Management Compensation, Debt Contract and Earnings Management Strategy

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Abstract

Positive accounting theory hypothesizes that certain economic and contracting variables (such as earnings-based compensations and debt contracts) provide a manager with incentives to obtain his own self-interest by managing reported earnings. This study analyzes in a two-period setting the impact that liquidation of a debt contract has on managers' incentives to manage reported earnings to increase his compensation. We assume that the owner hires the manager to operate a project, and only the manager knows the real cash flow of the project. There are two types of firms, a good firm and a bad firm, which differ only in cash flow obtained at the end of the period. The information asymmetry leads the manager to increase reported earnings to maximize his compensation. However, the cash flow left, which is available for repayment, decreases due to managers' compensation. The trade-off influences the manager's earnings management strategy.

Under certain conditions, there is a separate equilibrium at stage 1, in which the manager of the good firm selects income-increasing strategy and the manager of the bad firm selects income-decreasing strategy. We point out the strategic use of the debt contract, comprised of repayment and the possibility of liquidation, can induce the manager to reveal his firm type by earnings management strategies at stage 1. However, in the final stage, a polling equilibrium and a separate equilibrium can be obtained at the same time. In a polling equilibrium, managers of two types both choose income-increasing strategy to increase their compensation. However, if the manager of the bad firm takes his reputation into consideration, he may have an incentive to choose the income-decreasing method. Then, we can derive a separate equilibrium at stage 2.

Key: debt contract, compensation, earnings management strategy, information asymmetry


1. **Introduction**

In this paper we present a two-period model in order to explain the manager's earnings management strategy from the aspect of compensation and debt covenants. Both the studies of Merchant(1990) and Bruns and Merchant (1990) indicate that earnings management is a widespread phenomenon. The earnings management literature says that managers choose accounting procedures and accruals or change accounting method in order to increase or decrease reported earnings. Positive accounting theory hypothesizes that certain economic and contracting variables induce the manager to manage reported earnings, e.g. increasing manager's compensation or reducing the possibility of violating provisions of debt covenants, and smooth reported earnings (see Healy (1985); Schipper (1989); Watts and Zimmerman (1978,1990)).

We review the literature related to the issue that discusses the effects of compensation and lending contracts on creating incentives for earnings management. Several articles examine 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 CEO reduces research and development spending in their final years in office to increase the reported earnings. This behavior of CEO is consistent with the short term nature of many CEOs’ compensation. Elitzur and Yaari (1995) show that the choice of compensation scheme by owners affects earnings management.

Besides evidences which reveal the relation between compensation and earnings management, academic accountants have devoted effort to obtain empirical evidence on the importance of debt agreements in determining accounting policy (see reviews of Watts and Zimmerman (1990) and Christie (1990)). According to Watts and Zimmerman (1990) survey, earlier empirical researches generally support that the closer the firm is to violate accounting-based debt covenants, the more likely the firm would select income-increasing strategy. DeFond and Jiambalvo (1991) 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 increase their job security. In order to protect the job, the manager has an incentive to avoid covenant violations by choosing a favorable accounting method. This paper is motivated by results of these studies. The manager is likely to increase reported earnings to increase bonus awards. However, the increased compensation will reduce available cash, which could be paid for the loan. The size of manager’s compensation affects the ability of repaying. If the firm can not repay, its managers should be changed. We are concerned in how the manager decides earnings management strategy given the tradeoff between increasing bonus awards and increasing job security.

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

The approach adopted in this paper differs in two ways from previous earnings management studies. Firstly, we consider compensation and debt variable simultaneously to analyze manager's earnings management strategy when he has private information about his firm’s cash flow. This paper considers debt contract, which includes a possibility of reducing the borrowing bases based on a two-period model. Then, 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 study indicates that firm’s private information about future profit, influences the firm’s earnings management strategy. Thereafter, we set the firm’s prospect of cash flow to be the firm’s private information. We combine the private information and debt covenants to discuss the firm’s earnings management behavior. We hope that the results of theory analysis will support and fit the empirical studies.
The remainder of this paper is organized as follows. In section 2, we establish the economic setting of basic model. In section 3, a variant of 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 of the 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 outlined 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 access to a positive net cash flow project, which requires capital \( B \) to undertake the project. Assume that the project is a two-period investment. The firm needs to raise amount \( B \) to undertake a two-period project. The firm has to repay \( P_t \), at the end of stage \( t \) whenever possible, \( t=1,2 \). \( P_t \) includes interests of period \( t \) and the period \( t \) repayment required by the creditor. As cash flows are non-verifiable, feasible contracts can only specify that the firm repays the promised amounts, otherwise the creditor has the right to liquidate the assets. The firm generates \( l_t \) at the end of stage \( t \) when the assets are liquidated. Assets depreciate, so we know \( l_1 < B \). For simplicity, we assume \( l_2=0 \).\(^1\)

2.2 Expected cash flow and reported earnings

We attempt to model the sensibility and desirability of earning management strategy in 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 expected cash

\(^1\) In a past version, the analytical results were not affected by this assumption.
flow from the project is referred to as the good firm (H type firm). The company that yields the lower expected cash flow 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 perception is that the firm is bad with probability $q$.

The cash flow from the project is either $\pi^H$ or $\pi^L$, where $\pi^H > \pi^L$. We refer to the firm’s cash flow from the project as its type. In the good (bad) firm, the expected cash flow from the project is $\pi_{it}^H$ ($\pi_{it}^L$), $t=1,2$.

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

The manager’s reported earnings are,

$$R_{it}^m = \begin{cases} 
\pi^i + \varepsilon^i, & \text{if } m = I \\
\pi^i - \varepsilon^i, & \text{if } m = D 
\end{cases} \quad (1)$$

2.3 Management compensation

The manager is compensated in two periods. The manager’s compensations are based on the reported earnings. In $i$ type firm, the manager chooses $m$ method to report earnings, then and the manager’s compensations, $W_{it}^{im}$, can be expressed as follows:

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

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

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2 We can refer to the cash flow as true earnings.
After paying $W^{im}_t$ to the manager, $i$ type firm can obtain $\pi^i - W^{im}_t$. The surplus cash flow $\pi^i - W^{im}_t$ 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 adopts income-increasing method that enables him/herself to obtain 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:
  - The owner of the firm signs the debt contract. The firm borrows $SB$ from the creditor against a pledge to repay $\{P_t\}, t=1,2$.
  - The cash flow is realized at the end of period 1, if the creditor accepts the debt contract.
  - The true cash flow is observed by the manager. The manager reports financial earnings according to the earnings management strategy.
  - The manager is compensated based on reported earnings.
  - The firm obtains cash flow from the project and repays $P_1$ to the creditor after payment compensation. If the firm can not repay $P_1$, a fraction $f$ of the assets is to be liquidated. Re-negotiation may occur until the firm is satisfied.

- In stage 2:
  - The cash flow is realized if the firm still carries on at stage 2.
  - The manager observes the true earnings and reports according to the earnings management strategy.
  - The manager is compensated based on reported earnings.
  - The firm pays $P_2$ to the creditor.

In case of default, the result of re-negotiation implies that a fraction $f^{im}$ of the asset is liquidated if the manager of $i$ type firm chooses $m$ reporting strategy. Then, the operation capacity at stage 2 is $1 - f^{im}$. Alternatively, $1 - f^{im}$ may be considered
as a possibility of liquidation following a default. Assume the expected cash flow of
the good firm is enough to repay at stage 1 and 2.

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

- Given creditor’s beliefs regarding the firm’s type, the creditor decides a
  sequence of payments \( \{P_1, P_2\} \) of the firm and a fraction of the asset being
  liquidated \( f^{im} \) to maximize his profit.

- According to the type of the firm, the manager reports optimally. A sequence
  of reported earnings describing the manager’s earnings management strategy.
  Let \( R_i^n(P_t) \) 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 cash flow is available
for repayment. In stage 2, the relationship between the surplus cash flow and the
promised repayment of the debt contract can influence the manager's reporting
method. The earnings management strategy of a manager of \( i \) type firm in stage 2
is:

By Eq.(2), we know that the promised repayment in the debt contract will be:

\[
R^i_2(P_2) = \begin{cases} 
\pi^i, & \text{if } \pi^i - W^i_2 \geq P_2 \\
\pi^D, & \text{otherwise}
\end{cases}
\]  

(2)

\[ 3 \] In stage 2, the earnings management strategy of a manager of \( i \) type firm could be initially
expressed as: \( R^i_2(P_2) = \begin{cases} 
\pi^i, & \text{if } (1 - f^{il})L_2 + \pi^i - W^i_2 \geq P_2 \\
\pi^D, & \text{otherwise}
\end{cases} \), where, \( f^{il} \) is the fraction of
where \( \lambda \) is the probability that the owner knowing that the manager of L type firm does not adopt income-increasing strategy in stage 1.

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

\[
P_2 = \begin{cases} 
\pi^L - W_2^{LD}, & \text{if } \lambda \left( \pi^L - W_1^{LD} \right) \geq \pi^L - W_1^{LI} \\
\pi^L - W_2^{LI}, & \text{otherwise} 
\end{cases}
\]  

(3)

From (4), we know that if \( \pi^i - W_1^{ii} < P_1 \), then the manager adopts income-decreasing method in order to repay, irrespective of the firm's type. However, we consider the case of \( \pi^i - W_1^{ii} \geq P_1 \). When \( \pi^H - W_1^{Hi} \geq P_1 \) and \( \pi^L - W_1^{Li} < P_1 \), the manager of H type firm would like to adopt income-increasing strategy to report whereas the manager of L type firm would like to adopt income-decreasing strategy.

When the repayment of period 1 is set in the range of \( \pi^H - W_1^{Hi} \geq P_1 > \pi^L - W_1^{Li} \), the manager of L type firm expects a fraction \( f \) of assets to be liquidated in case he adopts income-increasing strategy. A fraction \( f \) of liquidation of assets reduces the operation capacity, then the manager's compensation would be reduced by the fraction. When the creditor liquidates a fraction \( f \) of the assets in stage 1, the manager looses at least \( f \pi^L \). 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 I strategy or D strategy, he has to accept the liquidation of a fraction \( f \) of the assets such that \( \pi^L - (a + bR_1^{LI}) + f^{LI} l_1 = \pi^L - (a + bR_1^{LD}) + f^{LD} l_1 = P_1 \). Thus, we can get that

\[
f^{LI} = f^{LD} + 2b\varepsilon^D / l_1. 
\]  

(5)

liquidation of the assets when the manager of \( i \) type firm adopts I strategy. However, we assume \( L_2=0 \).
**Dilemma 1:** There exists an optimal debt contract in which the fraction of liquidation is satisfied: 
\[ f^{LI} = f^{LD} + 2b\varepsilon^D / l_1. \]

Dilemma 1 is a typical feature of debt contracting problem. The piece rate of the manager’s compensation also influences the manager’s reporting strategy. Let us now describe the reason to explain why the manager of the bad firm adopts income-decreasing strategy. He avoids losing compensation at stage 2 due to liquidation. Assume the discount rate is zero. Thus, the manager of L type is willing to adopt income-decreasing strategy and obtain less compensation at period 1 if and only if he gets at least what he obtains by income-increasing strategy. That is:
\[
a + bR_{1}^{LD} + (1 - f^{LD})\left(a + b(\pi^L + \varepsilon)\right) \geq a + bR_{1}^{LI} + (1 - f^{LI})\left(a + b(\pi^L + \varepsilon)\right)
\]

The inequality in equation (6) induces the manager of the bad firm to choose the income-decreasing strategy. Thus, it follows from the inequality in Equ.(6) binding that:
\[
f^{LI}\left(a + b(\pi^L + \varepsilon^D)\right) = 2b\varepsilon^D + f^{LD}\left(a + b(\pi^L + \varepsilon^D)\right)
\]

Dilemma 1 can simply be equality (7), we can rewrite (7) to be:
\[
b = (l_1 - a)(\pi^L + \varepsilon^D)
\]

It is now shown that under asymmetric information regarding the firm’s expected cash flow from the two-period project, however, we find the possibility of liquidation and the piece rate induces the manager of the bad firm to adopt income-decreasing strategy. From such \( \pi^H - W_1^{HD} \geq P_1 > \pi^L - W_1^{LI} \), we derive the equilibrium that the manager of the bad firm chooses income-decreasing strategy and the manager of the good firm chooses income-increasing strategy.

**Proposition 1:** At stage 1, a separating equilibrium, in which the manager of the good firm chooses income-increasing strategy and the manager of the bad firm chooses income-decreasing strategy, does obtain if and only if:

The manager’s earnings management strategy can be rewritten as equation (2).
\[ \pi^H - W_1^{HD} \geq P_1 > \pi^L - W_1^{LL}. \] Hence, the piece rate of maximum separating stage 1 is: \[ b = \left( l_1 - a \right) / \left( \pi^L + \varepsilon^D \right). \]

We know that \( P_1 = \pi^L - W_1^{LL} + f^{LL} l_1 \). If \( f^{LL} \neq 0 \), \( P_1 > \pi^L - W_1^{LL} \) can be held. 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 the stage 2. At this time, the owner should set the optimal piece rate, \( b = \left( l_1 - a \right) / \left( \pi^L + \varepsilon^D \right) \), which induces the manager of the bad firm to choose the income-decreasing strategy. The value of piece rate increases with the value of liquidation. This implies that the owner should provide a higher piece rate when the value of liquidation increases. If the liquidation is inefficient, the owner could avoid the liquidation by setting piece rate. The threat of bad consequences associated with liquidation makes the owner to provide more incentive compensation contract. Thus it can be said that in a separating equilibrium, the manager of the bad firm adopts income-increasing method, as the left cash flow is not enough for repayment. The possibility of liquidation decreases stage 2’s payoff. Combination of the possibility of liquidation and the piece rate of compensation contract, makes the income-increasing strategy unfavorable to the manager of the bad firm.

Thus, the expectation of liquidation induces the manager of the bad firm to adopt 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 being identified as the one that expects to get higher profit from the project. A good firm has the ability to repay to 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 higher compensation.

At stage 1, the manager of the good firm chooses income-increasing strategy and the manager of the bad firm chooses income-decreasing strategy. The implication is
that the strategic use of debt contract and compensation contract induce the manager to reveal the type of the firm in stage 1 by earnings management strategies. If the repayment is too high for the manager of the bad firm when he/she chooses income-increasing strategy, then the firm expects low cash flow and the owner should set the covenant of early repayment and increase the piece rate. Thus, when the manager considers the earnings reporting strategy, he/she will not only care for 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 summaries 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 avoid default.

According to proposition 1, we know that the manager of the bad firm chooses the income-decreasing strategy. The ex-post belief of the owner regarding $\lambda$ is $\lambda=1$, i.e. the manager of the bad firm does not adopt the income-increasing method. Hence, by equation (3), we obtain $P_2 = \pi^L - W_2^{LD}$. Therefore, $P_2 \leq \pi^H - W_2^{LI}$, 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 would choose income-decreasing strategy. However, the project is only a two-period one. At stage 2, the liquidation of assets does not have 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 when he chooses the income-increasing method than he chooses 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 of period 2. If the event of liquidation of assets has impacts on the manager’s reputation, 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 low earnings. Their managers have different considerations.

In the above equilibrium, available reporting discretion and the fraction of liquidation, influence the repayment of the debt contract. In order to make manager of the bad firm reveal the firm 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 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

The owner hires the manager to operate the firm and the manager’s compensation is partly based on the reported earnings. The manager can secretly observe the future cash flow from the project. 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. 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 expected cash flow. This paper demonstrates that debt can be thought of as an incentive for firms choosing earnings management strategy. Furthermore, the 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 income-increasing strategy to increase his/her own
interests. The higher the expectation of 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 piece rate when the value of liquidation increases. The owner could adjust the
piece 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 polling equilibrium and a separate equilibrium may exist at the same
time. In a polling 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 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. Then, we can derive a separate
equilibrium in which the manager of the bad firm adopts income-decreasing strategy
and the manager of the good firm adopts income-increasing strategy at the final stage.

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

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