pay Duration and Good News and Total Management Forecasts

The first two columns of this table report the results from the Probit regression of the likelihood of forecast issuance (Column 1) and the OLS regression of forecast frequency (Column 2) for good news forecasts. The next two columns of this table report the results from the Probit regression of the likelihood of forecast issuance (Column 3) and the OLS regression of forecast frequency (Column 4) for total management forecasts (i.e., both good news and bad news forecasts). See Appendix A for the variable definitions. All continuous variables are winsorized at the 1% and 99% levels. All p-values are two-sided and are based on standard errors adjusted for firm and year clustering. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	Good News Forecasts				Total Forecasts			
	Dep. Var. = *D_MF* (1)		Dep. Var. = *N_MF* (2)		Dep. Var. = *D_MF* (3)		Dep. Var. = *N_MF* (4)	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
P_DURATION	0.0732	0.177	0.0191	0.286	0.1122***	0.009	0.0522**	0.014
EQ_COMP	0.1091	0.546	0.0336	0.627	0.0394	0.752	0.0397	0.595
SHAREHOLDING	0.0491**	0.014	0.0177***	0.004	0.0258	0.168	0.0218**	0.028
INST	0.5614***	0.000	0.1546***	0.000	0.6536***	0.000	0.2746***	0.000
AC	0.0122*	0.083	0.0042	0.148	0.0185***	0.004	0.0108***	0.009
DISP	-1.1513***	0.000	-0.2528***	0.000	-1.2428***	0.000	-0.4597***	0.000
RVOL	-0.1193***	0.000	-0.0576***	0.000	-0.1378***	0.000	-0.0876***	0.000
BIND	0.2018***	0.000	0.0759***	0.000	0.1719***	0.001	0.1105***	0.000
LIT	-0.0388	0.751	-0.0034	0.943	0.0764	0.550	0.0252	0.757
SIZE	0.0241	0.262	0.0183**	0.045	0.0458*	0.061	0.0443***	0.002
MTB	-0.0172***	0.005	-0.0036	0.123	-0.0194**	0.010	-0.0061	0.154
EQ_ISS	-0.2794***	0.000	-0.0605***	0.000	-0.2444***	0.001	-0.0920***	0.000
RET	0.0670	0.219	0.0486***	0.010	0.0247	0.590	0.0247	0.320
Industry Dummies	Included		Included		Included		Included	
Year Dummies	Included		Included		Included		Included	
N	7,686		7,686		7,686		7,686	
Pseudo R^2	0.2130		0.2214		0.2559		0.3106	