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Disclose or Not? The Voluntary Disclosure Strategy Under Reputation Effect

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Abstract

This paper utilizes a multi-period adverse selection model to analyze the behaviors of a manager making voluntary disclosure policy under his (her) reputation consideration. After observing the released information by a manager in multiple periods, investors will update their recognitions of the manager's ability and give valuation to the manager. To maximize his (her) own compensation, the manager decides whether to make a preemptive announcement or not. We find that there exists a unique non-degenerate equilibrium with no separating solution which implies that both high and low ability managers will make voluntary disclosure. The analyses further show three main reputation effects that can explain a manager's discretionary disclosure behavior: the feedback, the direct reputation, and the signaling effects. We conclude that the manager will have an aggressive disclosure policy for the manager having higher reputation and ability. Our analyses also provide the reputation maintenance as an alternative explanation for a manager's action to disclose bad news.

Key words: Voluntary disclosure, Reputation, Announcement, Investors' valuation.

1. Introduction

In recent years, reputation has been considered as an important factor to affect a manager's decision in capital budget (Chen and Liu, 2005; Dimond, 1991; Egli, Ongena and Smith, 2006; Li, Chen and Liu, 1998)[1], fund valuation (Li, and Liu, 2006)[2], earning management (Lee and Liu, 2001)[3] and financial reporting policy (Chalmers and Godfrey, 2004)[4]. This paper considers investors' reaction to managers' voluntary disclosure and analyzes how the managers make voluntary disclosure policy based on the conjecture of investors' reaction and cost concept. In our model, each manager is characterized by an exogenously given ability level, which is the managers' private information. After observing information released by the managers in multiple periods, investors will update their recognition of managers' ability and give valuation to the managers. Thus, in our model, the reputation comes from investors' observation of the released news and the investors' valuation is the reward for the managers' reputation. A capable manager decides whether to make voluntary disclosure or not in order to maximize his (her) own compensation via investors' valuation. Especially, we

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[1] Chen and Liu (2005) suggest that high reputation firm has greater probability to promote investment project than low reputation firm. Dimond (1991) proposes that firms will borrow repeatedly from banks to build reputation for repayment. However, Egli, Ongena and Smith (2006) suggest that in an environment where strategic default risk is low, entrepreneurs will choose to finance projects from arm's-length lenders when the benefit from reputation building are outweighed by holdup rents extractable by the repeated finance. Li, Chen and Liu (1998) demonstrate that, under information asymmetry, when reputation effect outweighs investor's preference, good manager will choose short-term project while bad managers will chose the long-term one.

[2] Li and Liu (2006) show that fund manager's herding behavior may create a negative effect for the fund's reputation and cause fund discount.

[3] Lee and Liu (2001) find that firms with high future cash flow tend to adopt income-increasing choice to strengthen their reputation and the firms with low future cash flow are also likely to adopt income-increasing choice if they posses good reputation.

[4] Chalmers and Godfrey (2004) propose that companies making more transparent disclosure could maintain better financial reporting reputation.

develop a three-period model and analyze the investors' possible revaluation scenario during the periods. The investors can update their beliefs in the manager's ability after observing the manager's announcement.

In general, there are two channels for managers to make public announcement. One is a mandatory disclosure which includes the reporting of the financial statements, footnote, insider trading and other mandatory disclosures. The other is a discretionary disclosure which includes an early announcement of mandatory reporting, a new investment project, big-sales orders, through press releases, conference calls or other communication media. However, a mandatory financial reporting regime based on completed transactions may be better characterized as a source of confirmatory information (backward-looking). While a voluntary preemptive disclosure could be a source of timely information (forward-looking) (Healy and Palepu, 2001) and is much more relevant to investors' expectation of a firm's future value. The manager can make decisions on what, when and how to provide timely discretionary information to the market. With less limitation and more relevance than mandatory reporting, we will address the effect of the investors' valuation on managers' voluntary disclosure strategy.

In recent years, researchers have shown interests on disclosure issues. Verrecchia (2001) summarized the related studies into three broad categories: how exogenous disclosure is associated to investors' activities; how a manager exercises discretion with regard to information disclosure; which disclosure arrangements are preferred in the absence of prior knowledge of the information (examine unconditional disclosure choices). Kim and Verrecchia (hereafter KV) (1991), Demski and Feltham (hereafter DF) (1994), and McNichols (1989) assumed public disclosure will exacerbate information asymmetry and examine how mandatory disclosure affects prior information acquisition activities and pre-announcement security prices. However, Diamond (1985) proposed that timely information provided by firms could reduce the information asymmetries and help traders to revise their expectation. Gelb (2000), and Khurana, Pereira and Martin (2006) suggested that accounting disclosure can decrease investors' information gathering cost, and thus benefit firms with lower cost of capital and help companies' growth.

Instead of considering information content of disclosure, some researchers studied whether the compensation contract between managers and shareholders could be an important mechanism for optimal disclosure strategy. Watts and Zimmerman (1990), and Smith and Watts (1992) argued the compensation contract could determine the manager's accounting choice. Levitt and Snyder (1997) suggested that an optimal compensation contract without cancellation can encourage managers to make early warning for a loss project. Milbourn (2003) showed a positive and economically meaningful relationship between stock-based pay-sensitivities and CEO reputation. Essentially, these studies imply that an optimal compensation may solve the shareholder-manager relationship for information disclosure, but did not mention the limitation of compensation in real economy.

Another interesting study of voluntary disclosure is why firms disclose bad news? Darrough and Stoughton (1990) presented that the disclosure of unfavorable information will discourage entry competition. Skinner (1994) proposed that managers will disclose bad news in a timely manner to avoid incurring legal and reputation costs. Levitt and Snyder (1997) suggested that an optimal incentive contract between principals and agents can encourage agents to provide an "early warning" for a loss of project. Even though these findings provide some explanations for the announcement of bad news, the incentive for a manager's action to do such a disclosure still need further investigations.

This paper, by utilizing the Carbral's (2000) brand stretching reputation model, analyzes the interaction between managers' disclosure policies and investors' valuations. Our propositions differ from the prior studies in several ways. First, most prior studies like DF (1994) and KV (1991) assumed that traders, whether acquiring same or different signals, hold their positions in a firm's share until its liquidating value is revealed. On the contrary, we assume that investors prefer short-term profits and the manager's performance is evaluated over short intervals. Consequently, analysis extending from one single period to multiple periods can help us observe the relation of information contents among consecutive periods.

The second distinction between this study and the prior research is that we consider the reputation and rewarded compensation as an integrated factor to affect a manager's disclosure decision. KV (1991) and DF (1994) addressed the announcement effect on the changes of trading volumes and security prices on investors' side.

Nevertheless, we focus on the impact of investors' beliefs on a manager's disclosure policy. Thus, instead of measuring changes on trading volumes and stock prices, we construct the announcement effect as a change of investors' valuation on the manager's reputation.

Third, our model is not only limited to analyze the shareholder-manager relationship. We emphasize the manager's voluntary disclosure policy based on cost concept. A manager will make voluntary disclosure only when the disclosure brings himself (herself) higher compensation. With the model, we can analyze the relations of managers' voluntary disclosure policy and market reaction by a more general structure without the limitation of compensation contract that may be hardly agreed between shareholders and managers in real economy.

Based on our analyses, we observe three effects given as follows:

1. Feedback reputation effect: a high ability manager has a higher probability to announce good (favorable) news and is more likely to make voluntary disclosure than the low ability manager;
2. Direct reputation effect: a manager with announcement of the good news in period 0 is more likely to make voluntary disclosure in period 1;
3. Signaling effect: both types of managers will make disclosure to signal his/her ability. Especially, when a high ability manager can disclose good news with the probability equal to 1, we find that a low ability manager will also make preemptive announcement even with bad news (over-announcement).

As mentioned in Verrecchia (2001), there is no central paradigm and no integrated theory in the disclosure literature. Our analysis contributes to provide the reputation consideration as an alternative explanation for a manager's disclosure behavior, and could provide an explanation for the phenomenon why the bad news is released in the market.

Our paper is organized as follows. In section 2, we provide a detailed description of the model. The model is then analyzed and equilibriums with three main effects are derived in section 3. Some empirical evidences consistent to our analyses are provided in section 4. Section 5 performs comparative statistics analysis based on different probability of the manager's announcing good news. Section 6 concludes our analyses on managers' disclosure policy.

2. Model

Our model assumes that the manager is endowed with an ability level t ($t \in (h,l)$), which only the manager himself/herself can observe. After observing the information of the company in multiple periods, investors will update their recognition of the manager's reputation and make conjecture on the manager's ability. We assume that a high ability (h) manager has higher probability to create good future prospect and has more chance to announce favorable news than a low ability (l) manager. To simplify the analysis, we assume that the prior probability for a high ability manager to announce favorable news r is the same one as a low ability manager to announce unfavorable news, namely $\Pr(G|h)=\Pr(B|l)=r$. Here Pr denotes the probability and r is set between 1/2 and 1 ($1/2 < r \leq 1$). G and B denote good news and bad news, respectively. Since a manager's type is unknown to investors, investors will observe the manager's announcement to construct their beliefs of a manager's type and decide the payoff to manager. We assume the investors will give manager valuation equal to 1 for good news and 0 for bad news.

Our adverse selection model has three periods. As depicted in Figure 1, in period 0, the investors observe the existing reporting of good news (G) or bad news (B), $S \in (G,B)$ (first signal). The news in period 0 is the historic records of a manager's announcement which comes from various resources such as annual financial statements, periodic regulatory reports, and released news by a company. The good or bad news in period 0 is a result of a company's normal operation. In period 1, the manager has the proprietary information and decides whether to make voluntary disclosure or not (D or N). If new information is disclosed, $S \in (GG,BG,GB,BB)$ where GB representing good news in period 0 and bad news in period 1, investors will construct the posterior probability of the managers' ability being of high (P_S^D) or low (1-P_S^D) to revise their belief about the manager's ability and decide the payoff to the manager in period 2. If no news is disclosed in period 1, based on the history signal $S \in (G,B)$, investors will construct the posterior probability P_S^N of the manager's ability being of high and $1-P_S^N$ of that of being low in period 2. In summary, in period 2, the investors will observe the manager's announcement history $S \in (G,B,GG,BG,GB,BB)$ and evaluate the manager's ability.

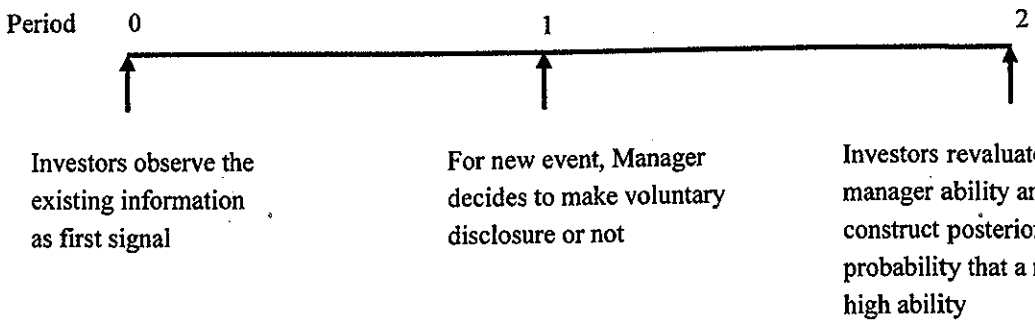

Figure 1. Timing and event of the model

Regarding observability of the analysis, we make some important assumptions given as follows:

Assumption 1: Investors will observe a manager's voluntary disclosure and update their recognition of the manager's ability level unless information is not disclosed.

Unlike the assumptions made by KV (1991) and DF (1994), in which traders will acquire private information before public announcement, we assume that investors will obtain private and public information and form their recognition of a manager's ability level (high or low) only after observing the manager's disclosure. If investors can not identify the manager's ability by only observing manager's disclosure, investors' reaction is just like not receiving new information. They will remain the same recognition as the previous one until observing new disclosure. The premise of our analysis is that investors will update their recognition of the manager's ability after observing the manager's disclosure behavior. This specification helps us focus on the interaction between managers' disclosure behavior and investors' reaction without considering the effect of different precision among informed and non-informed traders.

Assumption 2: The probability that the given information being good news or bad news is independent across periods.

A high or low ability manager probably could have good or bad news in each period. The type of news announced in period 0 is independent from that in period 1. This assumption is important for examining investors' reaction for different combinations of the news in period 0 and that in period 1.

Assumption 3: The managers will make truthful voluntary disclosure and have the same disclosure cost.

We assume the manager will make truthful voluntary disclosure although the credibility of voluntary disclosure is unclear and still in debate (McNichols 1989, Aranya and Yampuler 1997). Thus, via this assumption, we exclude the condition that a manager will make false presentation to damage his (her) reputation and the complicated scenario of true or false presentation is not considered here. Furthermore, truthful presentations made by managers will help investors to evaluate the managers' abilities via observing their disclosures directly. Moreover, traditional models may rely on the existence of different proprietary cost to prevent full disclosure and information gathering. However, our model focuses on the investors' valuation on the managers' ability rather than the different costs of disclosure. Thus we assume the managers have the same disclosure cost.

Assumption 4: The high ability managers will announce good news with the probability of higher than 1/2 ($1/2< r <1$). The disclosure cost k and the manager's bonus θ from disclosing good news are between zero and one ($0<k, \theta<1$).

Since r is the probability for a high ability manager to announce good news, it is set in between 1/2 and 1. Because investors give the manager valuation one when good news is announced by the manager, it is reasonable to assume the disclosure cost k and the manager's bonus θ pro rata to market valuation to be smaller than one.

As the posterior probability of the manager's ability being of high for the specific disclosure is P_S^D, investors will give high reputation and valuation to the manager who discloses good news and give him (her). The manager's expected valuation is given as:

$$v(P_S^D) = P_S^D \times r \times 1 + (1 - P_S^D) \times (1 - r) \times 1 \qquad (1)$$

where equation (1) represents the investor's expected valuation for the good news. The first term on the right-hand side $P_S^D \times r$ is the probability that investor believes the manager is of high ability times the probability of the high ability manager has favorable news. The second term $(1 - P_S^D)(1 - r)$ is the probability that investor believes the

manager is of low ability times the probability the low ability manager will have good news. The valuation for good news is 1 and 0 for bad news.

Based on the investors' valuation, the manager will receive his/her compensation C_S^t defined as

$$C_S^t = a + \theta(v(P_S^D) - k), \quad (2)$$

where a is the minimum wage that is not related to performance, θ is the manager's bonus pro rata, $v(p_S^D)$ is the investors' valuation, and k is the disclosure cost. The disclosure cost includes information gathering and possible market share loss due to disclosure (Aranya and Yampuler, 1999). We assume both types of managers have the same disclosure cost k since we are not addressing the question of which signaling mechanism is less costly. The cost might be assumed to be very small when the valuation from the investors is much more important. If there is no voluntary information released in period 1, investors will remain the same recognition of the manager's ability as the one in period 0. Therefore, the compensation for a manager not making voluntary disclosure in period 1 could be expressed as

$$N_S^t = a + \theta v(P_S^N) \text{ for } t \in (h, l), S \in (G,B) \quad (3)$$

where P_S^N is the posterior that the investor believes the manager is of high ability for the non-disclosure. The notation and definition of the variables appeared in the assumptions and models are summarized in Table 1.

Table 1. Notation and variable definition in the model

t	type of manager, h : high ability, l: low ability
G, B	investors' evaluation of bad or good when manager makes voluntary disclosure
r	probability that a high ability manager disclose good news
P_S^D	posterior that investors believe managers being high ability under the given manager's disclosure behavior D in period 1 and signal s $\in \{GG, GB, BG, BB\}$
P_S^N	posterior that investors believe managers being high ability for non-disclosure in period 1 and the historic signal s (s $\in \{B, G\}$)
D_s^t	probability that a manager make voluntary disclosure for the manager type t and signal s $\in \{G, B, GG, GB, BG, BB\}$
$v(P_S^D)$	investor's valuation that the manager is of high ability h given manager's disclosure action D and signal s
C_S^t	manager's compensation according to investors' valuation given a manager's type t$\in (h,l)$ and signal s
N_S^t	manager's compensation for not making voluntary disclosure in period 1 given a manager's type t$\in (h,l)$ and signal s
k	disclosure cost
θ	Manager's compensation pro rate to investors' valuation

Under the proposed assumptions, the expected payoff for a manager given his type $t \in (h, l)$ and disclosure history $S \in (G, B, GG, BG, GB, BB)$ are expressed as:

$$C_s^h = a + \theta[rv(P_{SG}^D) + (1-r)v(P_{SB}^D) - k] \quad (4)$$

$$C_s^l = a + \theta[(1-r)v(P_{SG}^D) + rv(P_{SB}^D) - k] \quad (5)$$

Equation (4) represents the compensation of a high ability manager based on investors' valuation. The first term a is a constant representing the minimum wage. The second term $rv(P_{SG}^D)$ is the payoff that investors are willing to pay for good news in period 1 and the third term $(1-r)v(P_{SB}^D)$ is the payoff for unfavorable news in period 1. Equation (5) represents the compensation of a low ability manager making discretionary disclosure. The second term $(1-r)v(P_{SG}^D)$ is the payoff for announcing favorable news in period 1. The third term $rv(P_{SB}^D)$ is the

payoff for announcing unfavorable news in period 1. Given a specific manager's ability, the probability of the information contents for the two periods is illustrated in Table 2.

Table 2. Probability of information content

payoff \ type		h type		l type	
	signal	Period 0	Period 1	Period 0	Period 1
$v(P_{SG}^D)$	*GG*	*r*	*r*	*1-r*	*1-r*
	BG	*1-r*	*r*	*r*	*1-r*
$v(P_{SB}^D))$	*GB*	*r*	*1-r*	*1-r*	*r*
	BB	*1-r*	*1-r*	*r*	*r*
$v(P_S^N)$	*G*	*r*	*N/A*	*1-r*	*N/A*
	B	*1-r*	*N/A*	*r*	*N/A*

Note. *r* is the probability that a high (low) type manager choose to announce favorable (unfavorable) news.

The manager's strategy is whether or not to make voluntary disclosure in period 1 to maximize his (her) expected compensation. The decision is based on the manager's endowed ability as well as on his (her) history announcement. Thus a clever manager will make conjecture about the investor's reaction and how much his (her) compensation for making voluntary disclosure will be. D_S^t denotes the probability that a manager makes preemptive announcement in period 1 and $D_S^t \in [0, 1]$.

3. Equilibrium

Based on the proposed model, four propositions are made to provide the characterization of the equilibriums between a manager's disclosure policy and investors' valuation.

Proposition 1. There exists a unique equilibrium such that the probability of making voluntary disclosure is strictly positive for both types of managers: no separating equilibrium exists such that $D_S^t > 0$, $D_S^{t'} = 0$.

A separating equilibrium implies that only one type of managers makes voluntary disclosure and the other type would not make voluntary disclosure. For instance, $D_S^t > 0$ and $D_S^h = 0$ could be a separating equilibrium which indicates a low ability manager prefers making discretionary disclosure ($D_S^t > 0$, t = low) and a high ability manager prefers not making voluntary disclosure ($D_S^{t'} = 0$, t' = high) and vice versa.

We use the contradictive method to prove proposition 1. To prove the inexistence of the case of $D_S^t > 0$ and $D_S^h = 0$, we compare the expected compensation of a low ability manager making voluntary disclosure with that of not making discretionary announcement, we find that a low ability manager will not make preemptive announcement ($D_S^t = 0$) which contradicts preliminary assumption $D_S^t > 0$. The details of the proof are given in Part 1 of Appendix A.

The proof of the inexistence of the case of $D_S^h > 0$ and $D_S^t = 0$ is given in Part 2 of Appendix A. The case of $D_S^h > 0$ and $D_S^t = 0$ indicates that a high ability manager prefers making voluntary disclosure ($D_S^h > 0$) and a low ability manager prefers not making discretionary disclosure ($D_S^t = 0$). The expected compensation of a low ability manager making voluntary disclosure is greater than that of not making discretionary announcement. Therefore, the low ability manager will make voluntary disclosure $D_S^t > 0$ which contradicts the assumption of $D_S^t = 0$.

Proposition 1 shows that there is no situation for only a high ability manager to acquire good names by making voluntary disclosure (reputation maintenance). The low ability manager also has the incentive to make discretionary announcement to build up his (her) reputation (reputation start-up). Next we will present the three main effects under non-degenerate equilibriums for managers with different ability.

Proposition 2. There exists a unique non-degenerate equilibrium that a high ability manager has more aggressive disclosure policy than a low ability manager:

$D_S^h \geq D_S^l > 0$, $\forall s$ (feed back reputation).

The marginal benefit from making voluntary disclosure for a high ability manager is $(C_S^h - N_S^h)$ and that for the low ability is $(C_S^l - N_S^l)$. It can be shown that the marginal benefit obtained from making voluntary disclosure for a high ability manager is strictly greater than that for a low ability manager. The proof of proposition 2 is given in Appendix B. In brief, we have

$$(C_S^h - N_S^h) - (C_S^l - N_S^l) = \theta(2r-1) \times [(2r-1)(P_{SG}^D - P_{SB}^D)] > 0 \quad (6)$$

Next we prove that that $(C_S^h - N_S^h) \leq 0$ won't exist. If $(C_S^h - N_S^h) \leq 0$ exists, it implies $(C_S^l - N_S^l) < 0$ and thus $D_S^l = 0$ which contradicts the fact $D_S^l > 0$ $\forall s$ obtained from proposition 1. Thus we can conclude that $(C_S^h - N_S^h) > 0$ and $D_S^h = 1$. This result shows that a high ability manager will make full discretionary announcement to gain the positive marginal profit. For the value of D_S^l, the equilibrium value of D_S^l can be either 1 when $(C_S^l - N_S^l) > 0$ or $D_S^l \in (0,1)$ when $(C_S^l - N_S^l) = 0$.

Proposition 2 demonstrates that the marginal benefit for a high ability manager to make disclosure is higher than that of a low ability manager. The high ability manager will fully make voluntary disclosure ($D_S^h = 1$) while the low ability manager may make a fully disclosure ($D_S^l = 1$) or partial disclosure ($D_S^l \in (0,1)$) depending on his marginal benefit. For the partial disclosure, it is uncertain for the low ability manager's disclosure decision. We set one and zero as the upper and lower bounds for the disclosure policy as $D_S^l \in (0,1)$. Empirically, if there are 100 low ability managers with zero compensation from disclosure in the market and 20 managers decide to make voluntary disclosures, the value of D_S^l is equal to 0.2. Therefore, the voluntary disclosure decision is modeled as a probability between 0 and 1. Proposition 2 indicates that a high ability manager has more aggressive disclosure policy than a low ability ($D_S^h \geq D_S^l > 0$) and we call it feedback reputation effect.

Proposition 3. A manager will have more aggressive disclosure policy when the manager has good reputation at period 0: $D_G^t \geq D_B^t > 0$ $\forall t$, (direct reputation effect).

To prove the manager with good news in period 0 will have more aggressive reporting policy ($D_G^t \geq D_B^t > 0$), we analyze a high ability manager and a low ability manager's disclosure policy separately ($D_G^h \geq D_B^h > 0$ and $D_G^l \geq D_B^l > 0$). Because a high type manager absolutely will make discretionary announcement to gain positive marginal profit as shown in proposition 2 ($D_S^h = 1$, $D_G^h = D_B^h = 1$), the statement $D_G^h = D_B^h = 1 > 0$ proves that $D_G^h \geq D_B^h > 0$.

We are left to prove that the low type manager who announces good news in period 0 will have more aggressive attitude than the low type manager who announces bad news in period 0 ($D_G^l \geq D_B^l > 0$). The detailed proof is given in Appendix C. In brief, we have

$$\begin{aligned}&[(C_G^l - N_G^l) - (C_B^l - N_B^l)] \\ &= \theta[r(P_{GB}^D - P_{BB}^D) + (1-r)(P_{BB}^D)] \geq 0\end{aligned} \quad (7)$$

This result implies that the low type manager with good news at period 0 will be more aggressive to make voluntary disclosure than the low type with bad news at period 0.

Proposition 3 shows that the manager of either high or low ability who discloses good news in period 0 (good reputation) will have more aggressive attitude to make voluntary disclosure in period 1 than the manager who discloses bad news in period 0 (bad reputation). The favorable news in period 0 will directly affect the manager's disclosure policy and thus we call it "direct reputation effect".

Proposition 4. If $r \to 1$, a low ability manager with historic good reputation $S \in (G)$, will make voluntary disclosure in period 1 even knowing the news is bad: $D_G^l \in (0,1]$.

In proposition 1 to proposition 3, we assume the probability of a high ability manager to announce good news is $r > 1/2$. In this section, we consider a manager's disclosure policy when the probability of a high ability manager to announce good news reaches the highest i.e. $r \to 1$. Under this condition, the investors observe good news in the capital market and believe that the manager makes preemptive announcement is of high ability ($P_S^D = 1$). It is because the good news are almost disclosed by a high ability managers as $r \to 1$. Proposition 4 is proved in Appendix D by showing that the low ability manager with good news in period 0 will have positive marginal benefit from disclosure in period 1 ($\lim_{r \to 1}(C_S^t - N_S^t) > 0$). In brief, the expected compensation for a manager is given as

$$\begin{aligned}&C_S^t = \lim_{r \to 1}\{a + \theta[(1-r)v(P_{SG}^D) + rv(P_{SB}^D)] - k = a + \theta(1-k), \\ &t \in (h,l)\end{aligned} \quad (8)$$

The manager's expected compensation from not making voluntary disclosure is given as:

$$\lim_{r\to 1} N_S^I = \lim_{r\to 1}(a+\theta v(P_S^N)) = a \quad (9)$$

The result shows that the marginal benefit of a manager to make voluntary disclosure is higher than that of a manager making no disclosure. The high ability manager will make voluntary disclosure which confirms Proposition 1 that the non-degenerate equilibrium exists. From equation (D-5) in Appendix D, we observe that a low ability manager with good news in period 0 will also make voluntary disclosure in period 1 no matter it is a good or bad news. By utilizing good reputation gained from good news in period 0 and good reputation of other mangers who disclose good news in period 1, the low ability manager will choose to make disclosure with a policy of $D_G^I \in (0,1]$ to signal his ability rather than keeping silence under the extreme condition. We call it a signaling effect.

In summary, the three effects imply that a manager's propensity to strengthen his (her) reputation when he (she) has higher ability and reputation. The high ability manager and the manager with good reputation in period 0 have more aggressive disclosure policy.

4. Empirical Evidence and Implication

4.1 Empirical Evidence and Implication

In addition to our analysis, some empirical evidences seem to support the existence of different equilibriums predicted in our model. Many papers showed that managers usually release good and bad news voluntarily (Aranya and Yampuler, 1997) and the fact confirms to our non-degenerate equilibrium. Lev and Penman (1990) found managers are more likely to release forecasts when their firms are performing relatively well which is related to the feedback reputation effect. Healy, Hutton and Palepu (1999) reported that the managers with higher analyst ratings of disclosure have an abnormally high frequency of subsequent public debt offers. This is related to the direct reputation effect. Lang and Lundholm (1996), and Healy et al. (1999) showed that there is a significant increase in disclosure beginning six months before the equity and debt offering. Stephen and Pavelin (2006) indicated that corporate explores both the decision to make voluntary environmental disclosure and the decisions concerning the quality of such disclosure will strengthen its reputation for environmental social responsibility. This is related to the signaling effect.

A recent study by Chalmers and Godfrey (2004) further found that a discretionary reporting was predicted to be positively related to the magnitude of reputation costs. And this finding agrees to our model that is developed on the base of cost concept (manager's compensation).

4.2 Discussion for Bad News Disclosed

One of the most interesting issues is that why managers disclose bad news voluntarily. This phenomenon has been explained by the studies which include avoiding entry competition (Darrough and Stoughton, 1990), avoiding litigation loss (Skinner, 1994) and keeping manager's credibility (Healy and Palepu, 2001). By establishing the reputation model of multiple time periods, we find that a low ability manager with good news in period 0 will choose to make disclosure of bad news to maintain his/her reputation and obtain a positive valuation comparing no disclosure of such news (Darrough and Stoughton, 1990). This result provides an alternative explanation for the reason why managers choose to disclose unfavorable news (over-disclosure).

5. Comparative Statistics: Differential Information Contents

We assume that a high (low) type manager has the chance to announce favorable (unfavorable) news with the probability of r. Comparative statistics analysis is performed to evaluate the effects of managers' ability. By varying the value of r, we can examine the differential marginal benefit of the managers with different ability. Thus, the manager's disclosure strategy under different information contents could be observed in a more robust way.

From Proposition 2, we conclude that the differences of the marginal benefit depend on the values of parameters: r, P_{SG}^D and P_{SB}^D shown in Eq. (6). The comparative statistics analysis starts with r = 0.5 under the setting constraint of $P_{SG}^D \geq P_{SB}^D$. The differences of the marginal benefit are shown in Figure 2. Here the values of the horizontal axes correspond to P_{SG}^D and P_{SB}^D ranging from 0 to 1, and line AB represents the cases for $P_{SG}^D = P_{SB}^D$. The vertical axis is the differential marginal benefit between two types of managers obtained from Eq. (6). The triangular area ΔABC represents the different marginal benefits under the constraint of $P_{SG}^D \geq P_{SB}^D$. The

triangular area ΔABD should be ignored because this area corresponds to the region under the unreasonable condition of $P_{SG}^D < P_{SB}^D$. Some cases shown in Table 3 are used to illustrate the concepts where point A represents the conditions of $P_{SG}^D = 0$ and $P_{SB}^D = 0$; point B represents $P_{SG}^D = 1$ and $P_{SB}^D = 1$; point C represents $P_{SG}^D = 1$ and $P_{SB}^D = 0$; and point E represents $P_{SG}^D = 0.8$ and $P_{SB}^D = 0.3$ in Figures 2~4.

Table 3. The differences of the marginal benefit under different r

r \ case	A ($P_{SG}^D = 0, P_{SB}^D = 0$)	B ($P_{SG}^D = 1, P_{SB}^D = 1$)	C ($P_{SG}^D = 1, P_{SB}^D = 0$)	E ($P_{SG}^D = 0.8, P_{SB}^D = 0.3$)
0.5	0	0	0	0
0.75	0	0	0.25	0.075
1	0	0	1	0.3

Figure 2 shows that the marginal benefits will be zero as r =0.5 no matter what values of P_{SG}^D and P_{SB}^D are. Since the condition of r = 0.5 implies that the high ability and low ability managers will have the same probability to announce good or bad news. Thus investors could not distinguish the true types of managers and will give both of them the same valuation.

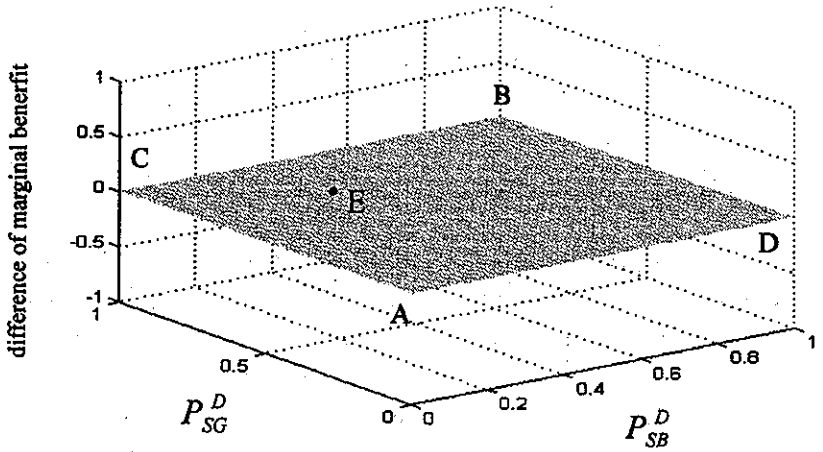

Figure 2. The differences of marginal benefit for r=0.5

Figure 3 shows the differences of marginal benefit are between 0 and 0.25 as r =0.75 when P_{SG}^D and P_{SB}^D vary. As compared to the case of r=0.5, it is concluded that the high-type manager can achieve higher marginal benefits than the low-type manager as r increases.

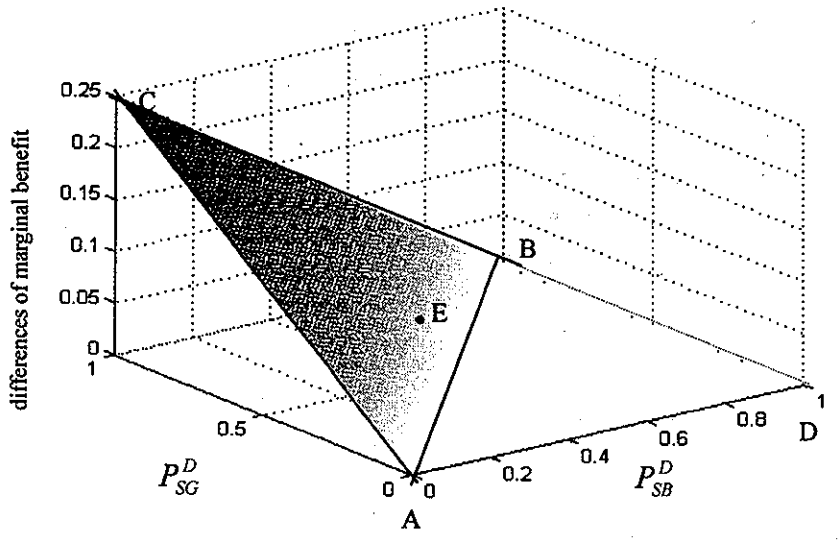

Figure 3. The differences of marginal benefit for r=0.75.

Figure 4 shows the maximum marginal benefit will be 1 as r =1, $P_{SG}^{D}=1$ and $P_{SB}^{D}=0$. In this extreme case, the high (low) type manager will announce good (bad) news with probability close to 1. The investors believe that the manager sending signal $S \in (SG)$ is of high ability and the manager sending signal with $s \in (SB)$ is a low ability. Therefore, the marginal benefit between the high ability manager and the low ability manager reaches its maximum value.

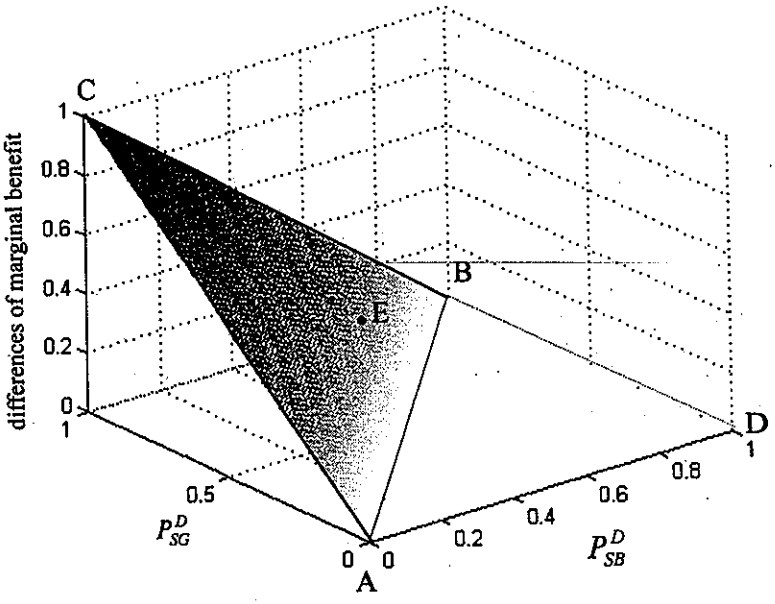

Figure 4. The differences of marginal benefit for r=1.

The results discussed above indicate that the differences of marginal benefit increase as r increases and imply that the information content does matter a lot for investors' valuation.

6. Conclusion

As noted by Ruth and York (2004, p14) "Reputation is vitally important to a firm because it impacts the bottom-line profit-ability through its ability to attract employees to its jobs, investors to its securities, and customers to its products", reputation has been considered as an important factor to affect manager's decision and has been studied by researchers in recent years. Instead of the traditional principal-agent model, we develop a reputation model that focuses on information contents to analyze the manager's voluntary disclosure policy based on the cost concept. In our model, investors observe the manager's announcement and update their belief of the manager's ability in an ongoing process. A capable manager makes a decision on whether to make voluntary disclosure in order to maximize his own compensation via investors' valuation.

We conclude a unique non-degenerate equilibrium with no separating solution which implies that both types of manager will make voluntary disclosure. Our analysis shows three main reputation effects that can explain a manager's discretionary disclosure policy. First, a high ability manager has higher probability to announce favorable news and is more likely to make voluntary disclosure than a low ability manager. We call it feedback effect. Secondly, a manager's reputation from the past announcement influences the investors' valuation. Thus, for a given type of manager, a manager discloses good news (high reputation) in period 0 are more likely to make voluntary disclosure in period 1 than a manager discloses bad news (low reputation) in period 0. We call it direct reputation effect. Finally, our analysis indicates that both types of managers will make disclosure to signal his/her ability. The low ability manager with good news in period 0 will choose to make disclosure in period 1 to signal his ability rather than keeping silence under the extreme condition. We call it signaling effect.

Rather than investigating the one-to-one disclosure effect as most of the prior studies, our model relates the information contents and market reaction using a multi-period model. Consequently, a manager's voluntary disclosure policy is an equilibrium resulting from the revealed information contents and investors' valuation. We finally conclude that a manager will have an aggressive

voluntary disclosure strategy when he (she) has higher ability and past reputation. As compared to other literature, this study provides an alternative explanation for the reason why the manager chooses to make voluntary disclosure.

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Appendix A

Proof of proposition 1

Proposition 1. There exists a unique equilibrium such that the probability of making voluntary disclosure is strictly positive for both types of managers: no separating equilibrium exists such that $D_S^l > 0$, $D_S^h = 0$.

We first prove the equilibrium that $D_S^l > 0$, $D_S^h = 0$ does not exist in Part 1. Then we prove the equilibrium that $D_S^h > 0$, $D_S^l = 0$ does not exist to complete the proof of Proposition 1.

Part 1: The following shows that the equilibrium under $D_S^l > 0$ and $D_S^h = 0$ does not exist.

For the case of $D_S^l > 0$ and $D_S^h = 0$ where only the low ability managers make disclosure, investors will observe more bad news disclosure based on the assumption 4 that the probability for a low ability manager to announce good news is 1-r and r is set between 1/2 and 1. Thus, outside investors observe more bad news and could conjecture the manager making voluntary disclosure might be of low ability. The probability P_S^D of investors to guess the managers making disclosure being of high ability is smaller than 1/2 and is given as $0 \le P_S^D < 1/2$. The value of P_S^N is given as $1/2 \le P_S^N \le 1$ because investors believe that the managers not making voluntary disclosure have a higher probability being of high ability.

The compensations of a low ability manager from either making disclosure or not are given as:

$$\begin{aligned} C_S^l &= a+\theta\left[(1-r)v(P_{SG}^D)+rv(P_{SB}^D)-k\right] \\ &= a+\theta\{(1-r)\left[P_{SG}^D\times r\times 1+(1-P_{SG}^D)\times(1-r)\times 1\right] \\ &\quad +r\left[P_{SB}^D\times r\times 1+(1-P_{SB}^D)\times(1-r)\times 1\right]-k\} \\ &= a+\theta\{(1-r)+(2r-1)[P_{SG}^D(1-r)+rP_{SB}^D]-k\} \end{aligned} \tag{A-1}$$

$$\begin{aligned} N_S^l &= a+\theta\left[P_S^N\times r\times 1+(1-P_S^N)\times(1-r)\times 1\right] \\ &= a+\theta[P_S^N(2r-1)+(1-r)] \end{aligned} \tag{A-2}$$

Based assumption 4 for $1/2<r\le 1$, $0<k, \theta<1$, and the given conditions of $P_{SB}^D \le P_{SG}^D$, $0\le P_S^D<1/2$ and $1/2\le P_S^N\le 1$, one can obtain

$$N_S^l - C_S^l = (2r-1)\theta[(P_S^N - P_{SG}^D)+r(P_{SG}^D - P_{SB}^D)+k]>0 \tag{A-3}$$

Thus the low ability manager will not make voluntary disclosure ($D_S^l=0$) which contradicts the assumption of $D_S^l>0$. Therefore, we prove that the equilibrium for the case of $D_S^l>0$ and $D_S^h=0$ does not exist.

Under the extreme case of $r\to 1$, the P_S^D and P_S^N are equal to 0 and 1, respectively. Then equations (A-1), (A-2) and (A-3) become:

$$C_S^l = a+\theta(1-r-k) \tag{A-5}$$

$$N_S^l = a+r\theta \tag{A-6}$$

$$N_S^l - C_S^l = (2r-1)\theta(1+k)>0 \tag{A-7}$$

The same conclusion can be made under the extreme case of $r\to 1$.

Part 2: The following proves that the equilibrium under $D_S^h>0$ and $D_S^l=0$ does not exist.

For the case of $D_S^h>0$ and $D_S^l=0$, outside investors will observe more good news disclosure in the capital market, and conjecture the manager making voluntary to be high type with a posterior probability equal to $1/2\le P_S^D\le 1$. The P_S^N is set to be $0\le P_S^N<1/2$ because investors believe that the manager not making voluntary announcement has a lower probably being of high ability.

To show the equilibrium for the $D_S^h>0$ and $D_S^l=0$ does not exist, the marginal benefit of the low type manager in Eq. (A-3) is rewritten as:

$$C_S^l - N_S^l = (2r-1)\theta[(1-r)P_{SG}^D + rP_{SB}^D - P_S^N - k] \tag{A-8}$$

Equation (A-8) can be transformed into the following:

$$C_S^l - N_S^l = (2r-1)\theta[(1-r)(P_{SG}^D - P_{SB}^D)+(P_{SB}^D - P_S^N)-k] \tag{A-9}$$

Based the assumptions of $1/2<r\le 1$, $P_{SB}^D \le P_{SG}^D$, $1/2\le P_S^D\le 1$, and $0\le P_S^N<1/2$ and further assuming that k is negligible, equation (A-9) is given as:

$$C_S^l - N_S^l > 0 \tag{A-10}$$

Thus the low ability manager will make voluntary disclosure ($D_S^l>0$) which contradicts the assumption of $D_S^l=0$. Therefore, we prove that the equilibrium for the case of $D_s^h>0$ and $D_S^l=0$ does not exist.

With the proofs of Part 1 and Part 2, proposition 1 proves no separating solution exists. This proposition shows that both types of managers will make voluntary disclosure.

Appendix B

Proof of proposition 2

Proposition 2: There exists a unique non-degenerate equilibrium that a high ability manager has more aggressive disclosure policy than a low ability manager: $D_S^h \geq D_S^l > 0$, $\forall s$ (feed back reputation)

We first compare the marginal benefit for making preemptive announcement between the high ability and low ability managers.

$$\begin{aligned}(C_S^h - N_S^h) - (C_S^l - N_S^l) &= \theta\left[rv(P_{SG}^D) + (1-r)v(P_{SB}^D) - k - v(P_S^N)\right] - \left[(1-r)v(P_{SG}^D) + rv(P_{SG}^D) - k - v(P_S^N)\right] \\ &= \theta(2r-1)\left[v(P_{SG}^D) - v(P_{SB}^D)\right] = \theta(2r-1)\{[(P_{SG}^D \times r \times 1 + (1-P_{SG}^D)\times(1-r)\times 1] - [P_{SB}^D \times r \times 1 + (1-P_{SB}^D)\times(1-r)\times 1)]\} \\ &= \theta(2r-1)[(2r-1)(P_{SG}^D - P_{SB}^D)] > 0\end{aligned} \tag{B-1}$$

Since $r > 1/2$, and $P_{SG}^D > P_{SB}^D$, we conclude that $(C_S^h - N_S^h) - (C_S^l - N_S^l) > 0$. Equation (B-1) shows that the high ability manager has higher compensation than that of the low ability manager. We conclude that the high ability manager will have more aggressive disclosure policy than the low ability manager.

Appendix C

Proof of proposition 3

Proposition 3. A manager will have more aggressive disclosure policy when the manager has good reputation at period 0: $D_G^t \geq D_B^t > 0 \quad \forall t$, (direct reputation effect). $(C_G^t - N_G^t) - (C_B^t - N_B^t) > 0$

Part 1: Conditional Probability

Assume $p(h)$ is the probability that the high ability manager chooses not to make voluntary disclosure and $p(\ell)$ is the probability that the low ability manager chooses not to make disclosure. $P(G|h) / P(B|h)$ is the probability that the good ability manager has favorable /unfavorable news. $P(G|l) / P(B|l)$ is the probability that the low ability has favorable /unfavorable news. Thus the probability that a good/low ability manager has favorable news but does not make voluntary disclosure is $[P(G|h)p(h)]/[P(G|l)p(l)]$. And the probability that a good/low ability manager has unfavorable news but does not make voluntary disclosure is $[P(B|h)p(h)]/[P(B|l)p(l)]$.

Since we prove that $D_S^h = 1$ (high ability managers will make disclosure), the probability $p(h)$ which represents the high ability manager chooses not to make voluntary disclosure is 0. According to Bayer's rule, we have

$$P_G^N = \frac{P(G|h)p(h)}{P(G|h)p(h) + P(G|\ell)p(\ell)} = 0 \tag{C-1}$$

$$P_B^N = \frac{P(B|h)p(h)}{P(B|h)p(h) + P(B|\ell)p(\ell)} = 0 \tag{C-2}$$

Here P_S^N is the posterior probability that the high ability manager does not make disclosure with a historic signal $s \in \{B, G\}$. The results of $P_S^N = 0$ are used in the proof of Part 2.

Part 2: Proof of proposition 3: $(C_G^l - N_G^l) - (C_B^l - N_B^l) > 0$

The differences of marginal benefits for a low type manager from making voluntary disclosure and not making voluntary disclosure are given as follows:

$$
\begin{aligned}
&(C_G^l - N_G^l) - (C_B^l - N_B^l) \\
&= \theta[(1-r)v(P_{GG}^D) + rv(P_{GB}^D) - k - v(P_G^N) - \theta[(1-r)v(P_{BG}^D) + rv(P_{BB}^D) - k - v(P_B^N)] \\
&= \theta[v(P_{GB}^D) - v(P_{BB}^D) - v(P_G^N) + v(P_B^N)] \\
&= \theta\{[(P_{GB}^D)\times r\times 1 + (1-P_{GB}^D)\times(1-r)\times 1] - [(P_{BB}^D)\times r\times 1 + (1-P_{BB}^D)\times(1-r)\times 1]\} \\
&= \theta[r(P_{GB}^D - P_{BB}^D) + (1-r)(P_{BB}^D)] > 0
\end{aligned}
\tag{C-3}
$$

The proposition shows that the managers who disclose good news in period 0 will have more aggressive attitude to make voluntary disclosure in period 1 than the managers who disclose bad news in period 0.

Appendix D

Proof of proposition 4

Proposition 4. If $r \to 1$, a low ability manager with historic good reputation $S \in (G)$, will make voluntary disclosure in period 1 even knowing the news is bad: $D_G^l \in (0,1]$.

The compensations for both types of managers under different disclosure policy are given as:

$$
\begin{aligned}
\lim_{r\to 1} C_S^h &= \lim_{r\to 1}\{a + \theta[rv(P_{SG}^D) + (1-r)v(P_{SB}^D) - k]\} \\
&= \lim_{r\to 1}\{a + \theta[r(P_{SG}^D \times r\times 1 + (1-P_{SG}^D)\times(1-r)\times 1 - k]\} \\
&= a + \theta(P_{SG}^D - k) = a + \theta(1-k)
\end{aligned}
\tag{D-1}
$$

$$
\begin{aligned}
\lim_{r\to 1} C_S^l &= \lim_{r\to 1}\{a + \theta[(1-r)v(P_{SG}^D) + rv(P_{SB}^D) - k]\} \\
&= \lim_{r\to 1}\{a + \theta[r(P_{SB}^D \times r\times 1 + (1-P_{SB}^D)(1-r)\times 1 - k]\} \\
&= a + \theta(P_{SB}^D - k) = a + \theta(1-k)
\end{aligned}
\tag{D-2}
$$

$$
\begin{aligned}
\lim_{r\to 1} N_S^l &= \lim_{r\to 1}(a + \theta v(P_S^N)) \\
&= \lim_{r\to 1}\{a + \theta[P_S^N \times r\times 1 + (1-P_S^N)\times(1-r)\times 1]\} \\
&= a + \theta(P_S^N) = a
\end{aligned}
\tag{D-3}
$$

The marginal benefits for both types of managers from making voluntary disclosure are given as:

$$
\begin{aligned}
&(C_S^h - N_S^h) \\
&= \theta\left[rv(P_{SG}^D) + (1-r)v(P_{SB}^D) - k - v(P_S^N)\right] \\
&= \theta\left[r((P_{SG}^D)\times r\times 1 + (1-P_{SG}^D)\times(1-r)\times 1 - k)\right] \\
&= \theta(1-k) > 0
\end{aligned}
\tag{D-4}
$$

1

$$
\begin{aligned}
&(C_S^l - N_S^l) \\
&= \theta\left[(1-r)v(P_{SG}^D) + rv(P_{SB}^D) - k - v(P_S^N)\right] \\
&= \theta\left[r((P_{SB}^D)\times r\times 1 + (1-P_{SG}^D)\times(1-r)\times 1 - k)\right] \\
&= \theta(1-k) > 0
\end{aligned}
\tag{D-5}
$$

The results show that a manager making voluntary disclosure will have higher compensation than the one not making voluntary disclosure as $r \to 1$. From proposition 1, we have $D_S^l > 0$. From equation (D-5), we find that the low ability manager with historic good news in period 0 will make voluntary disclosure in period 1 to obtain higher valuation and compensation. Under the extreme case of $r \to 1$, the low ability manager will choose to make disclosure with a policy of $D_G^l \in (0,1]$ to signal his ability rather than keeping silence.