科技部補助專題研究計畫成果報告
期末報告

N 打預防針或提前引爆？盈餘預測，監理及風險傾向

計 畫 類 別 ：個別型計畫
計 畫 編 號 ：MOST 102-2410-H-004-054-
執 行 期 間 ：102 年 08 月 01 日至 103 年 09 月 30 日
執 行 單 位 ：國立政治大學經濟學系

計 畫 主 持 人 ：何靜嫻

計畫參與人員：碩士班研究生-兼任助理人員：陳年億
博士班研究生-兼任助理人員：傅中原
博士班研究生-兼任助理人員：傅中原

處 理 方 式 ：
1.公開資訊：本計畫涉及專利或其他智慧財產權，2 年後可公開查詢
2.「本研究」是否已有嚴重損及公共利益之發現：否
3.「本報告」是否建議提供政府單位施政參考：否

中 華 民 國 103 年 12 月 25 日

中 文 摘 要 ： 大多數文獻研究經理人提供盈餘預測的誘因及動機. 且多數專注於分析經理人盈餘預測的資訊性及短期股價效果. 本文的重心在於經理人盈餘預測所造成的長期效果, 及是如何的所有權及薪資結構促使經理人提供造成不同長期效果的預測. 本計畫可望將盈餘預測的長期效果與所有權及薪資結構相連結, 因此, 預期將可填補不完全資訊模型與公司監理間的關係, 並可導出可供實證的結論來解釋所有權及薪資結構, 與經理人貢獻及盈餘預測的長期效果間的關係.

本文模型將說明所有權及薪資結構是導致經理人提供導致不同長期效果(打預防針或提前引爆)的預測的主因. 換言之, 與其他就行為角度來分析投資人過度或過少反應的文獻不同, 本文主張理性的經理人其實已經預見此長期效果之不同, 而刻意選擇造成不同長期效果的盈餘預測來獲取最高的經理人報償.

中文關鍵詞： 盈餘預測, 公司治理, 風險傾向

英 文 摘 要 ： A large amount of literature examines managers ‘ incentives to provide earnings forecasts. Most studies focus on the informativeness of management forecasts and their short term reactions on stock prices. Our interest is in the long term impacts of management forecasts, as well as the compensation structures that motivate the managers to provide the forecasts that cause these different long term reactions. The linkage between compensation structure and the long term impacts of management forecasts will bridge the gap between signaling models and the corporate governance concerns about whether management disclosures are substitutes or complements to corporate governance. It also provides testable results that explain the relation between ownership structure, compensation, managerial effort, and the long term effects on stock prices.

Our model will demonstrate that ownership and compensation structures are the main factors that motivate the managers to provide the forecasts that cause different long term reactions (inoculation or preignition). In other words, in contract to the

large volume of works on addressing investors ‘ behavioral reasons for over or under reactions, we assert that managers are actually aware of this difference in long term reactions, and they deliberately choose the forecasts that trigger different reactions to exploit the maximal benefit from managerial compensations.

英文關鍵詞： Earnings Forecasts, Governace, Risk Attitudes

Preignition or Inoculation? An Interpretation of Stock Price Trends in Management Forecasts

Shirley J. Ho

National Chengchi University

Email: sjho@nccu.edu.tw

December 25, 2014

Abstract

A large amount of literature examines managers' incentives to provide earnings forecasts. Most studies focus on the informativeness of management forecasts and their short term reactions on stock prices. Our interest is in the long term impacts of management forecasts, as well as the compensation structures that motivate the managers to provide the forecasts that cause these different long term reactions. The linkage between compensation structure and the long term impacts of management forecasts will bridge the gap between signaling models and the corporate governance concerns about whether management disclosures are substitutes or complements to corporate governance. It also provides testable results that explain the relation between ownership structure, compensation, managerial effort, and the long term effects on stock prices. Our model will demonstrate that ownership and compensation structures are the main factors that motivate the managers to provide the forecasts that cause different long term reactions (inoculation or preignition). In other words, in contract to the large volume of works on addressing investors' behavioral reasons for over or under reactions, we assert that managers are actually aware of this difference in long term reactions, and they deliberately choose the forecasts that trigger different reactions to exploit the maximal benefit from managerial compensations.

1 Introduction

A large accounting literature examines managers' incentives to provide earnings forecasts. Most studies focus on the informativeness of management forecasts and their short-run reactions on stock prices. Some representative papers include Patell (1976), Penman (1980), Waymire (1984), Baginski, et al.(1993), Skinner (1994), Williams (1996), Stocken (2000), Miller (2002), and Hutton, Miller and Skinner (2003).

Our interest is in the long-run impacts of management forecasts, as well as the compensation structure that motivates the managers to provide the forecasts that cause these different long run reactions. The linkage between **managerial compensation** and the **long-run impacts of management forecasts** will bridge the gap between *signaling models* and the *corporate governance* concern about whether management disclosures are subsitutes to corporate governance.[1] It also provides testable results that explain the relation between ownership structure,[2] compensation, managerial effort, and the long run effects on stock prices.

We consider two specific long-run impacts subsequent to the announcement of management forecasts. The first is the manager's effort decision in the production stage, which together with the firm's future prospect will determine the level of actual earnings. Unlike the conventional moral hazard model, managerial effort will determine the true state of private information (i.e., the actual earnings) to be revealed in the signaling process. Hence, upon deciding the informativeness of managerial forecasts, managers also need to choose the effort level to be committed in the production process. We show that both shirking and overworking can happen

[1] See Healy et al. (1999),Bushee and Noe (2000), Core (2001), Bens (2002), Bushman et al. (2004), Fan and Wong (2002), Ajinkya et al. (2005) Francis et al. (2005a, 2005b),Karamanou and Vafeas (2005) Ali et al. (2007) and Hope and Thomas (2008).

[2] For example, Frankel, McNichols, and Wilson (1995) conclude that a firm that does not require external financing faces less pressure from Wall Street and has fewer concerns with temporary undervaluation, whereas such firms are less likely to provide earnings guidance of any sort (selective or public). Eng and Mak (2003) examine the relation between ownership structure and disclosure in the broader context of voluntary disclosure in the financial statements.

in equilibrium.

The second impact involves a comparison between the stock price following the release of earnings forecast (denoted as $P(x^R)$), and the price following the publication of actual earnings (denoted as $P(x)$). We can classify the observations into two groups: **inoculation** and **preignition**.[3] The definitions for inoculation and preignition vary with the content of firm's future prospect. That is, if the prospect is good, then inoculation means $P(x^R)>P(x)$, while preignition means $P(x^R)< P(x)$. On the other hand, if the prospect is bad, then inoculation means $P(x^R)< P(x)$, while preignition means $P(x^R)> P(x)$.

Our model will demonstrate that ownership and compensation structures are the main factors that motivate the managers to provide the forecasts that cause the different long-run reactions (inoculation or preignition). In other words, in contract to the large volume of works on addressing investors' behavioral reasons for over or under reactions (see Kuhnen, 2012), we assert that managers are actually aware of this difference in long-run reactions, and they deliberately choose the forecasts that trigger different reactions to exploit the maximal benefit from managerial compensations.

To characterize the circumstances that cause the two different impacts (inoculation or preignition) of management earnings forecasts, we consider a signaling model where a privately informed manager issues an earnings forecast to signal his information about the future prospect as well as the precommitted effort level, and public investors will determine stock price based on the public information provided by the manager. The managerial compensation is a weighted sum of stock options and performance bonus, and in the basic model we assume that investors are risk neutral.

As noted by Beyer, et al. (2010), "*models that further explore optimal compensation structures and consider their effect on management's disclosure decisions have the potential to provide new insights into both firms' disclosure behavior and optimal incentive structures.*" Moreover, Kanodia (2006) suggests that "*models that incorporate disclosure decisions alongside with other*

[3] **Inoculation** and **preignition** are defined in terms of stock price, while the concepts of overshooting and undershooting are defined in terms of earnings forecast.

(real) decisions or effort allocation allow us to obtain a better understanding about how firms' disclosure policies affect not only market valuations but also firms' other (real) decisions and cash flows and the welfare of different shareholder groups."

Our preliminary results are the following. First, the conditions for a full effort truth-telling equilibrium where the forecast truly reveals the actual earnings are when the penalty of misreporting is infinite or when the proportion of stock option in the managerial compensation is equal to $\frac{2}{3}$. At this level, the benefit from the increase in stock price is offset by the implicit cost from the decrease in performance bonus. Second, there exist equilibria where the manager shirks and lies more in his management forecasts as well as equilibria where the manager overworks and being more honest in his management forecast. Third, when there is good news, the manager can either increase effort or lie more, while when there is bad news, the manager will either decrease effort or lie less.

Since the future prospect involves good and bad news, we will consider investors with mean-variance utilities, and examine how investors risk attitudes will alter the manager's effort and disclosure strategy. We then derive the optimal compensation structure and provide the empirical analysis.

1.1 Related Literature

Our paper not only bridges the gap between signaling models and the corporate governance concerns of management earnings forecasts, but also provides testable results that explain the relation between ownership structure, compensation, managerial effort, and the long term effects on stock prices (inoculation or preignition).

To characterize the circumstances that cause different long term impacts, we consider a signaling model where a privately informed manager issues an earnings forecast to signal his information about the future prospect as well as a precommitted effort level, and public investors will determine stock price based on the public information provided by the manager. Our model is an adaptation from Guttman, Kadan and Kandel (2006) (see also Fischer and Verrecchia,

2000), who consider the short term reactions of earnings forecasts on stock prices. The manager will maximize stock price, and the main contribution of Guttman, Kadan and Kandel (2006) is to characterize partial revelation equilibria which explains the evidence such as range forecasts (in contrast to the separating equilibria by Riley (1979) and Stein (1989)). Our setup is different in three aspects. First, our model assumes that the managerial compensation is a weighted sum of stock option and performance bonus. The weights on the stock option can be alternatively interpreted as different ownership structures. Thus we are able to characterize the condtions on ownership and compensation structures that motive the manager to provide different earnings forecasts. Second, in our model, the actual earnings are endogenously determined by the manager's effort decisions. With this framework, we can study the trade-off between corporate governance and management earnings forecast. Third, we consider the long term impacts on management effort and the stock price, both of which are not addressed in their model.

Beyer, et al. (2010) provide a thorough survey for recent works on management earnings forecasts. We repeat the parts that are related to our model, including the pioneering works that use singling models to address management earnings forecasts, the relation with managerial compensation, and the trade-off between corporate governance and management earnings forecasts.

1.1.1 Informativeness

The pioneering works by Grossman and Hart (1980), Grossman (1981), Milgrom (1981) and Milgrom and Roberts (1986) identify conditions under which firms voluntarily disclose all their private information. Later contributions extend this "unravelling result" by considering costly disclosure (e.g., Jovanovic, 1982; Verrecchia, 1983, 1990a; Dye, 1986; Lanen and Verrecchia, 1987), and conclude that information is favorable when it reveals that asset values are expected to be high. This disclosure costs can also include the consequential costs resulting from the proprietary nature of the information (see Verrecchia, 2001; Wagenhofer, 1990; Fischer and Verrecchia, 2004; Arya, et al., 2009).

Similarly, there will be two sources of disclosure costs in our model: an explicit cost which is

a quadratic function of misreproting in earnings forecast, and an implicit cost which describes the negative effect on performance bonus from misreproting. The quadratic cost is assumed so that we have a well defined maximization problem. From this aspect, our model is different from another strand of literature which analyzes the informativeness of management earnings forecasts with cheap talk models (see Crawford and Sobel, 1982; Gigler, 1994; Stocken, 2000). Moreover, as described above, our main difference from the existing literature is to address the influence of ownership structure and managerial compensation on management effort (hence the trade-off with corporate governance) as well as the long term impacts on stock prices.

Our model assumes that after the issuance of earnings forecasts, the managers need to put in efforts which, together with the firm's future prospect, will determine the level of actual earnings. This is different from the line of research which studies the timing of announcing the actual earnings,[4] profit warnings (Pukthuanthong, 2010) or the conference calls before the release of actual earnings (see Bushee, et al., 2003; Kimbrough, 2005), where the actual earnings have already realized.

1.1.2 Compensation

Due to the separation of management and ownership, when shareholders design management's incentives and the firm's governance structure in order to maximize the value of their investment, they take into account how incentives and governance structure affect management's disclosure decisions and hence firm value (John and Ronen, 1990; Core, 2001). However, most models assume that **managers attempt to maximize share price** (Beyer, et al., 2010), with variants on addressing managers' incentives to reduce stock prices (Yermack, 1997; Aboody and Kasznik, 2000) or to pursue intertemporal preference on stock prices (Dye, 2010).

Most importantly, Beyer, et al. (2010) note that "*models that further explore optimal compensation structures and consider their effect on management's disclosure decisions have the potential to provide new insights into both firms' disclosure behavior and optimal incentive struc-*

[4]For example, researches (Yermack, 1997 and Aboody and Kaznik, 2000) show that the timing of corporate voluntary disclosures is related to the granting of stock options.

tures." Moreover, Kanodia (2006) suggests that "*models that incorporate disclosure decisions alongside with other (real) decisions or effort allocation allow us to obtain a better understanding about how firms' disclosure policies affect not only market valuations but also firms' other (real) decisions and cash flows and the welfare of different shareholder groups.*"

In our model, the managerial compensation is a weighted sum of stock option and performance bonus. With this framework, we can investigate the impacts from ownership and compensation structure on the manager's disclosure and effort decisions. The optimal compensation structure can be derived by calculating the optimal weight to be put on the sock option. Our model will provide a linkage between managerial compensation and the long-run impacts of management forecasts.

Empirically, several studies in this area suggest that voluntary disclosures are related to managerial opportunism. For example, Aboody and Kasznik (2000) find that firms issue bad news earnings forecasts just prior to stock option awards to CEOs. Noe (1999) finds that managers sell more after good news than after bad news disclosures, while Cheng and Lo (2006) find evidence suggesting that firms strategically issue bad news forecasts prior to insider's net purchases. In a more general setting, Nagar, et al. (2003) argue that equity incentives motivate CEOs to voluntarily issue earnings forecasts.

1.1.3 Market response

Most studies focus on the informativeness of management forecasts and their short-run reactions on stock prices.

Our paper will increase the observation span from the time that earnings forecast are announced till the time after the publication of the actual earnings. We discover an interesting distinction between two long term effects: inoculation and preignition, both of which are defined differently in good or bad news. Our model will characterize the circumstances where managers might change their earnings forecasts for good or bad states,[5] so that the long term effect would

[5] Miller and Piotroski (2000) find that managers of firms in turnaround situations are more likely to provide earnings forecasts if they have higher stock option compensation at risk.

change from inoculation to preignition, or vice versa.

Many researches have studied the market effect of voluntary earnings disclosure for good or bad news. Similar to the distinction between inoculation and preignition, Bernhardt and Campello (2007) find a nonlinear relation between earnings surprises and stock prices as follows. (i) Prices rise less in response to a positive earnings surprise than they fall following a comparably-sized negative earnings surprise; (ii) Greater positive earnings surprises have only marginally positive impacts on returns; but (iii) more negative earnings surprises have sharper adverse impacts on stock price. Researches suggest that the stock market's asymmetric response to earnings surprises (stock prices respond more to negative earnings surprises than to positive earnings surprises) is particularly large for high-growth firms (Skinner and Sloan 2002). Therefore, managers of firms with higher valuation multiples (price-to-earnings and market-to-book) are likely to face greater pressure not to disappoint (see Matsumoto 2002).

For the difference between good and bad news, Skinner (1994) and Kasznik and Lev (1995) conclude that managers are more likely to voluntarily preempt bad news than good news, and that bad news disclosures often occur shortly before earnings announcements. Kothari, et al. (2009) find an asymmetric response to good and bad forecast news and conclude that, on average, managers delay the release of bad news (see Dye and Sridhar (1995) and Acharya, et al. (2008)). Contrarily, Aboody and Kasznik (2000) show that firms delay disclosure of good news and accelerate the release of bad news prior to stock option award periods, consistent with managers making disclosure decisions to increase stock-based compensation.

Skinner (1994) find that bad news disclosures generate larger stock price reactions than good news disclosures, and that large negative earnings surprises are preempted more frequently (20-25% of the time) than other earnings releases (preempted less than 10% of the time). Similarly, Skinner and Sloan (2002) find that the market reaction to negative earnings surprises is much stronger than the market reaction to positive earnings surprises. Hutton, et al. (2003) examine the market response to management earnings forecasts and find that bad news earnings forecasts are always informative but that good news forecasts are informative only when supplemented by verifiable forward-looking statements. Hutton and Stocken (2009) use a firm-level measure

of the accuracy of prior management earnings forecasts and find that the market response to the news in management earnings forecasts increases in the accuracy of prior forecasts.

Finally, there is a strand of literate addressing the impacts on investors' risk or uncertainty. Our model addresses the reverse impacts by asking whether investors' risk attitudes (risk averse or risk loving) can change the manager's disclosure decisions.

Trueman (1986) Dutta and Trueman (2002) consider the reaction on the investors' uncertainty. Morse, Stephan, and Stice (1991) and Baginski, Conrand, and Hassel(1993) indicate that earnings announcements and management forecasts containing a large surprise component can increase the standard derivation across analysts forecasts that constitute the consensus, imply an increase in investor uncertainty. The uncertainty-reducing effects of forecasts with a minimal surprise component. Graham, Harvey and Rajgopal (2005) find that managers make voluntary disclosures to reduce information risk and boost stock price but at the same time, try to avoid setting disclosure precedents that will be difficult to maintain. Suijs (2008) considers an overlapping generations model where investors trade in a firm's stock. Investment risk is partly determined by the volatility of the stock price at which current investors can sell their shares to the next generation of investors. It is shown that asymmetric reporting of good and bad news is value relevant as it affects the allocation of risk among future generations of shareholders.

2 The Model

Here we present a signaling model with effort decisions to describe how stock price trends (inoculation or preignition) can reveal managers' private information on firm's future prospect and their effort decisions. We demonstrate that the choices of inoculation or preignition will depend on the type of information (good or bad news), managerial compensation structures and managers' cognition bias (overconfidence).

The participants are a privately informed *manager* and numerously many *investors*. In a four-stage signaling model, the *manager* first issues an earnings forecast to signal his information about the firm's future prospect as well as his choice of effort. The *investors* calculate the

expected firm value based on the public information (forecast and actual earnings) and determine the stock price accordingly. Specifically, we consider the following sequence of actions. At $t = 1$, the manager, who is informed of the firm's future prospect, issues an earnings forecast. The firm's future prospect and the manager's effort level at $t = 3$ will determine the level of actual earnings to be realized at $t = 4$. At $t = 2$, numerous investors observe this forecast, calculate the expected earnings and modify the stock price accordingly. At $t = 3$, the manager makes his effort decision. The firm's actual earnings are released and publicized at $t = 4$, and the public investors observe the actual earnings and modify the stock price accordingly. More details about earnings and the information structure are given as follows.

Incomplete information on prospect and effort The actual earnings are determined by the firm's future prospect (u) and managerial effort ($e \in [0, 1]$).[6] Other inputs such as capital and labor are assumed to be publicly observable, and we use a constant K to summarize the overall impacts from these inputs. Since no private information is contained in K, there is no loss of generality to assume that $K = 1$. Specifically, the actual earnings x are assumed to be a function of firm's future prospect and effort as follows.

$$x(e, u) = \Phi e^{\theta} u^{1-\theta},$$

where $0 < \theta < 1$ $(1 - \theta)$ measures the output elasticity of effort (prospect). The Cobb-Doglous function is assumed because it provides tractable solutions, and it has a property that the effort's marginal production is increasing with the level of prospect. When the prospect is low, the manager needs to put in more effort to reach the same earnings level as when the prospect is high. This property will reinforce the incentive of the performance bonus in managerial compensation.

We use a parameter $\Phi \geq 1$ to indicate the manager's cognitive bias towards the earnings.

[6] Note that managers' effort decisions are endogenously determined in our model. This is different from the literature which attributes the CEO-specific characteristic of ability as important factor to determine the likelihood and frequency of issuing a forecast (seeTrueman (1986), Aboody and Kasznik 2000; Nagar, Nanda, and Wysocki 2003; Cheng and Lo 2006).

When $\Phi > 1$, the manager is overconfident about future earnings, and when $\Phi = 1$, the manager is neutral. Next, both the firm's future prospect and the managerial effort are privately known by the manager. The uninformed public investors believe that e is uniformly distributed over $[0, 1]$, and that u is drawn from a normal distribution[7] with mean m and variance σ^2. The cumulative distribution function is F, and the density function is denoted by f. All parameters and the function forms of these distributions are common knowledge.

Public investors will adjust their beliefs, the expected earnings and the stock price according the public information released by the firm. There are two sources of public information: the management forecast (x^R) announced at $t = 1$ and the actual earnings (x) publicized at $t = 4$. Let $F(x|x^R)$ and $f(x|x^R)$ be the posterior cumulative and density functions and $E(x|x^R)$ be the expected earnings after observing x^R. Following Guttman, Kadan and Kandel (2006), we assume the following pricing function that maps the set of management forecast into the set of stock price: $P : R \to R$. In particular, the stock price after observing x^R is:

$$P(x^R) = E(x|x^R). \tag{1}$$

Numerous investors will dilute any arbitrage benefit and hence the stock price reflects the expected earnings. Waymire (1984) and Ajinkya and Gift (1984) show that there are positive stock price reactions to management forecasts of earnings increases, and negative reactions to forecasts of earnings decreases. When the actual earnings are publicized at $t = 4$, there is no uncertainty, so $P(x) = x$.

Manager's payoff The manager's payoff $U(x(e, u), x^R)$ is the managerial compensation minus effort and price manipulation costs. The managerial compensation is a weighted sum of stock option awards and performance bonus, and let $0 < \alpha < 1$ denote the proportion on stock option awards. Specifically,

$$U(x(e, u), x^R) = \alpha \left(\frac{P(x) + P(x^R)}{2} \right) + (1 - \alpha) \left(x - E(x|x^R) \right) - \frac{e^2}{2} - \beta \frac{\left(E(x|x^R) - x \right)^2}{2}. \tag{2}$$

[7] We have followed Fischer and Verrecchia (2000) and Guttman, et al. (2006) in making this assumption.

The first two terms represent the managerial compensations, and the last two terms are the effort and manipulation costs. First, since stock price is positively related to stockholders' returns, we use a weighted sum of $P(x)$ and $P(x^R)$ to measure the period-average stock price. Most large firms compensate their top executives through stock options, which now represent the largest single component of managerial pay (Murphy, 1999; Kanagaretnam et al., 2004). Baik et al. (2011) conclude that the forecast release will lead to a higher firm value at the end of the period than if the forecast had not been issued, thereby enhancing the manager's equity-based wealth.

Second, a performance bonus is rewarded according to the difference between actual earnings and the expected earnings. In business practices, a predetermined performance bonus for meeting a specific goal or target is common in the sales industry and for C-suite executives at large companies.[8]

Third, the effort cost measures the manager's direct or opportunity cost involved in producing the earnings. The manipulation cost represents the manager's legal, regulatory, or psychic costs, which will be increasing with the forecast dispersion (see Guttman et al., 2006). The quadratic functions of these two cost terms are assumed so that the manager objective function will be concave and the discussion on the manager's optimization problem is meaningful.

Equilibrium We look for the perfect Bayesian equilibrium of this game, including a disclosure strategy, an effort decision and the investors' beliefs updating processes.

Let $\rho : [0,1] \times R \rightarrow R$ with $\rho(x(e,u)) = x^R$ denote the disclosure strategy which is a correspondence that maps the actual earnings to management forecast. When making the announcement of x^R, the manager needs to pre-commit to an effort level. Let $\delta : R \rightarrow [0,1]$ with $\delta(u) = e$ denote the manager's effort decision, which is a real function that maps the future prospect to effort level. A perfect Bayesian equilibrium is a pair of strategies (ρ, δ) together with investors' posterior beliefs that satisfy the following conditions.

(i) For all u, $(\rho(x(e,u), \delta(u)) \in \arg\max_{x^R, e} U(x(e,u), x^R)$.

[8] Read more: http://www.businessdictionary.com/definition/performance-bonus.html#ixzz2D4Qa36tG

(ii) The posterior beliefs $F(x|z)$ and $f(x|z)$ are consistent with the disclosure strategy by Bayes' rule wherever possible.

Notice that although the forecast is announced at $t = 1$ while the effort decision is made at $t = 3$, the only new information released at $t = 2$ is the price change caused by the announcement. Since there is no other uncertainty in the updating process, the informed manager faces the same maximization problem at $t = 1$ and $t = 3$.+

2.1 Characterization of Equilibrium

We now demonstrate how stock price trends are linked with the manager's disclosure strategy. First, we substitute the pricing function $P(x^R) = E(x|x^R)$ and $P(x) = x$ into $U(x(e,u), x^R)$. Let $\triangle = E(x|x^R) - x$ denote the stock price trend, and we can rewrite the manager's payoff as a function of e and $\triangle$.

$$\begin{aligned} U(x(e,u), x^R) &= \alpha\left(\frac{P(x)+P(x^R)}{2}\right) + (1-\alpha)\left(x - E(x|x^R)\right) - \beta\frac{\left(E(x|x^R)-x\right)^2}{2} - \frac{e^2}{2} \\ &= \alpha x - \frac{\alpha}{2}(x - E(x|x^R)) + (1-\alpha)\left(x - E(x|x^R)\right) - \beta\frac{\left(E(x|x^R)-x\right)^2}{2} - \frac{e^2}{2} \\ &= \alpha\Phi e^{\theta}u^{1-\theta} - \frac{e^2}{2} + \frac{\alpha}{2}\triangle - (1-\alpha)\triangle - \beta\frac{\triangle}{2}^2 \equiv U(x(e,u), \triangle). \end{aligned} \tag{3}$$

$\triangle$ describes the stock price change from the "*perceived*" earnings ($E(x|x^R)$) to the actual earnings (x). We can see the net benefit of increasing $\triangle$ and increasing e from equation (3). The benefit of increasing $\triangle$ is to the increase of compensation from the stock option awards: $\frac{\alpha}{2}\triangle$. The cost of increasing $\triangle$ is the loss from performance bonus: $-(1-\alpha)\triangle$, and the manipulation cost: $\beta\frac{\triangle}{2}^2$. On the other hand, the net benefit of increasing e is the increase in final earnings minus the effort cost: $\frac{e^2}{2}$.

Hence we can rewrite the manager's maximization problem as:

$$\max_{\triangle, e} U(x(e,u), \triangle).$$

The first order condition of maximization is:[9]

$$\frac{\partial}{\partial(\triangle, e)}\{\alpha\Phi e^{\theta}u^{1-\theta} - \frac{e^2}{2} + \triangle\left((\frac{3\alpha}{2} - 1) - \frac{\beta}{2}\triangle\right)\} = 0. \tag{4}$$

[9] The second order condititon of maximization is satisfied.

The manager seeks for a pair of $(\triangle, e)$ to keep this equality satisfied. Although the forecast x^R is announced at $t = 1$ while the effort decision is made at $t = 3$, when we transform the maximization problem to a choice of $\triangle$, the manager needs to pre-commit to an effort level. This pre-committed effort determines an earnings level first, then $\triangle$ is added in to become the forecast x^R.

Notice that $\triangle$ refers to the stock price change from the "*perceived*" earnings $(E(x|x^R))$ to the actual earnings (x). It is different from the "precision of announcement", which is defined as $x^R - x$. Also, the two relevant terms "overshooting" and "undershooting", indicating the cases with $x^R - x > 0$ and $x^R - x < 0$, should not be confused with the notions of *preignition* and *inoculation*. The definitions of preignition and inoculation are defined in terms of the stock price pattern and vary with the type of information. Specifically, *preignition* means $\triangle < 0$ for good news, and $\triangle > 0$ for bad news, while *inoculation* means $\triangle > 0$ for good news, and $\triangle < 0$ for bad news. Take the case of bad news for example. Preignition means to hide this bad news by confusing the investors with a high earnings forecast. This can avoid a sudden depreciation in current stock price, but when the final earnings realize low, the stock price will eventually drop down. Inoculation, on the other hand, means to reveal this bad news by confusing the investors with a exogenously low earnings forecast. This creates a sudden depreciation in current stock price, but when the final earnings realize better than expectation, the stock price will eventually rise up.

We identify two groups of equilibria: the equilibria with full effort and other equilibria involving shirking or overworking. Full effort refers to the case where the partial derivative $\frac{\partial}{\partial e}[\alpha\Phi e^{\theta}u^{1-\theta} - \frac{e^2}{2}] = 0$; while shirking or overworking refers to the case where the partial derivative $\frac{\partial}{\partial e}[\alpha\Phi e^{\theta}u^{1-\theta} - \frac{e^2}{2}] \gtrless 0$. All of these cases are possible since the maximization condition (equation (3)) only requires the sum of net benefit of increasing $\triangle$ and e be zero. When the net benefit of increasing e is greater, equal and smaller than zero, then the net benefit of increasing $\triangle$ needs to be smaller, equal and greater than zero, respectively, to keep the equality in equation (3) satisfied.

2.1.1 Full effort equilibrium

In this equilibrium, the partial derivative $\frac{\partial}{\partial e}[\alpha\Phi e^{\theta}u^{1-\theta} - \frac{e^2}{2}] = 0$. Let e^* denote this full effort. In order to satisfy equation (3), we need the partial derivative $\frac{\partial}{\partial \triangle}[\triangle\left((\frac{3\alpha}{2} - 1) - \frac{\beta}{2}\triangle\right)] = 0$. That is, $(\frac{3\alpha}{2} - 1) - \beta\triangle = 0$. Let $\triangle^*$ denote this stock price trend, and

$$\triangle^* = \frac{1}{\beta}(\frac{3\alpha}{2} - 1). \tag{5}$$

Hence, given full effort, the condition for a truth-telling equilibrium (i.e., $\triangle^* = 0$) is either $\beta = \infty$ or $\alpha = \frac{2}{3}$. $\beta = \infty$ indicates that there is a severe penalty for misreporting, and $\alpha = \frac{2}{3}$ requires that two thirds of the managerial compensation are stock option awards. When $\alpha = \frac{2}{3}$, the benefit from the increase in stock option award is offset by the implicit cost from the decrease in performance bonus (i.e., $(\frac{3\alpha}{2} - 1) = 0$).

Proposition 1 *If $\beta = \infty$ or $\alpha = \frac{2}{3}$, then there exists a truth-telling equilibrium where x^R truly reveals the actual earnings x. However, if $\frac{1}{\beta}(\frac{3\alpha}{2} - 1) \neq 0$, then there will not be any separating equilibrium.*

When $\frac{1}{\beta}(\frac{3\alpha}{2} - 1) = 0$, the net benefit of increasing $\triangle$ is zero. When $\alpha > \frac{2}{3}$, the benefit from the increase in stock option awards is higher than the decrease in performance bonus and manipulation cost, so $\triangle^* > 0$. When $\alpha < \frac{2}{3}$, the benefit from the increase in performance bonus is higher than the implicit loss from the decrease in stock option awards, so $\triangle^* < 0$. In other words, the choice of $\triangle^*$ depends on α. As α increases, the chance that $\alpha > \frac{2}{3}$ will increase and the chance that $\alpha > \frac{2}{3}$ will decrease. So the probability of choosing $\triangle > 0$ is increasing in α, and the possibility of choosing $\triangle < 0$ is decreasing in α.

Prediction 2 *The possibility of choosing $\triangle > 0$ is increasing in α; The possibility of choosing $\triangle < 0$ is decreasing in α.*

Put in different content of information, our results predict that for good news, the probability of choosing preignition (in this case, $\triangle < 0$) is decreasing in α, and for bad news, the probability of choosing preignition (in this case, $\triangle > 0$) is increasing in α.

Intuitively, when the stock option awards increase, the *net* benefit from increasing $\triangle$ is more likely to become positive. The net benefit from increasing $\triangle$ is a sum of benefit from stock option award, implicit loss in performance bonus, and explicit cost of price manipulation. Hence the probability of choosing $\triangle > 0$ will increase with the stock option awards. On the other hand, the probability of choosing $\triangle < 0$ will decrease with the stock option awards. Put in different contents of information, our results predict that, for good news, the probability of *preignition* (in this case, $\triangle < 0$) will decrease with the proportion of stock option, while for bad news, the probability of *preignition* (in this case, $\triangle > 0$) will increase with the proportion of stock option. In other words, we predict that when the proportion of *performance bonus* increases, the probability of *preignition* (inoculation) will decrease (increase) for bad news. That is, managers tend to use inoculation in bad times as the share of performance bonus increases.

2.1.2 Other equilibria

In addition to the full effort equilibrium, we now characterize the properties for other equilibria involving shirking or overworking. If the manager shirks (i.e., $\frac{\partial}{\partial e}(\alpha\Phi e^{\theta}u^{1-\theta} - \frac{e^2}{2}) > 0$) or overworks (i.e, $\frac{\partial}{\partial e}(\alpha\Phi e^{\theta}u^{1-\theta} - \frac{e^2}{2}) > 0$),[10] then we need to have $\frac{\partial}{\partial\triangle}\{\triangle\left((\frac{3\alpha}{2} - 1) - \frac{\beta}{2}\triangle\right)\} < 0$ and > 0 to satisfy the first order condition in equation (3).

Information Type and Choices of $\triangle$ and e Here we examine how good news and bad news affect the manager's effort and reporting decisions. Recall that m is the mean of the distribution F. We define $u > m$ to be good news and $u < m$ to be bad news. Only the manager knows whether the future prospect is good or bad news. In equilibrium, the overall net benefits of increasing effort level and $\triangle$ must be zero (equation (3)).

We explain how the choice of preignition will affect the manager's effort decision under different types of information. Later in the empirical studies, we will define dummy variables **preignition (G)** and **preignition (B)** to refer to the choices of stock price trends under good and bad news. For good news ($u > m$), since the term $\alpha\Phi e^{\theta}u^{1-\theta}$ will be greater than expectation,

[10] Since $\alpha x - \frac{e^2}{2}$ is concave in e, a smaller e will cause the partial derivates of e to be greater than zero.

the net benefit of increasing e is higher than expectation. *Ceteris paribus*, the manager should increase effort to lower down this net benefit. Moreover, if preignition (in this case, $\triangle < 0$) is adopted, then the net benefit of $\triangle$ will be $(1 - \frac{3\alpha}{2}) - \frac{\beta}{2}\triangle$. Given that $\triangle < 0$, this net benefit will be negative if $\alpha > \frac{2}{3} - \frac{\beta}{3}\triangle$, and it will be postive if otherwise. Altogether, for good news, the overall net benefits of increasing $\triangle$ and e can be higher or lower than expectation, depending on the relative size of α and $\triangle$. If the overall net benefits are higher than expectation, then the manager needs to increase effort to lower down the overall net benefits to keep the first order condition satisfied. However, if the overall net benefits are lower than expectation, then the manager needs to decrease effort to pull up the overall net benefits to keep the first order condition satisfied.

On the other hand, for bad news ($u < m$), since the term $\alpha\Phi e^{\theta}u^{1-\theta}$ will be smaller than expectation, the net benefit of increasing e is lower than expectation. *Ceteris paribus*, the manager should decrease effort to lower down this net benefit. Moreover, if preignition (in this case, $\triangle > 0$) is adopted, then the net benefit of $\triangle$ will be $(\frac{3\alpha}{2} - 1) - \frac{\beta}{2}\triangle$. If $\alpha > \frac{2}{3} - \frac{\beta}{3}\triangle$, then this net benefit will be postiive, otherwise, it will be negative. Altogether, for bad news, the overall net benefits of increasing $\triangle$ and e can be higher or lower than expectation, depending on the relative size of α and $\triangle$. If the overall net benefits are higher than expectation, then the manager needs to increase effort to lower down the overall net benefits to keep the first order condition satisfied. However, if the overall net benefits are lower than expectation, then the manager needs to decrease effort to pull up the overall net benefits to keep the first order condition satisfied.

Prediction 3 *For good and bad news, managers' effort levels can increase or decrease with the probability of using preignition.*

Managerial Overconfidence and Choices of $\triangle$ and e First, regarding to the impacts of *managerial overconfidence* on the choice of *price trends*, we predict that for good news, the probability of using preignition will increase with managerial overconfidence, while for bad news, the overconfidence impact on the choice of price trend is uncertain.

The effect of managerial overconfidence is similar to that of good news, i.e., the term $\alpha\Phi e^{\theta}u^{1-\theta}$ will be greater than $\alpha e^{\theta}u^{1-\theta}$ ($\Phi = 1$ for non-overconfidence). Given that $\alpha\Phi e^{\theta}u^{1-\theta}$ will be greater than expectation for good news, when we calculate the net benefit of increasing $\triangle$, the implicit loss in performance bonus will be higher with managerial overconfidence. Therefore, the net benefit of increasing $\triangle$ is less with an overconfident manager. *Ceteris paribus*, the manager should decrease $\triangle$ to pull up this net benefit (by concavity). Hence, the probability of using preignition (in this case, $\triangle < 0$) is higher with managerial overconfidence.

For bad news, $\alpha\Phi e^{\theta}u^{1-\theta}$ will be greater than expectation. But managerial overconfidence will increase this term as $\alpha\Phi e^{\theta}u^{1-\theta}$ is greater than $\alpha e^{\theta}u^{1-\theta}$. If the positive effect from overconfidence dominates, then the implicit loss in performance bonus will be higher, so the net benefit of increasing $\triangle$ is less with an overconfident manager. *Ceteris paribus*, the manager should decrease $\triangle$ to pull up this net benefit (by concavity). Hence, the probability of using preignition (in this case, $\triangle < 0$) is higher with managerial overconfidence. On the other hand, if the negative effect from bad news dominates, then the implicit loss in performance bonus will be smaller, so the net benefit of increasing $\triangle$ is higher with an overconfident manager. *Ceteris paribus*, the manager should increase $\triangle$ to reduce this net benefit (by concavity). Hence, the probability of using preignition (in this case, $\triangle < 0$) is lower with managerial overconfidence.

Prediction 4 *For good news, the probability of using preignition will increase with managerial overconfidence; For bad news, the overconfidence impact on the choice of price trend is uncertain. Next, regarding to the impacts of managerial overconfidence on the manager's effort decision, we predict that for good news, managers' effort level will increase with managerial overconfidence; while for bad news, managers' effort level can increase or decrease with managerial overconfidence.*

For good news, $\alpha\Phi e^{\theta}u^{1-\theta}$ will be greater than expectation, and this term is even higher if the manager is overconfident. The net benefit of increasing e is greater with managerial overconfidence, and *ceteris paribus*, the manager should increase effort to lower down this net benefit.

For bad news, $\alpha\Phi e^{\theta}u^{1-\theta}$ will be lower than expectation, but this term will be higher if the manager is overconfident. So the the overall impact depends on the relative effects of bad news and overconfidence. If the negative effect from bad news dominates, then the overall benefit will decrease and managers need to decrease the effort to keep the first order condition satisfied. Alternatively, if the positive effect from managerial overconfidence dominates, then the overall benefit will increase and managers need to increase the effort to keep the first order condition satisfied.

Prediction 5 *For good news, managers' effort levels will increase with managerial overconfidence; For bad news, managers' effort level can increase or decrease with managerial overconfidence.*

The final result is about stock volatility and the choice of price trend. Since the literature has documented that investors will overreact to bad news (Veronesi, 1999), we expect that the downward price trend will cause more volatility to stock return. In other words, stock volatility is negatively related to the choice of preignition for good news and positively related to the choice of preignition for bad news. Bekaert and Wu (2000) provide evidence that market-level news can create volatility feedback loops, where bad news exacerbates price responses through leverage and volatility effects, while good news dampens price responses. Conrad, Cornell, and Landsman (2002) find that investors weight bad news more heavily than good news when the macro-economy is in a relatively good state. Mian and Sankaraguruswamy (2012) show that, during periods of high market sentiment, investors respond more strongly to bad vs. good news. Conversely, when market sentiment is low, investors respond more strongly to good vs. bad news.

3 Empirical Studies

Our empirical studies test the relation between the forecast induced stock price trends, management compensation structure (Prediction 2) and managerial overconfidence (Prediction 4),

and how the choices of price trend and managerial overconfidence affect the manager's effort decision (Predictions 3 and 5). Finally we test whether the choice of stock price trend will affect the companies' stock volatility.

3.1 Data and Variables

We analyze a sample of 17120 company issued guidance data from Thomson Reuters' First Call Historical Database (FCHD) for the period 2008-2011. We have deleted samples whose forecasts are not earnings per share (eps), whose company types are not COM, whose forecasts are not yearly and whose stock market details are not in the CUSIP dataset.

We test our analytical predictions by investigating, and the compensation and company details from Execucomp and Compustat. The sampling period is 2008-2011, as during the period of global recession the revealed information is supposed to be valued most carefully. Our empirical results support most of our analytical predictions. Frist, according to both probit and logisitic regressions, we can conclude that for good news, the probability of choosing preignition decreases with the proportion of stock and option awards, and increases with managerial overconfidence. For bad news, the probability of choosing inoculation decrease with the proportion of stock and option awards, and also increase with managerial overconfidence. Next, regarding to the effort decision, for good news, manager's effort level decrease with the probability of preigniton and increases with managerial overconfidence. For bad news, manager's effort level increases with the probability of preigniton and also increases with managerial overconfidence. Finally, as for the effect on stock volatility, for good news, choosing preignition will reduce stock volatility but managerial overconfidence will increase it. For bad news, choosing preignition (inoculation) will increase (reduce) stock volatility and managerial overconfidence will also increase it.

We download SIC codes from the COLEV file in the Execucomp dataset, then combine the SIC codes with our sample data. We firstly delete 4230 samples that have no SIC codes, and further exclude 2331 financial firms and public utilities whose SIC codes are 4900-4999 and 6000-6999. In order to measure CEO overconfidence, we delete 165 samples that have no

EXECID data■Unique Executive ID Number■.

From the 10394 samples, we delete 741 nonsensial samples including those with forecasts announced dates smaller than Fiscal Period End (FPE) and those with FPE 2015. We further delete 791 samples that contain no stock price data for the forecasts announcing date (PRCCF) from CRSP dataset. Next, since we are interested in manager's yearly performance, we only keep the first forecast of the year and delete the following revisions (6846 samples). Finally, for the remaining 2044 samples, we combine with the reported actual EPS from Thomson Reuters' I/B/E/S database, and delelet further 55 samples that cannot find the actual EPS from I/B/E/S.

3.1.1 Management Forecasts and Stock Price Trends

A. Management Forecasts For the remaining 1989 samples, management forecasts are defined as the average of the Company Issued Guidelines. (i.e., Averageeps =(EST_1+ EST_2)/2). If EST_1+ EST_2 is missing, then management forecasts are defined as the remaining estimates. For example, if EST_1=1.32 and EST_2=1.48, then the management forecast is 1.4(=1.32+ 1.48)/2. However, if EST_1=1.25 and EST_2=NA, then the management forecast is 1.25.

B. Information Types We use the difference between the reported actual EPSs of the previous year and the current year as a proxy for good or bad news. If the current year reported actual EPS is higher than the previous year actual EPS, then it is good news. On the other hand, if the current year actual EPS is lower than the previous year actual EPS, then it is bad news.

C. Stock Price Trends Stock price trends refer to the difference between the three-day average stock price after the announcement of management forecasts and the three-day average stock price after the reports of actual EPS. The three-day average stock price is calculated as follows. Let T denote the date when the forecast is announced or when the actual EPS is

reported. From the database CRSP, we download stock prices Prccf for T, T+1 and T+2 (denoted by Prccf_AC_T, Prccf_AC_T+1, and Prccf_AC_T+2), and let Averprccf_AC_T+1 be the average of three day stock prices. If there is missing value (due to holiday), then Averprccf_AC_T+1 is defined as the two-day average or one day stock price. We delete 28 samples for which Averprccf_AC_T+1 are missing and 1961 samples remain.

Following our earlier notations, let $\mathbf{x}^R$ denote the management forcast and $\mathbf{x}$ denote the actual earning. $\mathbf{p}(\mathbf{x}^R)$ and $\mathbf{p}(\mathbf{x})$ be the average stock price for the first three trading days following the annoucement of management earnings forecast and the actual earnings, respectively. We are interested in two groups of stock price trends: Preignition and Inoculation, whose definitions vary with the type of information. That is, let $\triangle \equiv \mathbf{p}(\mathbf{x}^R) - \mathbf{p}(\mathbf{x})$ be the difference between the two average stock prices. When there is good news, *Preignition* refers to $\triangle \leq 0$ and *Inoculation* refers to $\triangle > 0$; Contrarily, when there is bad news, *Preignition* refers to $\triangle \geq 0$ and *Inoculation* refers to $\triangle < 0$. We use $\triangle$ to define two dummy variables to indicate the manager's choice of price trend for good news and bad news.

$$
\begin{aligned}
\textit{Preigntion (good)} &= 1, \text{ if } \triangle \leq 0 \text{ and there is good news;} \\
&= 0, \text{ if } \triangle > 0 \text{ and there is good news;} \\
\textit{Preigntion (bad)} &= 1, \text{ if } \triangle \geq 0 \text{ and there is bad news;} \\
&= 0, \text{ if } \triangle < 0 \text{ and there is bad news;}
\end{aligned}
$$

Take the case of bad news for example. Preignition means to hide this bad news by confusing the investors with a high earnings forecast. This can avoid a sudden depreciation in current stock price, but when the final earnings realize low, the stock price will eventually drop down. Inoculation, on the other hand, means to reveal this bad news by confusing the investors with a exogenously low earnings forecast. This creates a sudden depreciation in current stock price, but when the final earnings realize better than expectation, the stock price will eventually rise up.

D. Managerial Overconfidence The literature has proposed three measurements for overconfidence: the first and second by Malmendier and Tate (2005) and Jin and Kothari (2008), and the third by Ben-David, Graham, and Harvey (2007). First, Malmendier and Tate (2005) classifies managers as overconfident if they overexpose themselves to the idiosyncratic risk of their firms. They classify CEOs as overconfident if they exercise options later than the optimal date, hold their options until expiration, or increase their holdings of company stock. Second, Malmendier and Tate (2005) and Jin and Kothari (2008) propose a press-based measure, as it does not suffer from the same endogeneity and omitted variable explanations as the equity-based measure of overconfidence. Third, Ben-David, Graham, and Harvey (2007) measure the confidence bounds that executives provide when asked to estimate the future performance of a stock index. Overconfidence can then be defined as having too narrow of confidence intervals relative to the historical distribution (i.e. variance) of the stock index.

It is important to recognize the difference in the notion of overconfidence examined in Malmedier and Tate (2005) and Jin and Kothari (2008) versus Ben-David et al. (2007). Malmedier and Tate (2005, 2008) are motivated from the "better than average" effect, where individuals over-estimate their acumen relative to others. This upward bias in the assessment of future events is also referred to as over-optimism, although we retain the term overconfidence for consistency with the finance literature. In contrast, Ben-David et al. (2007) define overconfidence as too narrow confidence intervals when predicting probabilistic events, regardless of whether the expectation is biased or not.

Hence, for our purpose we will use the options-based overconfidence measure. Following Malmendier and Tate (2005) and Hirshleifer et al (2012), we calculate an average moneyness of the manager's option portfolio for each year. First, for each CEO year, we calculate the average realizable value per option by dividing the total realizable value of the options by the number of options held by the CEO. The strike price is calculated as the fiscal year-end stock price minus the average realizable value. The average moneyness of the options is then calculated as the stock price divided by the estimated strike price minus one. As we are only interested in options that the CEO can exercise, we include only the vested options held by the CEO.

Following Malmendier and Tate (2005a, 2008), Confident CEO (Options) takes a value 1 if a CEO postpones the exercise of vested options that are at least 67% in the money, and 0 otherwise. If a CEO is identified as overconfident by this measure, she remains so for the rest of the sample period. This treatment is consistent with the notion that overconfidence is a persistent trait.

D. Manager Efforts and Stock Return Volitility From the production function $x(e, u) = \Phi e^{\theta} u^{1-\theta}$, managers' effort is the key determinant for the growth of sales. The firms' future perspectives are treated as exogenously given private information of the managers. Hence, we measure Managers' Effort by the growth of sales, and we capture the impacts from furture perspectives by seperating the samples to two subgroups: good news and bad news.

Finally, we measure *Stock Return Volatility* as the standard deviation of daily stock returns, expressed in percentage terms. Since the literature has documented that investors will overreact to bad news (Veronesi, 1999), we expect that the downward price trend will cause more volatility to stock return. In other words, stock volatility is negatively related to the choice of preignition for good news and positively related to the choice of preignition for bad news. Bekaert and Wu (2000) provide evidence that market-level news can create volatility feedback loops, where bad news exacerbates price responses through leverage and volatility effects, while good news dampens price responses. Conrad, Cornell, and Landsman (2002) find that investors weight bad news more heavily than good news when the macro-economy is in a relatively good state. Mian and Sankaraguruswamy (2012) show that, during periods of high market sentiment, investors respond more strongly to bad vs. good news. Conversely, when market sentiment is low, investors respond more strongly to good vs. bad news.

3.1.2 Control Variables

A. Compensation Structures From ExecuComp's compensation data, we extract Executive's Age and compensation structures variables (including Salary, Bonus, Value of Stock Awards, Value of Option Awards, Non-Equity Incentive Plan Compensation, Change in Pen-

sion Value and NonQualified Deferred Compensation Earnings, All Other Compensation, Total Compensation, Percentage of Total Shares Owned and Percentage of Total Shares Owned – Options Excluded■. We redefine variables to describe CEO's stock option awards (including Stock_Awards, Option_Awards) and Non-Equity incentive compensations (Salary, Bonus, Noneq_Incent, Pension_Chg and Othcomp). The definitions of the variables used in the empirical analysis are given in the Appendix.

B. Firm Charactersitics Finally, from Compustat, we include control variables describing firms' characteristics from supply side (firm Size and capital itneisty), financial conditions (book Leverage and Cash Holding), market preformance (Sales), market valuation (Tobin's). Capital intensity is proxied by the natural logarithm of the ratio of net property, plant, and equipment in 2006 dollars to the number of employees (i.e., PPE / EMP). Again we refer to the Appendix for the detailed description of each variable.

We delete 26 samples for missing data and 231 samples for not able to define managerial overconfidence, and 89 more samples for not able to define inoculation and preignition for good and bad news cases. Table 1 shows the numbers and distributions of inoculation and preignition in good and bad news cases in the total 1615 samples.

Table 1 describes the the numbers and distributions of inoculation and preignition for good and bad news. For good news, there is a higher proprotion to use preignition, and for bad news, there is a higher proportion to use inoculation. Our tests will demonstrate how the choices of stock price trends are related to managerial overconfidence and managers' compensation structures.

Table 1 Numbers and Distributions of Inoculation and Preignition for Good and Bad News

The table describes the numbers and distributions of inoculation and preignition for good and bad news. *Preignition* and Inoculation refer to two kinds of stock price trends and the definitions vary with the type of information. For good news, *Preignition* indicates the case when the stock price trend is nonpoisitive and Inoculation denotes the case when the stock price is positive; For bad news, Preignition indicates that the stock price trend is nonnegative and Inoculation denotes the case when the stock price is negative. Numbers in parentheses indicate the distributions of each type of stock price trends for good and bad news.

	Good news	Bad news	Total
Inoculation	487 (42%)	234 (51%)	721
Preignition	670 (58%)	224 (49%)	894
Total	1157 (100%)	458 (100%)	1615

Table 2 describes the the numbers and distributions of overconfident and non-overconfident CEOs in our sample. There is only 42 percent of our sample CEOs are classified as overconfident. This is much smaller than the average percentage for the period 1993-2003 (61.08% accroding to Hirsh...,et al, 2012). Next, Table 3 presents the descriptive statistics of the variables used in this study.

Table 2 Numbers and Distributions of Overconfident and Non-Overconfident CEOs For Good and Bad news

The table describes the numbers and distributions of overconfident CEOs in our sample. We use the options-based overconfidence measure. We calculate an average moneyness of the manager`s option portfolio for each year. Overconfident CEO takes a value 1 if a CEO postpones the exercise of vested options that are at least 67% in the money, and 0 otherwise. If a CEO is identified as overconfident by this measure, she remains so for the rest of the sample period. This treatment is consistent with the notion that overconfidence is a persistent trait. Numbers in parentheses indicate the distributions of overconfident and non-overconfident CEOs in our sample.

Overconfident	Non- Overconfident	Total
671 (42%)	944 (58%)	1615 (100%)

Table 3. Descriptive Statistics

The table gives the means and standard deviations of the variables used in this study. The sample consists of company issued guidance data for all nonfinancial and nonutility firms from Thomson Reuters' First Call Historical Database (FCHD) for the period 2008-2011, as during the period of global recession the revealed information is supposed to be valued most carefully. To be included in the sample, firms are required to have executive compensation details from Execucomp, accounting data from Compustat and stock returns data from CRSP. *Preignition (good)* and *Preignition (bad)* refers to stock price trends for good and bad news, respectively. We adopt the options-based measure of CEO overconfidence, which defines a CEO as overconfident after he holds options that are at least 67% in the money. Variable definitions are provided in the Appendix.

Variables	Obs	Mean	Std. Dev.	Min	Max
Preignition (good)	1157	0.57908	0.49392	0	1
Preignition (bad)	458	0.48908	0.50042	0	1
Overconfident	1615	0.41548	0.49295	0	1
Age	1615	56.3015	8.03532	0	84
Salary_t (%)	1615	0.21680	0.11045	0	0.61093
Bonus_t (%)	1615	0.05053	0.54978	0	20.5996
Stock_awards_t (%)	1615	0.46163	0.76259	-0.00483	11.6367
Option_awards_t (%)	1615	0.33713	0.49171	-0.09478	5.53191
Noneq_incent_t (%)	1615	0.29964	0.49257	0	5.52746
Pension_chg_t (%)	1615	0.17812	0.46120	-0.19610	6.01380
Othcomp_t (%)	1615	0.07897	0.31869	0	5.53051
Difference_t (%)	1615	0.17156	0.90985	-0.80309	14.19630
Stock Volatility_t	1615	0.44410	0.21928	0.13277	2.59440
Size_t	1615	6.78992	1.42714	2.82512	11.02950
Sales_t	1615	8345.74	25793.8	37.83800	444948
Growth of sales_t	1615	0.07389	0.16797	-0.59030	1.59712
Growth of sales_t-1	1615	0.08705	0.18634	-0.68981	1.62071
Ppeemp_t	1615	78.0401	230.748	0.72130	4079.98
Leverage_t	1615	0.31652	0.28100	0	3.10099
Cashholding_t	1615	2.35341	6.34550	0.00282	113.357
Tobinq_t	1615	4.55280	3.77025	0.25412	37.6184

3.1.3 Empirical Models

$$\Pr eignition(type)_i = \beta_0 + \beta_1 overconfident_i + \beta_2' X_{it} + \beta_3' Z_{it} + \epsilon_{it}. \tag{6}$$

where

$\Pr eignition(type)_i =$ a dummy variable set to 1 if is equal to ; and 0 otherwise

$overconfident_i =$ a dummy variable set to 1 if 67% is equal to ; and 0 otherwise

X_{it} = other compensation strucutre variables

Z_{it} = firm chracterisitc variables controlling supply side, financial side, market performance.

The net benefit from increasing $\triangle$ is a sum of benefit from stock option award, implicit loss in performance bonus, and explicit cost of price manipulation. (Prediction 2) When the proportion of stock option awards increases, the net benefit of $\triangle$ inreases. Hence the probabiilty of using $\triangle > 0$ will increase, and contrarily, the probabiilty of using $\triangle < 0$ will decrease. Our results predict that, for good news, the probability of *innoculation* (in this case, $\triangle < 0$) will decrease with the proportion of stock option, while for bad news, the probability of *innoculation* (in this case, $\triangle > 0$) will increase with the proportion of stock option.

In other words, we predict that when the proportion of *performance bonus* increases, the probability of *preignition* (inoculation) will decrease (increase) for bad news.

The effect of managerial overconfidence is similar to that of good news, i.e., the term $\alpha\Phi e^{\theta}u^{1-\theta}$ will be greater than $\alpha e^{\theta}u^{1-\theta}$ ($\Phi = 1$ for non-overconfidence). Given that $\alpha\Phi e^{\theta}u^{1-\theta}$ will be greater than expectation for good news, when we calculate the net benefit of increasing $\triangle$, the implicit loss in performance bonus will be higher with managerial overconfidence. Therefore, the net benefit of increasing $\triangle$ is lower with an overconfident manager. *Ceteris paribus*, the manager should decrease $\triangle$ to pull up this net benefit (by concavity). Hence, the probability of using preignition (in this case, $\triangle < 0$) is higher with managerial overconfidence.

For bad news, $\alpha\Phi e^{\theta}u^{1-\theta}$ will be greater than expectation. But managerial overconfidence will increase this term as $\alpha\Phi e^{\theta}u^{1-\theta}$ is greater than $\alpha e^{\theta}u^{1-\theta}$. If the positive effect from overconfidence dominates, then the implicit loss in performance bonus will be higher, so the net benefit of increasing $\triangle$ is less with an overconfident manager. *Ceteris paribus*, the manager should decrease $\triangle$ to pull up this net benefit (by concavity). Hence, the probability of using preignition (in this case, $\triangle < 0$) is higher with managerial overconfidence. On the other hand, if the negative effect from bad news dominates, then the implicit loss in performance bonus will be smaller, so the net benefit of increasing $\triangle$ is higher with an overconfident manager. *Ceteris paribus*, the manager should increase $\triangle$ to reduce this net benefit (by concavity). Hence, the probability of

using preignition (in this case, $\triangle < 0$) is lower with managerial overconfidence.

2. Effort and Stock Price Trend

We estimate the following probability model:

$$Managers'efforts_{it} = \beta_0 + \beta_1 overconfident_i + \beta_2 Preigntion(type)_{it} + \beta_3' X_{it} + \beta_4' Z_{it} + \epsilon_{it}. \quad (7)$$

where

$Managers'efforts_{it}$ = effort level, proxied by growth rate at t.

$overconfident_{it}$ = a dummy variable set to 1 if 67% is equal to ; and 0 otherwise

$Preigntion(type)_{it}$ = a dummy variable set to 1 if is equal to ; and 0 otherwise

X_{it} = other compensation strucutre variables

Z_{it} = firm chracterisitc variables controlling supply side, financial side, market performance.

For good news ($u > m$), since the term $\alpha \Phi e^{\theta} u^{1-\theta}$ will be greater than expectation, the net benefit of increasing e is higher than expectation. *Ceteris paribus*, the manager should increase effort to lower down this net benefit. Moreover, if preignition (in this case, $\triangle < 0$) is adopted, then the net benefit of increasing $\triangle$ will increase (by the concavity of the payoff function). Altogether, the overall net benefits of increasing $\triangle$ and e will be higher than expectation. The manager needs to increase effort to lower down the overall net benefits to keep the first order condition satisfied.

On the other hand, for bad news ($u < m$), since the term $\alpha \Phi e^{\theta} u^{1-\theta}$ will be smaller than expectation, the net benefit of increasing e is lower than expectation. *Ceteris paribus*, the manager should decrease effort to lower down this net benefit. Moreover, if preignition (in this case, $\triangle > 0$) is adopted, then the net benefit of increasing $\triangle$ will decrease (by the concavity of the payoff function). Altogether, the overall net benefits of increasing $\triangle$ and e will be lower than expectation. The manager needs to decrease effort to pull up the overall net benefits to keep the first order condition satisfied. We make the following prediction.

Prediction 6 *For good news, the manager's effort level will increase with the probability of using preignition; the manager's effort level will decrease with the probability of using preignition.*

Finally, we estimate the following probability model:

$$Stock\ Volatility_{it} = \beta_0 + \beta_1 overconfident_i + \beta_2 Preigntion(type)_{it} + \beta_3' X_{it} + \beta_4' Z_{it} + \epsilon_{it}. \quad (8)$$

where

$Stock\ Volatility_{it}$ =Stock return volatility

$overconfident_{it}$ = a dummy variable set to 1 if 67% is equal to ; and 0 otherwise

$Preigntion(type)_{it}$ = a dummy variable set to 1 if is equal to ; and 0 otherwise

X_{it} = other compensation strucutre variables

Z_{it} = firm chracterisitc variables controlling supply side, financial side, market performance.

The final result is about stock volatility and the choice of price trend. Since the literature has documented that investors will overreact to bad news (Veronesi, 1999), we expect that the downward price trend will cause more volatility to stock return. In other words, stock volatility is negatively related to the choice of preignition for good news and positively related to the choice of preignition for bad news. Bekaert and Wu (2000) provide evidence that market-level news can create volatility feedback loops, where bad news exacerbates price responses through leverage and volatility effects, while good news dampens price responses. Conrad, Cornell, and Landsman (2002) find that investors weight bad news more heavily than good news when the macro-economy is in a relatively good state. Mian and Sankaraguruswamy (2012) show that, during periods of high market sentiment, investors respond more strongly to bad vs. good news. Conversely, when market sentiment is low, investors respond more strongly to good vs. bad news.

3.2 Empirical Results

Our empirical studies test the relation between the forecast induced stock price trends, management compensation structure (Prediction 2) and managerial overconfidence (Prediction 4), and how the choices of price trend and managerial overconfidence affect the manager's effort decision (Predictions 3 and 5). Finally we test whether the choice of stock price trend will affect the companies' stock volatility.

We test our theoretical predictions by estimating equations (*) to (&&&), whiel controlling for important factors that have systemic effects on hte corss-sectional variation in firm performance. Table *** and ** present the regression results on the choice of price stock trends for good and bad news, respectively.

Table 4: Effects of Compensation Structures and Managerial Overconfidence on the Choices of Stock Price Trends (Good News)

The table presents the results of regressions of stock Price Trends on compensation structures and CEO overconfidence for good news. Managers' choices of stock price trends can be either Preignition or Inoculation, whose definitions vary with the type of information. Dummy variable *Preignition (good)* is equal to 1 if the manager's choice is Preignition for good news. There are two groups of compensations: stock option awards (*Stock_awards, Option_awards*) and non-equity incentive compensations (*Salary, Bonus, Noneq_incent*). *Overconfident* is an indicator variable equal to 1 for all years after the CEO holds options that are at least 67% in the money. Standard errors are corrected for clustering of observations at the firm level (t-statistics are in parentheses). *, **, and *** measure significance at the 10%, 5%, and 1% level, respectively.

Dependent variable: ***Preignition (good)***	Probit Regression (N=1157)		Logistic Regression (N=1157)	
	Coefficient Estimate	(p-value)	Coefficient Estimate	(p-value)
Intercept	0.0342888	0.926	0.0567302	0.925
Overconfident	0.1763768**	0.032	0.2903778**	0.031
Age	-0.0042693	0.390	-0.0064358	0.424
Salary_t	0.9664556*	0.073	1.5061840*	0.087
Bonus_t	-0.0175667	0.936	-0.0467393	0.892
Stock_awards_t	-0.0177601	0.763	-0.0237464	0.808
Option_awards_t	-0.2917570***	0.004	-0.4734700***	0.006
Noneq_incent_t	0.1173594	0.206	0.1940484	0.206
Pension_chg_t	0.0193263	0.839	0.0416334	0.791
Othcomp_t	0.2862570*	0.074	0.4574256*	0.081
Size_t	0.1723750**	0.033	0.2868193**	0.033
Ln(Sales_t)	-0.1553991**	0.044	-0.2611051**	0.040
Growth of sales_t-1	-1.6590000***	0.000	-2.8996580***	0.000
Ppeemp_t	-0.0007884**	0.041	-0.0014275	0.108
Leverage_t	-0.3015026*	0.093	-0.5102244*	0.098
Cashholding_t	0.0072789	0.231	0.0114533	0.262
Tobinq_t	0.0997410***	0.000	0.1680110***	0.000
Pseudo R2	0.0749		0.0758	

Table 5: Effects of Compensation Structures and Managerial Overconfidence on the Choices of Stock Price Trends (Bad News)

The table presents the results of regressions of stock Price Trends on compensation structures and CEO overconfidence for bad news. Managers' choices of stock price trends can be either Preignition or Inoculation, whose definitions vary with the type of information. Dummy variable *Preignition (bad)* is equal to 1 if the manager's choice is Preignition for bad news. There are two groups of compensations: stock option awards (*Stock_awards, Option_awards*) and non-equity incentive compensations (*Salary, Bonus, Noneq_incent*). *Overconfident* is an indicator variable equal to 1 for all years after the CEO holds options that are at least 67% in the money. Standard errors are corrected for clustering of observations at the firm level (t-statistics are in parentheses). *, **, and *** measure significance at the 10%, 5%, and 1% level, respectively.

Dependent variable: ***Preignition (bad)***	Probit Regressions (N=458)		Logistic Regression (N=458)	
	Coefficient Estimate	(p-value)	Coefficient Estimate	(p-value)
Intercept	0.0543674	0.925	0.0633984	0.947
Overconfident	-0.3505896**	0.013	-0.6089210***	0.009
Age	-0.0036122	0.663	-0.0052754	0.698
Salary_t	2.1427230**	0.023	3.6720450**	0.022
Bonus_t	0.7001144	0.291	1.3693920	0.308
Stock_awards_t	0.3761224**	0.013	0.6788836**	0.019
Option_awards_t	0.2177069	0.303	0.4183311	0.260
Noneq_incent_t	-1.6516460***	0.000	-3.0145020***	0.000
Pension_chg_t	-0.7146580***	0.003	-1.1560100***	0.005
Othcomp_t	-0.1995368	0.344	-0.3698495	0.296
Size_t	-0.3192763**	0.019	-0.5318035**	0.029
Ln(Sales_t)	0.2461747*	0.062	0.4096380*	0.069
Growth of sales_t-1	1.1797060***	0.002	2.0198890***	0.004
Ppeemp_t	0.0003002	0.268	0.0005816	0.302
Leverage_t	0.4918430**	0.016	0.8281066**	0.020
Cashholding_t	0.0445601**	0.035	0.0748601**	0.033
Tobinq_t	-0.0561584**	0.032	-0.1066195	0.104
Pseudo R2	0.1321		0.1358	

A. Stock Price Trends and Compensation Structures

$$Innoculation(type)_{it} = \beta_0 + \beta_1 overconfident_{it} + \beta_2' X_{it} + \beta_3' Z_{it} + \epsilon_{it}. \tag{9}$$

First, Prediction 2 says that their impacts of compensation strucutres on the choice of price trends vary with the type of informaiton. Prediction 2 involves with the joint effects from compensaton structures and information type. First, the type of information affects the manager's perceived future earnings ($\alpha \Phi e^{\theta} u^{1-\theta}$), and hence the the implicit loss in performance

bonus will be higher with managerial overconfidence. For good news, the manager's perceived future earnings is greater than average, hence the implicit loss in performance bonus in the net benefit of increasing $\triangle$ is lower than average for good news. Hence, ceteris paribus, the incentive of increasing $\triangle$ is greater than average for good news. Contrarily, the incentive of increasing $\triangle$ is lower than average for bad news.

Second, the compensation strucutre will change the proportion of the positive benefit from stock option award and the negative effect in performance bonus. Explicitly, when the proportion of stock option awards increases, the positive benefit of increasing $\triangle$ will inrease. When the proportion of non-equity incentive compensation incrases, the negative effect of increasing $\triangle$ will inrease.

Overall, both good news and increasing the proportion of non-equity incentive compensations have negative effects on the net benefit of increasing $\triangle$, hence there is more incentive to decrease $\triangle$; Contrarily, both bad news and increasing the the proportion of stock option awards have postiive effects on the net benefit of increasing $\triangle$, hence there is more incentive to increase $\triangle$.

The depedent variables in both Table *** and ** are the preignition dummy, which takes value 1 if $\triangle < 0$ for good news, and $\triangle > 0$ for bad news. Table *** shows that, for good news, when the proportion of stock option awards increases, managers are more likely to use innoculation (in this case, $\triangle > 0$) as their dislcosure strategies. The coefficients of option awards are significantly negative at $p < 0.01$ for both probit and logistic regressions (-0.291757 and -0.473470, repsectivley). This suggests that in this case, the positive effect of stock option awards dominates the negative impact of good news. Managers are less likely to use preignition, or alternatively, they are more likely to use innoculation when there is good news.

Table ** shows that, for bad news, when the proportion of stock option awards increases, managers are more likely to use preignition (in this case, $\triangle > 0$) as their dislcosure strategies. The coefficients of stock awards are significantly positive at $p < 0.05$ for both probit and logistic regressions (0.3761224 and 0.6788836, repsectivley). Since both the increase of stock awards and bad news will increase the net benefit of increasing $\triangle$, managers are more likely to use preignition (in this case, $\triangle > 0$) when there is bad news.

Table ** also shows that when the proportion of non-equity incentive compensations increases, the coefficients of *Noneq_incent* and *Pension-chg* are both significantly negative at $p < 0.01$ for probit regressions (-1.651646 and -0.714658, respectively) and for logistic regressions (-3.014502 and -1.15601, respectively). As explained, both *Noneq_incent* and *Pension-chg* will increase the implicit cost of increasing $\triangle$, hence decrease the net benefit of increasing $\triangle$. Therefore managers are less willing to use preignition as disclosure strategies. Alternatively, for bad news, managers are more willing to use innoculation as the non-equity incentive compensations increases.

B. Stock Price Trends and Managerial Overconfidence

Prediction 4 says that their impacts of managerial overconfidence on the choice of price trends also vary with the type of informaiton.

As explained, price trends affects three directions: benefit from stock option award, implicit loss in performance bonus, and explicit cost of price manipulation Prediction 4 involves with the joint effects from managerial compensation and information type. First, as described, the incentive of increasing $\triangle$ is greater than average for good news. Contrarily, the incentive of increasing $\triangle$ is lower than average for bad news.

Second, the effect of managerial overconfidence is similar to that of good news, i.e., overconfidence will increase the implicit loss in performance bonus and therefore, decrease the net benefit of increasing $\triangle$.

Overall, both good news and managerial overconfidence will decrease the net benefit of increasing $\triangle$, hence there is more incentive to decrease $\triangle$. When bad news is combined with managerial overconfidence, the results depends on the two conflicting impacts on the implicit cost in performance bonus.

Table 4 shows that, for good news, managerial overconfidence will decrease the benefit of increasing $\triangle$, hence managers are more likely to use preignition (in this case, $\triangle < 0$). The coefficients of *Overconfident* are significantly positive at $p < 0.05$ for both probit and logistic regressions (0.1763768 and 0.2903778, repsectivley). Since both good news and managerial

overconfidence will decrease the net benefit of increasing $\triangle$, managers are less likely to use innoculation (in this case, $\triangle > 0$), or alternatively, they are more likely to use preignition when there is good news.

Table 6: Effects of Stock Price Trends and Managerial Overconfidence on Managers' Effort Decisions (Good and Bad News)

The table presents the results of regressions of Managers' Efforts on stock price trends and managerial overconfidence for good and bad news. We measure Managers' Effort by sales growth, as effort is a key determinant for growth. The choices of stock price trends can be either Preignition or Inoculation, whose definitions vary with the type of information. Dummy variable *Preignition (good/bad)* is equal to 1 if the manager's choice is Preignition for good/bad news. *Overconfident* is an indicator variable equal to 1 for all years after the CEO holds options that are at least 67% in the money. Standard errors are corrected for clustering of observations at the firm level (t-statistics are in parentheses). *, **, and *** measure significance at the 10%, 5%, and 1% level, respectively.

Dependent variable: ***Managers' Efforts***	OLS (*Good news*, N=1157)		OLS (*Bad news*, N=458)	
	Coefficient Estimate	(p-value)	Coefficient Estimate	(p-value)
Intercept	0.0718450*	0.070	-0.1167838	0.230
Preignition (good)	-0.0398579***	0.000		
Preignition (bad)			0.0665518***	0.000
Overconfident	0.0474517***	0.000	0.0003311	0.986
Age	0.0003294	0.604	-0.0012539	0.353
Salary_t	-0.1279101**	0.023	0.0694351	0.556
Bonus_t	0.0126215	0.395	0.0143054	0.875
Stock_awards_t	0.0048293	0.299	0.0057369	0.602
Option_awards_t	-0.0177552*	0.100	-0.0295798	0.204
Noneq_incent_t	0.0288426***	0.000	0.0851294	0.162
Pension_chg_t	-0.0171201**	0.011	-0.0235044	0.378
Othcomp_t	0.0049320	0.735	0.0185129	0.522
Size_t	0.0332593***	0.000	-0.0096676	0.626
Ln(Sales_t)	-0.0304217***	0.000	0.0167200	0.354
Growth of sales_t-1	0.1379784***	0.000	0.1177120	0.173
Ppeemp_t	-0.0000343	0.399	-0.0000773**	0.042
Leverage_t	-0.0391637**	0.013	-0.0450453*	0.098
Cashholding_t	0.0020927***	0.003	0.0034745	0.203
Tobinq_t	0.0110799***	0.000	0.0142381**	0.014
R-squared	0.2167		0.1884	

Table ** shows that, for bad news, the coefficients of *Overconfident* are significantly negative at least $p < 0.05$ for both probit and logistic regressions (-0.3505896 and -0.608921, repsectivley). Managerial overconfidence will increase the implict cost of performance bonus, and this impact is greather than that of bad news, which will decrease the implicit cost of performance bonus. Hence managerial overconfidence will decrease the net benefit of increasing $\triangle$, and hence managers are less likely to use preignition (in this case, $\triangle > 0$) when there is bad news.

C. Managers' Effort Decisions and Stock Price Trends

Predictions 3 and 5 suggest how manager's effort decision will change with the choices of price trend and managerial overconfidence. (Predictions 3 and 5). We test our theoretical predictions by estimating equations (&) to (&&), while controlling for important factors that have systemic effects on hte corss-sectional variation in firm performance. Table & and && present the regression results on managers' effort decisions for good and bad news, respectively. Since the earnings are determined by the firms' future perspect and managers' effort levels, we use the growth in sales as a proxy for effort levels.

Prediction 3 says that managers' effort decisions will change with the choice of stock price trends, but the impacts vary with the type of information. Explicitly, for both good or bad news, the manager's effort level can increase or decrease with the probability of using preignition, depending on the relative sizes of α and $\triangle$. When managers are free to manipulate both the effort levels and the stock price trends, equation (5) shows the overall trade-off faced by the managers. If the manager shirks (i.e., $\frac{\partial}{\partial e}(\alpha\Phi e^{\theta}u^{1-\theta} - \frac{e^2}{2}) > 0$) or overworks (i.e, $\frac{\partial}{\partial e}(\alpha\Phi e^{\theta}u^{1-\theta} - \frac{e^2}{2}) > 0$), then we need to have $\frac{\partial}{\partial\triangle}\{\triangle\left((\frac{3\alpha}{2} - 1) - \frac{\beta}{2}\triangle\right)\} < 0$ and > 0 to satisfy the first order condition in equation (3).

First, the type of information will affect the managers' perceived earnings $\alpha\Phi e^{\theta}u^{1-\theta}$, thus changing the incentives of using effort levels and stock price trends to keep the maximisation condition satisfied. When there is good news, the managers' perceived earnings will be greater than expectation, and the net benefit of increasing e is higher than expectation. *Ceteris paribus*, the manager should increase effort to lower down this net benefit. On the other hand, when there is bad news, the managers' perceived earnings will be lower than expectation and the net

benefit of increasing e is lower than expectation. *Ceteris paribus*, the manager should decrease effort to increase this net benefit.

However, the overall net benefits of $\triangle$ and e can be lower or higher than expectation, depending on the relative size of α and $\triangle$. If the net benefit of $\triangle$ is large enough to dominate the impacts from good and bad news, then managers' effort decisions can move in an opposite direction from those only with information effects. Hence, Prediction 3 suggests that managers' effort levels can increase or decrease with the probability of using preignition.

Table & shows that, for good news, managers' effort levels will decrease with the probability of using preignition. The coefficients of the dummy variable *Preignition (good)* is significantly negative at $p < 0.01$ for the OLS regression (-0.0398579). Using preignition (in this case, $\triangle < 0$) decreases the net benefit of $\triangle$. Despite that there is a positive impact from good news, the overal net benefits of $\triangle$ and e is lower than expectation, hence managers need to reduce effort to pull up the net benefit to keep the maximisation condition satisfied.

Table & also shows that, for bad news, managers' effort levels will increase with the probability of using preignition. The coefficients of the dummy variable *Preignition (bad)* is significantly positive at $p < 0.01$ for the OLS regression (0.0665518). Using preignition (in this case, $\triangle > 0$) increases the net benefit from $\triangle$. Despite that there is a negative impact from bad news, the overal net benefits of $\triangle$ and e is higher than expectation, hence managers need to increase effort to lower down the net benefit to keep the maximisation condition satisfied.

Since managers are free to manipulate both the effort levels and the stock price trends, we will later demonstrate the results from simultaneous regressions in the robust tests.

D. Managers' Effort Decisions and Managerial Overconfidence

Propostion 5 suggests that overconfidence has different impacts on managers' effort decisions for differernt type of information. For good news, managers' effort level will increase with managerial overconfidence; For bad news, managers' effort level can increase or decrease with managerial overconfidence.

Both the type of information and managerial overconfidence will affect the managers' per-

ceived earnings $\alpha\Phi e^{\theta}u^{1-\theta}$, thus changing the incentives of using efforts and stock price trends to keep the maximisation condition satisfied. When good news is combined with managerial overconfidence, the managers' perceived earnings will be greater than expectation, and the net benefit of increasing e is higher than expectation. However, when there is bad news, the negative effect on managers' perceived earnings is conteracted by the positive effect from managerial overconfidence.

Table & shows that, for good news, managers' effort levels will increase with managerial overconfidence, but for bad news, the impact of overconfidence is not significant. The coefficients of the dummy variable *Overconfident* is significantly positive at $p < 0.01$ for the OLS regression for good news (0.0474517). The coefficients of the dummy variable *Overconfident* is positive but not significant for the OLS regression for bad news (0.0003311). The negative effect from bad news is counteracted by the positive positive effect from managerial overconfidence, and hence the overall effect is minor and insignificant.

Table 7: Effects of Stock Price Trends on Stock Return Volatility

(Good and Bad News)

The table presents the results of regressions of Stock Return Volatility on stock price trends for good and bad news. Stock return volatility is the standard deviation of daily stock returns over the fiscal year, in percentage. The choices of stock price trends can be either Preignition or Inoculation, whose definitions vary with the type of information. Dummy variable *Preignition (good/bad)* is equal to 1 if the manager's choice is Preignition for good/bad news. *Overconfident* is an indicator variable equal to 1 for all years after the CEO holds options that are at least 67% in the money. Standard errors are corrected for clustering of observations at the firm level (t-statistics are in parentheses). *, **, and *** measure significance at the 10%, 5%, and 1% level, respectively.

Dependent variable:	OLS (*Good news*, N=1157)		OLS (*Bad news*, N=458)	
Stock Return Volatility	Coefficient Estimate	(p-value)	Coefficient Estimate	(p-value)
Intercept	0.8159992***	0.000	0.6812437***	0.000
Preignition (good)	-0.1038262***	0.000		
Preignition (bad)			0.2071553***	0.000
Overconfident	0.0280835***	0.002	-0.0439241**	0.023
Age	-0.0003165	0.557	0.0011686	0.398
Salary_t	-0.0105024	0.871	0.0331235	0.835
Bonus_t	0.0131501	0.528	0.0063723	0.768
Stock_awards_t	0.0025930	0.653	-0.0178481	0.484
Option_awards_t	0.0159844	0.143	-0.0698914**	0.026
Noneq_incent_t	-0.0118249	0.166	-0.0703874	0.126
Pension_chg_t	-0.0072981	0.415	-0.0515331*	0.068
Othcomp_t	0.0039125	0.828	-0.0051050	0.781
Size_t	-0.0434816***	0.000	-0.0949386***	0.000
Ln(Sales_t)	-0.0028378	0.730	0.0437030*	0.061
Growth of sales_t-1	0.1871094***	0.000	0.2458475***	0.001
Ppeemp_t	0.0000856***	0.007	0.0000813	0.185
Leverage_t	0.0595214***	0.008	0.2130688***	0.000
Cashholding_t	0.0006517	0.170	-0.0003584	0.897
Tobinq_t	-0.0121098***	0.000	-0.0221514***	0.001
R-squared	0.3323		0.4240	

E. Stock Price Trend and Stock Volatility

Table % shows the relation between stock price trends and stock volatility. The linkage is that stock price trends can affect the uninformed investors' perceptions about future earnings. Since the literature has documented that investors will overreact to bad news (Veronesi, 1999),

we expect that the downward price trend will cause more volatility to stock return. In other words, stock volatility is negatively related to the choice of preignition for good news and positively related to the choice of preignition for bad news.

Table % justifies our predictions. For good news, choosing preignition can decrease stock volatility for good news and choosing preignition will increase stock volatility for bad news. The coefficients of the dummy variable *Overconfident* is significantly negative at $p < 0.01$ for the OLS regression for good news (-0.1038262), and he coefficients of the dummy variable *Overconfident* is significantly positive at $p < 0.01$ for the OLS regression for bad news (0.2071553).

Table 8 Simultaneous Probit Regressions of Stock Price Trends and Managers' Effort Decisions (Good news)

The table presents the results of simultaneous probit regressions on stock price trends and managers' efforts on compensation structures and managerial overconfidence for good news. The choices of stock price trends can be either Preignition or Inoculation, whose definitions vary with the type of information. Dummy variable *Preignition (good)* is equal to 1 if the manager's choice is Preignition for good news. We measure Managers' Effort by sales growth, as effort is a key determinant for growth. There are two groups of compensations: stock option awards (*Stock_awards, Option_awards*) and non-equity incentive compensations (*Salary, Bonus, Noneq_incent*). *Overconfident* is an indicator variable equal to 1 for all years after the CEO holds options that are at least 67% in the money. The Instrument variable for the regression on Preignition (good) is a dummy variable whose value is 1 if there was good news in the previous period and 0 for otherwise. The instrument variable for the regression on Managers' Efforts is the medium of industry growth, where industry is classified by the first two codes in SIC. Standard errors are corrected for clustering of observations at the firm level (t-statistics are in parentheses). *, **, and *** measure significance at the 10%, 5%, and 1% level, respectively.

	Simultaneous Probit Regressions (Good news, N=1157)			
	Dependent variable: ***Preignition (good)***		Dependent variable: ***Managers' Efforts***	
	Coefficient Estimate	(p-value)	Coefficient Estimate	(p-value)
Preignition (good)			0.0040664	0.954
Managers' Efforts	-6.7225010***	0.000		
Intercept	0.3631134	0.272	0.0715542	0.168
Overconfident	0.4206310***	0.000	0.0507970***	0.000
Age	-0.0002113	0.962	0.0003121	0.627
Salary_t	-0.3219751	0.510	-0.1515321**	0.014
Bonus_t	0.0769992	0.700	0.0109925	0.365
Stock_awards_t	0.0210331	0.682	0.0056377	0.210
Option_awards_t	-0.2776943***	0.001	-0.0049637	0.688
Noneq_incent_t	0.2597348***	0.001	0.0226206***	0.008
Pension_chg_t	-0.1051668	0.192	-0.0143288**	0.024
Othcomp_t	0.1925195	0.247	-0.0057128	0.708
Size_t	0.3181629***	0.000	0.0329807***	0.000
Ln(Sales_t)	-0.2894067***	0.000	-0.0314047***	0.000
Ppeemp_t	-0.0006789***	0.003	-0.0000172	0.610
Leverage_t	-0.4312517***	0.003	-0.0394289**	0.012
Cashholding_t	0.0182954***	0.001	0.0021408***	0.000
Tobinq_t	0.1301000***	0.000	0.0105855***	0.000

Table 9 Simultaneous Probit Regressions on Stock Price Trends and Managers' Effort Decisions (Bad news)

The table presents the results of simultaneous probit regressions on stock price trends and managers' efforts on compensation structures and managerial overconfidence for good news. The choices of stock price trends can be either Preignition or Inoculation, whose definitions vary with the type of information. Dummy variable *Preignition (bad)* is equal to 1 if the manager's choice is Preignition for bad news. We measure *Managers' Effort* by sales growth, as effort is a key determinant for growth. There are two groups of compensations: stock option awards (*Stock_awards, Option_awards*) and non-equity incentive compensations (*Salary, Bonus, Noneq_incent*). *Overconfident* is an indicator variable equal to 1 for all years after the CEO holds options that are at least 67% in the money. The Instrument variable for the regression on Preignition (bad) is a dummy variable whose value is 1 if there was bad news in the previous period and 0 for otherwise. The instrument variable for the regression on Managers' Efforts is the medium of industry growth, where industry is classified by the first two codes in SIC. Standard errors are corrected for clustering of observations at the firm level (t-statistics are in parentheses). *, **, and *** measure significance at the 10%, 5%, and 1% level, respectively.

	Simultaneous Probit Regressions (Bad news, N=458)			
	Dependent variable: ***Preignition (bad)***		Dependent variable: ***Managers' Efforts***	
	Coefficient Estimate	(p-value)	Coefficient Estimate	(p-value)
Preignition (bad)			0.1426095	0.548
Managers' Efforts	5.562675***	0.000		
Intercept	0.4900774	0.338	-0.1383305	0.501
Overconfident	-0.2147159	0.111	0.0133182	0.710
Age	0.0050738	0.495	-0.0012443	0.375
Salary_t	0.8434910	0.345	-0.0114400	0.953
Bonus_t	0.2694601	0.464	0.0124358	0.203
Stock_awards_t	0.1847015	0.223	-0.0034653	0.922
Option_awards_t	0.3053548*	0.094	-0.0310497	0.392
Noneq_incent_t	-1.5003420***	0.000	0.1238176	0.225
Pension_chg_t	-0.2649075	0.298	-0.0056502	0.907
Othcomp_t	-0.2492698	0.171	0.0176695	0.361
Size_t	-0.1291128	0.342	-0.0009663	0.977
Ln(Sales_t)	0.0483510	0.705	0.0095249	0.688
Ppeemp_t	0.0006039***	0.004	-0.0000881**	0.022
Leverage_t	0.5359086***	0.006	-0.0635737	0.128
Cashholding_t	0.0080060	0.732	0.0029312	0.577
Tobinq_t	-0.1115713***	0.000	0.0161700**	0.012

F. Simultaneous Regressions on Stock Price Trends and Managers' Efforts

When management forecasts are announced, the managers need to precommit to the deci-

sions on stock price trend and effort level, as described by equation (3). Therefore, we estimate equations (&) and (&&) simultenously to see if our earlier results are robust to the interaction between stock price trend and managers' efforts.

Table # and ## present the simultaneous regression results on managers' decisions on stock price trend and effrots for good and bad news, respectively. Again, since the earnings are determined by the firms' future perspect and managers' effort levels, we use the growth in sales as a proxy for effort levels.

$$\Pr eignition(type)_i = \beta_0 + \beta_1 overconfident_i + \beta_2' X_{it} + \beta_3' Z_{it} + \epsilon_{it}. \tag{10}$$

$$Managers' efforts_{it} = \beta_0 + \beta_1 overconfident_i + \beta_2 Preigntion(type)_{it} + \beta_3' X_{it} + \beta_4' Z_{it} + \epsilon_{it}. \tag{11}$$

Table # shows that, for good news, **all** our predictions on the choice of stock price trends hold in the simultaneous regressions. (1) The coefficients of option awards are significantly negative at $p < 0.01$ (-0.2776943) for the regressions on Preignition (good), suggesting that as the the proportion of stock option awards increases, managers are more likely to use innoculation (in this case, $\triangle > 0$) as their dislcosure strategies. (2) The coefficients of *Overconfident* are significantly positive at $p < 0.01$ (0.420631) for the regressions on *Preignition (good)*, suugesting that managers are more likely to use preignition when there is good news.

Table # also shows that, for good news, our predictions on the relation between managers efforts and managerial overconfidence also holds in the simultaneous regressions. However, the relation between managers efforts and the choice of stock price trend becomes vague in the simultaneous regressions. (1) The coefficients of *Overconfident* is significantly positive at $p < 0.01$ (0.050797) for the regressions on *Managers' Efforts*, suggesting that managers' effort levels will increase with managerial overconfidence. (2) The coefficient of *Preignition (good)* is positive but insignificant (0.0040664) for the regressions on *Managers' Efforts,* suggesting that using preignition (in this case, $\triangle < 0$) decreases the net benefit of $\triangle$, which cancels out the positive impacts from good news, hence the overall impact on e remains unchanged.

Next, Table ## shows that, for bad news, **all** of our predictions on the choice of stock price

trends hold in the simultaneous regressions. (1) The coefficients of option awards are significantly positive at $p < 0.1$ (0.3053548) for the regressions on *Preignition (bad)*, suggesting that as the the proportion of stock option awards increases, managers are more likely to use preignition (in this case, $\triangle > 0$) when there is bad news. Also, when the proportion of non-equity incentive compensations increases, the coefficients of *Noneq_incent* is both significantly negative at $p <$ 0.01 (i.e., -1.500342) for the regressions on *Preignition (bad),* suggesting that managers are more willing to use innoculation as the non-equity incentive compensations increases. (2) The coefficient of *Overconfident* is negative but insignificant (i.e., 0.0133182) for the regressions on *Preignition (bad)*, suggesting that the two conflicting impacts on the implicit cost of performance bonus (i.e., bad news and overconfidence) cunteract with each other and cause the impact on the choice of stock price trends to be insignificant.

Finally, Table # also shows that, for bad news, neither of our predictions on the relation between managers efforts and managerial overconfidence holds in the simultaneous regressions. (1) The coefficients of *Overconfident* is positive but insignitcant (i.e., 0.0133182) for the regressions on *Managers' Efforts.* (2) The coefficient of *Preignition (bad)* is positive but insignificant (i.e., 0.01426095) for the regressions on *Managers' Efforts.* When there is bad news, the managers' perceived earnings will be lower than expectation and the net benefit of increasing e is lower than expectation. But by using preignition ($\triangle > 0$ in this case), there is a impact on the net benefit of $\triangle$. Our results suggest that the two conflicting effects counteract with each other and hence there is no significant impact on managers' effort.

References

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

Acharya, V.V., DeMarzo, P., Kremer, I., 2008. Endogenous information flows and the clustering of announcements. Working Paper.

Ajinkya, B. B., Gift, M. J., 1984. Corporate managers' earnings forecasts and symmetrical

adjustments of market expectations. *Journal of Accounting Research* 22, 425-444.

Ajinkya, B., Bhojraj, S., Sengupta, P., 2005. The association between outside directors, institutional investors and the properties of management earnings forecasts. *Journal of Accounting Research* 43, 343–76.

Ali, A., Chen, T., Radhakrishnan, S., 2007. Corporate disclosures by family firms. *Journal of Accounting and Economics* 44, 238–286.

Amihud, Y., Mendelson., H., 1986. Asset pricing and the bid-ask spread. *Journal of Financial Economics* 17, 223–249.

Arya, A., Frimor, H., Mittendorf, B., 2009. Discretionary disclosure of proprietary information in a multi-segment firm. Working Paper.

Ashby, F. G., Valentin, V. V., Turken, A. U., 2002. Emotional cognition: From brain to behaviour, John Benjamins Publishing Company, Amsterdam, chapter The effects of positive affect and arousal on working memory and executive attention: Neurobiology and computational models, 245–287.

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

Baginski, S., Hassell, J., 1997. Determinants of management forecast precision. The Accounting Review 72, 303–12.

Baginski, S., Hassell, J., Kimbrough, M., 2002. The effect of legal environment on voluntary disclosure: Evidence from management earnings forecasts issued in the U.S. and Canadian markets. *The Accounting Review* 77, 25–50.

Baik, B., Farber, D. B., Lee, S. S., 2011. CEO ability and management earnings forecasts. *Contemporary Accounting Research* 28, 1645-1668.

Balsam, S., Chen, H., Sankaragurusamy, S., 2003. Earnings management prior to stock options grant. Working paper, Temple University.

Bamber, L., Cheon, Y.,1998. Discretionary management earnings forecast disclosures: Antecedents and outcomes associated with forecast venue and forecast specificity choices. *Journal*

of Accounting Research 36, 167–90.

Basu, S. 1997. The conservatism principle and the asymmetric timeliness of earnings. *Journal of Accounting and Economics* 24, 3-37.

Bens, D., 2002. The determinants of the amount of information disclosed about corporate restructuring. *Journal of Accounting Research* 40, 1–20.

Bernhardt, D., Campello, M., 2007. The dynamics of earnings forecast management. *Review of Finance* 11, 287-324.

Beyer, A.„ Cohen, D. A., Lys T. Z., Walther B. R., 2010. The financial reporting environment: Review of the recent literature, *Journal of Accounting and Economics* 50, 296–343.

Botosan, C. A., 1997. Disclosure level and the cost of equity capital. *The Accounting Review* 72, 323–349.

Bushee, B., Noe, C. F., 2000. Corporate disclosure practices, institutional investors, and stock return volatility. *Journal of Accounting Research* 38, 171-202.

Bushee, B., Matsumoto, D., Miller, G., 2003. Open versus closed conference calls: the determinants and effects of broadening access to disclosure. *Journal of Accounting and Economics* 34, 149–180.

Bushman, R., Piotroski, J., Smith, A., 2004. What determines corporate transparency? *Journal of Accounting Research* 42, 207–252.

Charness, G., Levin, D., 2005, When optimal choices feel wrong: A laboratory study of Bayesian updating, complexity, and affect, *American Economic Review* 95, 1300–1309.

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

Cheng, Q., Warfield, T., 2003. Stock-based compensation, earnings management to meet analysts' forecasts, and the informativeness of earnings. Working paper, University of Wisconsin.

Chow, C.W., Wong-Boren, A., 1987. Voluntary financial disclosure by Mexican corporations. *The Accounting Review* 62, 533–541.

Chuk, L., Matsumoto, D., Miller, G., 2009. Assessing methods of identifying management forecasts: CIG vs. Hand-Collection. Working paper, University of Washington.

Clement, M., Frankel, R., Miller, J., 2003. Confirming management earnings forecasts, earnings uncertainty, and stock returns. *Journal of Accounting Research* 41, 653–79.

Core, J., 2001. A review of the empirical disclosure literature: Discussion, J*ournal of Accounting and Economics* 31, 441-456.

Crawford, V., Sobel, J., 1982. Strategic information transmission. *Econometrica* 50, 1431–51.

Das, S., Levine, C.B., Sivaramakrishnan, K., 1998. Earnings predictability and bias in analysts' earnings forecasts. *The Accounting Review* 73, 277-294.

Demerjian, P., Lev, B., McVay, S., 2009. Quantifying managerial ability: A new measure and validity tests. Working paper, University of Utah.

Diamond, D., Verrecchia, R.,1991. Disclosure, liquidity, and the cost of capital. *Journal of Finance* 66, 1325-1355.

Dutta, S., Trueman, B., 2002. Voluntary disclosure of information when firms are uncertain of investor response. *Journal of Accounting and Economics* 43, 391–410.

Dye, R.A., 1986. Proprietary and nonproprietary disclosures. *Journal of Business* 59, 331–366.

Dye, R.A., Sridhar, S.S., 1995. Industry-wide disclosure dynamics. *Journal of Accounting Research* 33, 157–174.

Dye, R.A., 2010. Disclosure "bunching". *Journal of Accounting Research* 48, 489–530.

Easley, D., O'Hara, M., 2004. Information and the cost of capital. *Journal of Finance* 59, 1553-1583.

El-Gazzar, S.M., 1998. Predisclosure information and institutional ownership: A cross-sectional examination of market revaluations during earnings announcement periods. *The Accounting Review* 73, 119–129.

Eng, L.L., Mak, Y.T., 2003. Corporate governance and voluntary disclosure. *Journal of Accounting and Public Policy* 22, 325–345.

Eppinger, B., Herbert, M., Kray, J., 2010. We remember the good things: Age differences in learning and memory, *Neurobiology of Learning and Memory* 93, 515–521.

Fan, J., Wong, T.J., 2002. Corporate ownership structure and the informativeness of accounting earnings in East Asia. *Journal of Accounting and Economics* 33, 401–442.

Fischer, P.E., Verrecchia, R. E., 2000. Reporting bias. *The Accounting Review* 75, 229-245.

Fischer, P. E., Verrecchia, R. E. 2004. Disclosure bias. *Journal of Accounting and Economics* 38, 223–250.

Francis, J., LaFond, R., Olsson, P., Schipper, K., 2005a. The market pricing of accruals quality. *Journal of Accounting and Economics* 39, 295–327.

Francis, J., Schipper, K., Vincent, L., 2005b. Earnings and dividend informativeness when cash flow rights are separated from voting rights. *Journal of Accounting and Economics* 39, 329–360.

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

Gao, P., Shrieves, R.E., 2002. Earnings management and executive compensation: A case of overdose of option and underdose of salary? Working paper, University of Tennessee.

Gigler, F.B., 1994. Self-enforcing voluntary disclosures. *Journal of Accounting Research* 32, 224–240.

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

Graham, J. R., Harvey, C., Rajgopal, S., 2005, The Economic implications of corporate financial reporting. *Journal of Accounting and Economics* 40, 3-73.

Grossman, S. J., Hart, O., 1980. Disclosure laws and takeover bids. *Journal of Finance* 35,323–334.

Guttman, I., Kadan, O., Kandel, E., 2006. A rational expectations theory of kinks in financial reporting. *The Accounting Review* 81, 811–848.

Grossman, S. S., 1981. The information role of warranties and private disclosure about product quality. *Journal of Law and Economics* 24, 461–483.

Guttman, I., Kadan, O., Kandel, E., 2006. A rational expectations theory of kinks in financial reporting. *The Accounting Review* 81, 811-848.

Hayn, C., 1995. The information content of losses. *Journal of Accounting and Economics* 20, 125–53.

Healy, P. M., Hutton, A. P., Palepu, K. G., 1999. Stock performance and intermediation changes surrounding sustained increases in disclosure. *Contemporary Accounting Research* 16, 485-520.

Healy, P. M., Krishna G., Palepu, K. G., 2001. Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics* 31, 405–440.

Hope, O., Thomas, W., 2008. Managerial empire building and firm disclosure. *Journal of Accounting Research* 46, 591–626.

Houston, J., Lev, B., Tucker, J., 2008. To guide or not to guide? Causes and consequences of stopping quarterly earnings guidance. Working paper, University of Florida.

Hutton, A., Miller, G., Skinner, D., 2003. The role of supplementary statements with management earnings forecasts. *Journal of Accounting Research* 41, 867–90.

Hutton, A., Stocken. P., 2009. Prior forecasting accuracy and investor reaction to management earnings forecasts, Working paper, Boston College.

Kahneman, D., Tversky, A., 1979. Prospect theory: An analysis of decision under risk, Econometrica 47, 263-291.

Kanagaretnam, K., Obo, G. J., Yang, D., 2004. Joint tests of signaling and income smoothing through bank loan loss provisions. *Contemporary Accounting Research* 21, 843–884.

Kanodia, C., 2006. Accounting disclosure and real effects. *Foundations and Trends in Accounting* 1, 167–258.

Kaplan, S. N., Minton, B., 1994. Appointments of outsiders to Japanese boards: determinants and implications for managers. *Journal of Financial Economics* 36, 225–257.

Karamanou, I., Vafeas, N., 2005. The association between corporate boards, audit committees, and management earnings forecasts: An empirical analysis. *Journal of Accounting Research* 43, 453–86.

Kasznik, R., Lev, B., 1995. To warn or not to warn: Management disclosures in the face of

an earnings surprise. *The Accounting Review* 70, 113–34.

Kim, O., Verrecchia, R. E., 1994. Market liquidity and volume around earnings announcements. *Journal of Accounting and Economics* 17, 41–67

Kimbrough, M., 2005. The effect of conference calls on analyst and market underreaction to earnings announcements. *The Accounting Review* 80, 189-219.

Knutson, B. Bossaerts, P., 2007, Neural antecedents of financial decisions. *Journal of Neuroscience* 27, 8174–8177.

Kothari, S.P., Shu, S., Wysocki, P., 2009. Do managers withhold bad news? *Journal of Accounting Research* 47, 241–276.

Kuhnen, C. M. Knutson, B., 2005, The neural basis of financial risk taking. *Neuron* 47, 763–770.

Kuhnen, C. M., 2012, Asymmetric learning from financial information. Working paper, Northwestern University.

John, K., Ronen, J., 1990. Information structures, optimal contracts and the theory of the firm. *Journal of Accounting, Auditing and Finance* 5, 61–95.

Jovanovic, B., 1982. Truthful disclosure of information. *Bell Journal of Economics* 13, 36-44.

Lambert, R. A., 2001. Contracting theory and accounting. *Journal of Accounting and Economics* 32, 3-87.

Lang, M., Lundholm, R., 1996. Corporate disclosure policy and analyst behavior. *The Accounting Review* 71, 467–92.

Lanen, W.N., Verrecchia, R.E., 1987. Operating decisions and the disclosure of management accounting information. *Journal of Accounting Research* 25, 165–189.

Lim, T., 2001. Rationality and analysts' forecast bias. *Journal of Finance* 56, 369–385.

Lo, A. W., Repin, D. V., Steenbarger, B. N., 2005. Fear and greed in financial markets: A clinical study of day-traders, *American Economic Review* 95, 352-359.

Malmendier, U., Tate, G., 2009. Superstar CEOs. *The Quarterly Journal of Economics* 124, 1593–638.

Mather, M., Mitchell, K. J., Raye, C. L., Novak, D. L., Greene, E. J., Johnson, M. K., 2006, Emotional arousal can impair feature binding in working memory, *Journal of Cognitive Neuroscience* 18, 614–625.

Mather, M., Schoeke, A., 2011. Positive outcomes enhance incidental learning for both younger and older adults, *Frontiers in Neuroscience* 5, 1–10.

Matsumoto, D., 2002. Management's incentives to avoid negative earnings surprises. *The Accounting Review* 77, 483–514.

Milbourn, T., 2003. CEO reputation and stock-based compensation. *Journal of Financial Economics* 68, 233–62.

Milgrom, P. R., 1981. Good news and bad news: Representation theorems and applications. *Bell Journal of Economics* 12, 380–91.

Milgrom, P.R., Roberts, J., 1986. Relying on information of interested parties. *The Rand Journal of Economics* 17, 18–32.

Miller, G., Piotroski, J., 2000. The role of disclosure for high book-to-market firms. Working Paper, Harvard University.

Miller, G. 2002. Earnings performance and discretionary disclosure. *Journal of Accounting Research* 40, 173–204.

Morse, D., Stephan, J., Stice, E. K., 1991. Earnings announcements and the convergence (or divergence) of beliefs. *The*

Accounting Review, 66, 376-388.

Murphy, K.J., 2003. Stock-based pay in new economy firms. *Journal of Accounting and Economics* 34, 129-47.

Murphy, K.J., 1999. Executive compensation, in Handbook of Labor Economics (Orley Ashenfleter and David Card eds.) North Holland: Amsterdam.

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

Noe, C., 1999. Voluntary disclosures and insider transactions. *Journal of Accounting and Economics* 27, 305–326.

Patell, J., 1976. Corporate forecasts of earnings per share and stock price behavior: Empirical tests. *Journal of Accounting Research* 14, 246–76.

Penman, S., 1980. An empirical investigation of the voluntary disclosure of corporate earnings forecasts. *Journal of Accounting Research* 18, 132–60.

Pukthuanthong, K., 2010. Why should we like firms that voluntarily disclose? Evidence from profit warning firms. *Journal of Investing* 19, 66-83.

Rajgopal, S., Shevlin, T., 2002. Empirical evidence on the relation between stock option compensation and risk taking. *Journal of Accounting and Economics* 33, 145-171.

Rajgopal, S., Shevlin, T., Zamora, V., 2006. CEOs' outside employment opportunities and the lack of relative performance evaluation in compensation contracts. *The Journal of Finance* 61, 1813–44.

Riley, J. G., 1979. Informational Equilibrium. *Econometrica* 47, 331-359.

Ruland, W., Tung, S., George, N.E., 1990. Factors associated with the disclosure of managers forecasts. *The Accounting Review* 65, 710–721.

Samanez-Larkin, G., Kuhnen, C. M., Knutson, B., 2011. Gain and loss learning differentially contribute to life financial outcomes, *PLoS ONE* 6.

Schadewitz, H.J., Blevins, D.R., 1998. Major determinants of interim disclosures in an emerging market. *American Business Review* 16, 41–55.

Sengupta, P., 1998. Corporate disclosure and the cost of debt. *The Accounting Review* 73, 459–474.

Skinner, D. J., 1994. Why firms voluntarily disclose bad news. *Journal of Accounting Researc*h 32, 38–60.

Skinner, D. J., Sloan, R. g., 2002. Earnings surprises, growth expectations, and stock returns. *Review of Accounting Studies* 7, 289-312.

Smith, C., Watts, R., 1992. The investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Financial Economics* 32, 117-61.

Sokol-Hessner, P., Hsu, M., Curley, N. G., Delgado, M. R., Camerer, C. F. and Phelps, E. A., 2009. Thinking like a trader selectively reduces individuals loss aversion, *Proceedings of the*

National Academy of Sciences 106, 5035–5040.

Stein, J. C., 1989. Efficient capital markets, inefficient firms: A model of myopic corporate behavior. *Quarterly Journal of Economics* 104, 655-669.

Stocken, P., 2000. Credibility of voluntary disclosure. *RAND Journal of Economics* 31, 359–74.

Suijs, J., 2008. On the value relevance of asymmetric financial reporting policies. *Journal of Accounting Research* 46, 1297–1321.

Trueman, B.,1986. Why do managers voluntarily release earnings forecasts? *Journal of Accounting and Economics* 8, 53–71.

Wagenhofer, J., 1990. Voluntary disclosure with a strategic opponent. *Journal of Accounting and Economics* 12, 341–363.

Waymire, G., 1984. Additional evidence on the information content of management earnings forecasts. *Journal of Accounting Research* 22, 703–18.

Williams, P., 1996. The relation between a prior earnings forecast by management and analyst response to a current management forecast. *The Accounting Review* 71, 103–13.

Verrecchia, R.E., 1983. Discretionary disclosure. *Journal of Accounting and Economics* 5, 365–380.

Verrecchia, R.E., 1990. Discretionary disclosure and information quality. *Journal of Accounting and Economics* 12, 179–194.

Verrecchia, R.E., 2001. Essays on disclosure. *Journal of Accounting and Economics* 32, 97–180.

Yermack, D., 1997. Good timing: CEO stock option awards and company news announcements. *Journal of Finance* 52, 449-476.

科技部補助計畫衍生研發成果推廣資料表

日期:2014/12/25

科技部補助計畫	計畫名稱: 打預防針或提前引爆？盈餘預測，監理及風險傾向
	計畫主持人: 何靜嫺
	計畫編號: 102-2410-H-004-054- 學門領域: 財務

無研發成果推廣資料

102 年度專題研究計畫研究成果彙整表

計畫主持人：何靜嫺	計畫編號：102-2410-H-004-054-
計畫名稱：N 打預防針或提前引爆？盈餘預測，監理及風險傾向	

成果項目			量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）
			實際已達成數（被接受或已發表）	預期總達成數(含實際已達成數)	本計畫實際貢獻百分比		
國內	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	0	100%		
		專書	0	0	100%		
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（本國籍）	碩士生	0	1	100%	人次	
		博士生	0	1	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
國外	論文著作	期刊論文	0	2	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	0	100%		
		專書	0	0	100%	章/本	
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（外國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		

其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)	無

	成果項目	量化	名稱或內容性質簡述
科教處計畫加填項目	測驗工具(含質性與量性)	0	
	課程/模組	0	
	電腦及網路系統或工具	0	
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
	計畫成果推廣之參與（閱聽）人數	0	

科技部補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估 ■達成目標 □未達成目標（請說明，以 100 字為限） □實驗失敗 □因故實驗中斷 □其他原因 說明：
2. 研究成果在學術期刊發表或申請專利等情形： 論文：□已發表 ■未發表之文稿 □撰寫中 □無 專利：□已獲得 □申請中 ■無 技轉：□已技轉 □洽談中 ■無 其他：（以 100 字為限）
3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）（以 500 字為限） 1. 此文章以不同角度分析盈餘管理的訊息長期效果, 2. 以本文為主, 我已經做出相關的其他兩篇文章