Chapter 3

Management Compensation, Debt Contract, and Earnings Management Strategy

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Positive accounting theory hypothesizes that certain economic and contracting variables (such as earnings-based compensation and debt contracts) provide a manager with incentives to obtain his own self-interest by managing reported earnings. A separating equilibrium at stage 1 is developed in which the manager of a good firm selects an income-increasing strategy and the manager of a bad firm selects an income-decreasing strategy. We point out that the strategic use of a debt-contract, comprised of repayments and costly distress financing, can induce the manager to reveal his firm type by an earnings management strategy at stage 1. However, in the final stage a pooling equilibrium and a separate equilibrium can be obtained at the same time. In a pooling equilibrium the managers of two types both choose an income-increasing strategy to increase their compensation. However, if the manager of the bad firm takes his reputation into consideration, then he may have an incentive to choose the income-decreasing method. We can hence derive a separate equilibrium at stage 2.

Keywords: Debt contract; compensation; earnings management strategy; information asymmetry.

1. Introduction

A growing number of studies provide evidence supporting that earnings management is a widespread phenomenon (Healy, 1985; Merchant, 1990; Bruns and Merchant, 1990; Defond and Jiambalvo, 1994; Richardson, 2000). The theoretical literature related to earnings management has discussed the motivation and result behind earnings management under the condition of information asymmetry between the manager and the owner (Dye, 1988; Tureman and Titman, 1988; Hughes and Schwartz, 1988; Chaney and Lewis, 1995). Managers choose accounting procedures and accruals or change the accounting method in order to increase or decrease reported earnings. Positive accounting

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theory hypothesizes that economic and contracting variables induce the manager to manage reported earnings, e.g. increasing a manager's compensation or reducing the possibility of violating any provisions of debt covenants, and to smooth out reported earnings (see Healy, 1985; Schipper, 1989; Watts and Zimmerman, 1978, 1990). However, in this paper we demonstrate that the strategic use of a debt-contract and managerial compensation can motivate the choice of reporting earnings and reveal a manager's true type about the prospects under the existence of information asymmetry.

We review the literature related to the issue that discusses the effects of compensation and debt-contracts on creating incentives for earnings management. Several articles examine the effects of compensation contracts on earnings management incentives. Watts (1977) and Watts and Zimmerman (1978) point out that bonus schemes create an incentive for managers to select accounting policies that boost the value of their award. Healy (1985) and Holthausen, Larcker, and Sloan (1995) find a strong association between accruals and managers' income-based incentives under a bonus contract. Dechow and Sloan (1991) show that a CEO may reduce research and development spending in his final years in office in order to increase the reported earnings. This kind of CEO behavior is consistent with the short-term nature of many CEOs' compensation.

In addition to these empirical studies, several theoretical papers address managerial compensation and earnings management. Lambert (1984) and Dye (1988) demonstrate that risk-averse managers have an incentive to smooth earnings so as to smooth their compensation. Elitzur and Yaari (1995) show that the choice of a compensation scheme by owners affects earnings management. Chaney and Lewis (1995) consider managerial compensation to analyze how the strategic management of reported earnings influences investors' assessments of a firm's market value.

Aside from evidence which reveals the relation between compensation and earnings management, academic accountants have devoted much effort to obtain empirical evidence on the importance of debt agreements in determining accounting policy (see the reviews of Watts and Zimmerman (1990) and Christie (1990)). According to the Watts and Zimmerman (1990) survey, earlier empirical research studies generally support that the closer the firm is to violating accounting-based debt covenants, the more likely the firm will be in selecting an income-increasing strategy. DeFond and Jiambalvo (1994) and Sweeney (1994) examine debtors' manipulative behavior. They find that violations of accounting covenants are expensive to debtors and hence debtors

will try to manipulate accounting numbers to avoid or defer defaults. Healy and Palepu (1990) and DeAngelo, DeAngelo and Skinner (1994) all indicate that firms in financial difficulty tend to place more emphasis on managing cash flows by reducing dividend payments and restructuring their operations and contractual relations.

The evidence provided by the above studies indicates that managers may manage earnings to increase bonus awards or to avoid debt covenant violations. In order to receive higher managerial compensation, managers with higher cash flows are more likely to choose an income-increasing method. Following the debt monitoring assumption provided by Jensen (1986, 1989), managers with higher debt are less likely to choose an income-increasing method. Although prior studies provide the effect of debt and compensation on earnings management, a manager's reporting choice is still unclear when we simultaneously consider the case of debt and compensation incentive. The manager is likely to increase reported earnings to increase bonus awards, but the size of a manager's compensation affects the ability of repaying. If the firm cannot repay, then its managers should be replaced.

What we are concerned with is how a manager decides an earnings management strategy given the trade-off between increasing bonus awards and increasing job security. Studies by Ross (1977), Ravid and Sarig (1991), and Brick, Frierman, and Kim (1998) have demonstrated that using financial policies, including the level of debt and dividends, can signal a firm's quality (e.g. cash flow and variance of cash flow) and help achieve a separating equilibrium. The main difference between our work and these three works is that this paper focuses on a manager's choice of earnings reporting based on the consideration of debt and managerial compensation.

This paper introduces the reaction of creditors to establish the debt-contract in a two-period setting. At the end of period 1, the manager's reported earnings influence the manager's awards. The paper then introduces the possibility of liquidation in a debt-contract. The manager considers that earnings are reported to ensure that no liquidation appears at the end of period 1. How a firm's true earnings and debt-contract influence the manager's earnings management strategy is also explained.

The approach adopted in this paper differs in two ways from previous earnings management studies. Firstly, we consider compensation and debt variables simultaneously to analyze a manager's earnings management strategy when he has private information about his firm's cash flow. This paper considers a

debt-contract, which includes the possibility of reducing the borrowing based on a two-period model. Such a debt-contract is sufficient to induce the privately-informed manager to adopt different earnings management methods. Our arguments should view debt as an incentive in financial reporting. Secondly, prior studies indicate that a firm's private information about future profit influences the firm's earnings management strategy. Thereafter, we set the firm's prospect of true earnings to be the firm's private information. Our model indicates that the manager of a bad firm facing a trade-off between debt-contract covenant and managerial compensation would less likely select an income-increasing method. This result is also consistent with empirical evidence provided by Gul (2001), which indicates that the level of debt decreases the likelihood that managers have an incentive to choose an income-increasing method.

The remainder of this paper is organized as follows. In Section 2, we establish the economic setting of the basic model. In Section 3, a variant of the basic model is analyzed. We show the equilibrium of the earnings management strategy for different types of firms. The conclusions are summarized in Section 4.

2. The Basic Model

This section introduces a model that focuses on the manager's earnings management strategy for his/her compensations in a debt-contract setting. The model in this study applies versions of Gilles and Antoine (1998) for the debt-contract in a two-period setting. The owner of the firm hires a manager to operate the project and the manager has to choose a reporting system at the beginning of each period. In order to realize how debt-contracts affect the manager's reporting strategy, we outline what debt-contracts, earnings reporting strategy, and manager's compensation are in the following section.

2.1. *The debt-contract*

The firm has an initial wealth of w and needs more capital to have access to a positive net cash flow project, which requires finance capital to undertake a project. Assume that the project is a two-period investment. The firm needs an issuance of debt at amount B to undertake the two-period project. The firm

has to repay P_t, at the end of stage t whenever possible, $t = 1, 2$.[1] Here, P_t includes the interest payment for period t and the period t repayment required by the creditor. The issuance of debt may incur some cost of financial distress. As cash flows are non-verifiable, feasible contracts can only specify that the firm repays the promised amounts, or otherwise the firm must raise additional funds to meet the repayment by using short-term financing or the creditor has the right to liquidate the assets.

Due to some transaction cost in the financial markets, distress financing is more costly than ordered financing. Thus, a financial shortfall incurs costs (e.g., Altman, 1984; Ravid and Sarig, 1991). When the credit, including the original debt financing and distress financing at the end of stage 1, is not paid at stage 2, the firm faces bankruptcy.[2] The firm will face the cost of distress financing and bankruptcy and will either raise debt at the end of stage 1 or not. Hence, this paper considers the condition of the probability of asset liquidation to proxy for the cost of distress financing. The firm generates X_t at the end of stage t when the assets are liquidated. The assets depreciate, and so we know $X_1 < B$. For simplicity, we assume $X_2 = 0$.[3]

2.2. *True earnings and reported earnings*

We attempt to model the sensibility and desirability of an earnings management strategy in a two-period setting. Consider a two-period, two-date setting with dates indexed by $t = 1, 2$. Productive activity takes place in each of the two periods. There are two types of firms in the economy, indexed by $i = L, H$. The firm with the higher true earnings from the project is referred to as the good firm (H-type firm). The company that yields the lower true earnings from the project is referred to as the bad firm (L-type firm). The manager has perfect knowledge of the firm's type $i \in \{H, L\}$, but potential creditors and the owner do not have.

The true income of firm i from the project in each period is π_{it}, $i = H, L$; $t = 1, 2$. We refer to the firm's true income from the project as its type, and

[1]Think, for instance, of stages 1 and 2 as being the short-run stage and long-run stage, respectively.

[2]While the firm cannot repay the promised amount at stage 2 even if the firm issues new debt, the firm cannot raise debt at the end of stage due to a bad reputation.

[3]At the end of stage 2, the value of asset liquidation is very low due to asset depreciation. In a past version of Gilles and Antoine (1998), the analytical results were not affected by this assumption.

thus $\pi_{Ht} > \pi_{Lt}$. Here, π_{it} is according to the following process: $\pi_{it} = \mu_i - e_{it}$. The true income in each period is affected by some random noise term e_{it} and we assume that e_{it} is stochastically independent with an identical normal distribution with variance σ_i^2 and zero mean and is stationary over time. The distribution of π_{it} takes either a low value (μ_L, σ_L^2) or a high value (μ_H, σ_H^2).

After observing the true earnings, the firm chooses the reporting strategy. We suppose the manager has two strategies of earnings reporting. One is an income-increasing strategy, and the other is an income-decreasing strategy. The manager of an i-type firm reports earnings, R_{it}^m, if he/she chooses the m reporting method, $m = D, I$. Symbol I (D) is denoted to represent the reporting strategy of the income-increasing (income-decreasing) method. The earnings report consists of true income plus or minus an available earnings manipulation. Denote ε^i to be the earnings manipulation accrual of an i-type firm. The manager's reported earnings are defined as:

$$R_{it}^m = \begin{cases} \pi_{it} + \varepsilon_{it} & \text{if } m = I \\ \pi_{it} - \varepsilon_{it} & \text{if } m = D \end{cases}; \quad i = H, L. \tag{1}$$

2.3. *Management compensation*

The manager is compensated in two periods. The manager's compensations are based on the reported earnings. This compensation scheme is analogous with the manager's compensation function set up by Elitzur and Yarri (1995). Furthermore, the measure of reported earnings used in a manager's compensation is consistent with empirical literature.

Many in the empirical literature have indicated evidence that managerial compensation is closely related to accounting measures of earnings and may even be more closely related to accounting measures of performance than to a stock market measure of performance (e.g., Antle and Smith, 1986; Lambert and Larcker, 1987; Kostiuk, 1989; Jensen and Murphy, 1990; Rosen, 1992). In addition, Rogerson (1997) shows that the other reason for managerial compensation based on accounting earnings is to provide a robust solution to the investment incentive problem. Rogerson (1997) also indicates that we can observe compensation contracts in the real world that are much more closely tied to stock market performance than to an accounting performance measure.

In an i-type firm, the manager chooses an m accounting method to report earnings. The manager's compensations, W_{it}^m, can then be expressed as follows:

$$W_{it}^m = a + bR_{it}^m ,$$

where a is the base salary, not contingent on earnings; and b is the bonus rate, or the slope of a linear sharing rule.

After paying W_{it}^m to the manager, an i-type firm can obtain $\pi_{it} - W_{it}^m$. The surplus cash flow $\pi_{it} - W_{it}^m$ is available for repaying creditors. The manager's compensations can affect the ability of the firm's repayments. However, the manager's reporting method influences his/her compensations. The manager will adopt an income-increasing method that enables him/herself to obtain a higher compensation, but it reduces the firm's ability to repay. The manager has to consider the trade-off when selecting the reporting method.

As described above, the sequence of the events is as follows:

- In stage 1:
  - (A_1) The owner of the firm signs the debt-contract. The firm borrows \$B from the creditor against a pledge to repay $\{P_t\}$, $t = 1, 2$.
  - (A_2) The cash flow is realized at the end of period 1, if the creditor accepts the debt-contract.
  - (A_3) The true cash flow is observed by the manager. The manager reports financial earnings according to the earnings management strategy.
  - (A_4) The manager is compensated based on reported earnings.
  - (A_5) The firm obtains cash flow from the project and repays P_1 to the creditor after payment compensation. If an i-type firm after choosing an m reporting strategy cannot repay P_1, then a fraction f_i^m of the assets is liquidated. Re-negotiation may occur until the firm is satisfied.
- In stage 2:
  - (A_6) The cash flow is realized if the firm still carries on in stage 2.
  - (A_7) The manager observes the true earnings and reports according to the reporting strategy.
  - (A_8) The manager is compensated based on reported earnings.
  - (A_9) The firm pays P_2 to the creditor.

In the case of default, the result of a re-negotiation implies that a fraction f_i^m of the asset is liquidated given an m reporting strategy of firm i. The operation capacity at stage 2 is then $1 - f_i^m$. Alternatively, $1 - f_i^m$ may be considered as a possibility for liquidation following a default. Assume the expected cash flow of the good firm is enough to repay at stages 1 and 2.

For a given debt-contract, a Perfect Bayesian Equilibrium in the finance market is defined by:

- Given a creditor's beliefs regarding the firm's type, the creditor decides a sequence of payments $\{P_1, P_2\}$ from the firm and a fraction of the asset being liquidated (f_i^m) to maximize his profit.
- According to the type of the firm, the manager reports his optimal earnings. A sequence of reported earnings describes the manager's earnings management strategy. Let $R_{it}^m(P_t)$ be the reported earnings at payment P_t, $t = 1, 2$.
- The creditor updates a probability distribution regarding his belief obtained by Bayes' rule and the manager's reporting equilibrium strategies.

The equilibrium in this paper is derived by reverse induction. The following section describes the manager's reporting strategy and the payment covenants.

3. Earnings Management Strategy and Debt Covenants

The manager's reports affect his/her compensations. The surplus' true earnings after deducting managerial compensation are available for repayment. In stage 2, the relationship between the surplus true earnings and the promised repayment of the debt-contract can influence the manager's reporting method. The manager's earnings management strategy in an i-type firm at stage 2 is as follows[4]:

$$R_{i2}^m(P_2) = \begin{cases} R_{i2}^{\mathrm{I}} & \text{if } \pi_{i2} - W_{i2}^{\mathrm{I}} \geq P_2, \\ R_{i2}^{\mathrm{D}} & \text{otherwise.} \end{cases} \tag{2}$$

Using R_{it}^m from Equation (1), we know that the promised repayment in the debt-contract will be:

$$P_2 = \begin{cases} \pi_{L2} - W_{L2}^{\mathrm{D}} & \text{if } \lambda\left(\pi_{L1} - W_{L1}^{\mathrm{D}}\right) \geq \pi_{L1} - W_{L1}^{\mathrm{I}}, \\ \pi_{L2} - W_{L2}^{\mathrm{I}} & \text{otherwise.} \end{cases} \tag{3}$$

[4]In stage 2 the earnings management strategy of a manager of an i-type firm could be initially expressed as:

$$R_{i2}^m(P_2) = \begin{cases} \pi^{i\mathrm{I}} & \text{if } \left(1 - f_i^{\mathrm{I}}\right) X_2 + \pi_2 - W_{i2}^{\mathrm{I}} \geq P_2, \\ \pi^{i\mathrm{D}} & \text{otherwise,} \end{cases}$$

where f_i^{I} is the fraction of liquidation of the assets when the manager of an i-type firm adopts the I reporting strategy. However, we assume $X_2 = 0$, and the manager's earnings management strategy can be rewritten as Equation (2).

Here, λ is the probability that the L-type firm knows that the manager does adopt an income-increasing strategy in stage 1.

In stage 1 the manager's reporting strategy can be expressed as follows:

$$R_{i1}^{m}(P_1) = \begin{cases} \pi_{i1}^{\mathrm{I}} & \pi_{i1} - W_{i1}^{\mathrm{I}} \geq P_1, \\ \pi_{i1}^{\mathrm{D}} & \text{otherwise.} \end{cases} \tag{4}$$

From Equation (4), we know that if $\pi_{i1} - W_{i1}^{\mathrm{I}} < P_1$, then the manager adopts an income-decreasing method in order to repay the debt, irrespective of the firm's type. However, we consider the case of $\pi_{i1} - W_{i1}^{\mathrm{I}} \geq P_1$. When $\pi_{H1} - W_{H1}^{\mathrm{I}} \geq P_1$ and $\pi_{L1} - W_{L1}^{\mathrm{I}} < P_1$, the manager of an H-type firm would like to adopt an income-increasing strategy to report earnings, whereas the manager of an L-type firm would like to adopt an income-decreasing strategy. Thus, the maximum repayment for separating the reporting in stage 1 is: $P_1 = \pi_{H1} - W_{H1}^{\mathrm{I}}$.

From $\pi_{H1} - W_{H1}^{\mathrm{I}} \geq P_1 > \pi_{L1} - W_{L1}^{\mathrm{I}}$, we derive the separating equilibrium that the manager of the bad firm chooses an income-decreasing strategy and the manager of the good firm chooses an income-increasing strategy. When the repayment of period 1 is set in the range of $\pi_{H1} - W_{H1}^{\mathrm{I}} \geq P_1 > \pi_{L1} - W_{L1}^{\mathrm{I}}$, the manager of an L-type firm expects a fraction f_L^{D} of assets to be liquidated in case he adopts an income-increasing strategy. A fraction f_L^{D} of liquidation of assets reduces the operation capacity, and the manager's compensation would then be reduced by the fraction.

When the creditor liquidates a fraction f of the assets in stage 1, the manager looses at least $f_L^{\mathrm{D}}\pi_{L2}$. Thus, the manager will prefer to repay in cash first and liquidate as little as possible. Once the manager is compensated based on reported earnings, the amount of cash left plus the return of liquidation are enough to repay P_1. Whenever the manager adopts an I strategy or D strategy, he has to accept the liquidation of a fraction f of the assets such that:

$$\pi_{L1} - (a + bR_{I_\varphi 1}^{\mathrm{I}}) + f_L^{\mathrm{I}} \cdot X_1 = \pi_{L1} - (a + bR_{L1}^{\mathrm{D}}) + f_L^{\mathrm{D}} \cdot X_1 = P_1.$$

Thus, we can obtain that

$$f_L^{\mathrm{I}} = \frac{f_L^{\mathrm{D}} + 2b\varepsilon_{L1}}{X_1}. \tag{5}$$

Lemma 1

There exists an optimal debt-contract in which the fraction of liquidation is satisfied: $f_L^{\mathrm{I}} = f_L^{\mathrm{D}} + 2b\varepsilon_{L1}/X_1$.

Lemma 1 is a typical feature of a debt-contracting problem. Let us now describe the reason to explain why the manager of the bad firm adopts an income-decreasing strategy. The manager avoids losing compensation at stage 2 due to liquidation. Assume that the discount rate is zero. Thus, given that the manager adopts an income-decreasing method at stage 2, the manager of the L firm is willing to adopt an income-decreasing strategy and obtain less compensation at period 1 if and only if he gets at least what he obtains by an income-increasing strategy. That is:

$$\begin{aligned} & a + bR_{L1}^{\mathrm{D}} + \left(1 - f_L^{\mathrm{D}}\right)\left(a + b(\pi_{L2} - \varepsilon_{L2})\right) \\ & \quad \geq a + bR_{L1}^{\mathrm{I}} + \left(1 - f_L^{\mathrm{I}}\right)\left(a + b(\pi_{L2} - \varepsilon_{L2})\right). \end{aligned} \tag{6}$$

The inequality in Equation (6) induces the manager of the bad firm to choose the income-decreasing strategy at $t = 1$. Thus, it follows from the inequality in Equation (6) binding that:

$$f_L^{\mathrm{I}}\left(a + b(\pi_{L2} - \varepsilon_{L2})\right) = 2b\varepsilon_{L2} + f_L^{\mathrm{D}}\left(a + b(\pi_{L2} - \varepsilon_{L2})\right). \tag{7}$$

Lemma 1 can simply be equality (7), we can rewrite (7) to be:

$$b = \frac{(X_1 - a)}{(\pi_{L2} - \varepsilon_{L2})}. \tag{8}$$

If the manager adopts an income-increasing method at stage 2, the manager of an L firm is willing to adopt an income-decreasing strategy at period 1, and it will be set as:

$$\begin{aligned} & a + bR_{L1}^{\mathrm{D}} + (1 - f_L^{\mathrm{D}})\left(a + b(\pi_{L2} + \varepsilon_{L2})\right) \\ & \quad \geq a + bR_{L1}^{\mathrm{I}} + (1 - f_L^{\mathrm{I}})\left(a + b(\pi_{L2} + \varepsilon_{L2})\right). \end{aligned} \tag{9}$$

This implies that the bonus rate induces the manager of the bad firm to choose the income-decreasing strategy at period 1, which should be set as:

$$b = \frac{(X_1 - a)}{(\pi_{L2} - \varepsilon_{L2})} \tag{10}$$

The set of bonus rates available to managers (which are given by (8) and (10) with a parameter X_1) induces the manager of the bad firm to choose the income-decreasing strategy. The value of the bonus rate increases with the value of liquidation. This implies that the owner should provide a higher bonus rate when the value of liquidation increases. If the liquidation is inefficient,

then the owner could avoid liquidation by setting a bonus rate. The threat of bad consequences associated with liquidation makes the owner provide higher incentives in the compensation contract. Thus, it can be said that in a separating equilibrium, the manager of the bad firm adopts an income-increasing method, as the left cash flow is not enough for repayment.

The possibility of liquidation decreases stage 2's payoff. A combination of the possibility of liquidation and the bonus rate in the compensation contract makes the income-increasing strategy unfavorable to the manager of the bad firm. It is now shown that under asymmetric information, with regards to the firm's true earnings, from the two-period project the debt-contract and bonus rate induce the manager of the bad firm to adopt an income-decreasing strategy.

Proposition 1

At stage 1, a separating equilibrium, in which the manager of the good firm chooses an income-increasing strategy and the manager of the bad firm chooses an income-decreasing strategy, is obtained if and only if: $\pi_{H1} - W^I_{H1} \geq P_1 > \pi_{L1} - W^I_{L1}$. *Hence, the value of the bonus rate increases with the value of liquidation.*

We know that $P_1 > \pi_{L1} - W^{\mathrm{I}}_{L1}$. If $f^{\mathrm{I}}_L \neq 0$, then $P_1 = \pi_{L1} - W^{\mathrm{I}}_{L1} + f^{\mathrm{I}}_L X_1$ can hold. In a separating equilibrium at stage 1, the manager of the bad firm gives up some compensation in order to maintain the size of operation in stage 2. At this time, the owner should set the optimal bonus rate of the manager's compensation in order to influence the manager's reporting strategy.

The expectation of liquidation induces the manager of the bad firm to adopt an income-decreasing method. For the parameter value of repayment, the owner makes sure that the manager of the bad firm chooses the income-increasing method to enjoy higher compensation, which will trigger liquidation. The manager of the bad firm prefers a reduction of compensation to a liquidated loss. Thus, the manager of the bad firm prefers the income-decreasing strategy rather than the income-increasing strategy.

A good firm is identified as one that expects to achieve a higher profit from the project. A good firm has the ability to repay the creditor. The compensation is based on the reported earnings. The manager has an incentive to make an increase in the reported earnings in order to be paid a higher compensation.

At stage 1 the manager of the good firm chooses an income-increasing strategy and the manager of the bad firm chooses an income-decreasing strategy.

The implication is that the strategic use of a debt-contract and compensation-contract induces the manager to reveal the firm's type in stage 1 by earnings management strategies. If the repayment is too high for the manager of the bad firm when he/she chooses an income-increasing strategy, then the firm expects a low cash flow and the owner should set the covenant of early repayment and increase the bonus rate. Thus, when the manager considers the earnings reporting strategy, he/she will not only care about capturing benefits for himself, but also keep the firm away from being liquidated.

At stage 1 the strategic use of debt and compensation can induce the manager to reveal his firm type. However, whether the separating equilibrium of the manager's earnings management strategy can be achieved or not depends on the degree of the manager's reputation. The following proposition summarizes the argument at stage 2.

Proposition 2

At stage 2, there exists a separating equilibrium and a pooling equilibrium regarding the manager's earnings management strategy. A separating equilibrium exists, in which the manager of the good firm chooses the income-increasing strategy and the manager of the bad firm chooses the income-decreasing strategy, when the manager indeed does not want to cause default. A pooling equilibrium, in which the managers of the good firm and the bad firm choose the income-increasing strategy, can possibly be obtained, if the manager of the bad firm prefers high compensation to avoidance of default.

According to Proposition 1, we know that the manager of the bad firm chooses the income-decreasing strategy t. The ex-post belief of the owner regarding λ is $\lambda = 1$, i.e., the manager of the bad firm does not adopt the income-increasing method. Hence, by Equation (3), we obtain $P_2 = \pi_{L2} - W_{L2}^{D}$. Therefore, $P_2 \leq \pi_{L2} - W_{L2}^{D}$, and we then know that the manager of the good firm will choose the income-increasing strategy at stage 2. In order to avoid default at stage 2, the manager of the bad firm will choose an income-decreasing strategy. However, the project is only for two periods. At stage 2, the liquidation of assets does not have an impact on the sequential compensation of the manager of the bad firm. Choosing the income-increasing method increases the earnings report. Hence the manager can obtain higher compensation by choosing the income-increasing method rather than the income-decreasing method. Thus, the manager of the bad firm has the incentive to adopt the income-increasing strategy at stage 2 for higher compensation in period 2.

If the event of liquidation of assets has an impact on the manager's reputation, then it may force the manager of the bad firm to choose the income-decreasing method. When the manager of the bad firm is concerned about his/her reputation, he/she may protect the firm and cover the firm's repayment at the expense of his/her compensation. This may be the reason why some bad firms report high earnings and some provide low earnings. Their managers have different considerations.

In the above equilibrium, both the available reporting discretion and the fraction of liquidation influence the repayment of the debt-contract. In order to make a manager of the bad firm reveal the firm's type at an early stage, the repayment of stage 1 should be set higher when the value of liquidation of the assets is higher. Since the project is a two-period investment in our setting, the fraction of liquidation would be useful in separating the types of firms at stage 2. This implies that the possibility of liquidation induces the manager to adopt an income-decreasing strategy at the end of the debt-contract when the manager is concerned about his/her reputation or because of the bad consequences associated with liquidation.

4. Conclusions

In a firm, the owner hires the manager to operate the business and the manager's compensation is partly based on the reported earnings. The manager can secretly observe the future cash flow from the given projects. If the manager chooses the income-increasing method, then he/she would be paid more compensation. However, this will result in a reduction of the available amount of cash flow for the repayment, and hence the firm might possibly face liquidation. This paper constructs a two-period debt-contract to analyze how compensation and debt-covenants influence the firm's earnings management strategy, when the firm possesses private information regarding the expected cash flow. This paper demonstrates that a debt-contract can be thought of as an incentive scheme for firms choosing an earnings management strategy. Furthermore, long-term debt can induce the firm to reveal its private information regarding the expected cash flow at the initial stage.

This paper assumes that the firm's expectation of cash flow is either high or low and introduces the possibility of liquidation into modeling the debt-contract. We describe how the possibility of liquidation induces the manager of the bad firm not to maximize his/her own self-interests by increasing the

reported earnings. The left-over cash flow of the bad firm will not be enough to make the repayments if the manager increases the reported earnings for his/her own self-interests. On the other hand, the good firm will produce enough cash flow irrespective of the chosen reporting strategy. In such a case, there will be a separate equilibrium at stage 1. The manager of the bad firm will then adopt the income-decreasing strategy to escape liquidation. Hence, the manager of the good firm will adopt an income-increasing strategy to increase his/her own interests. The higher the expectation is for being liquidated at the end of period 1, the more the manager of the bad firm will be induced to adopt the income-decreasing strategy. In a separate equilibrium, the results indicate that the owner should provide a higher bonus rate when the value of liquidation increases. The owner could adjust the bonus rate to avoid liquidation.

The debt-contract is a two-period contract. The threat of liquidation may not be a useful incentive in influencing the manager's choice of earnings management strategy. At stage 2, a pooling equilibrium and a separate equilibrium may exist at the same time. In a pooling equilibrium, managers of the two types of firms choose the income-increasing strategy, because they would like to increase their own self-interests. However, liquidation breaks down the manager's reputation. When the manager of the bad firm is concerned about his/her reputation, he/she may have an incentive to choose the income-decreasing method. We can then derive a separate equilibrium in which the manager of the bad firm adopts an income-decreasing strategy and the manager of the good firm adopts an income-increasing strategy at the final stage.

This paper studies how the liquidation of the debt-contract affects a manager's earnings management strategy. A situation in which the firm faces a threat of liquidation is like the situation of a takeover. Future research may include the study of the choice of reported earnings when the firm faces a friendly and/or hostile takeover.

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