# TOP MANAGEMENT COMPENSATION, EARNINGS MANAGEMENT AND DEFAULT RISK: INSIGHTS FROM THE CHINESE STOCK MARKET

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**ABSTRACT**

*China has sustained a rapid rate of economic growth and absorbed a great deal of foreign investment over the past decades. However, the laws pertaining to business in China have not kept up with China's market growth. For this reason, investors in the Chinese stock market must assess associated risks. We set out in this study to examine the relationships that exist between default risk, earnings management, and top management compensation of publicly-listed companies in the Chinese stock market, which is now considered the most important emerging market. The results reveal a greater likelihood of default amongst larger discretionary accruals and lower top management compensation. In addition to studying the relationships which exist in the full sample, we also divide the sample into two sub-groups, based upon the signs of discretionary accruals, to investigate the likelihood of default. We find higher default potential amongst firms only falling into the category of positive discretionary accruals.*

**JEL:** G14; G34; G35; M41

## INTRODUCTION

China has sustained a rapid rate of economic growth since the inauguration of its economic reform period. The trials and tribulations of the reform process have been well documented (Cao, Qian, and Weingast, 1999; Gao, 1996; Groves, Hong, McMillan, and Naughton, 1994; Lin and Zhu, 2001) and analyses of the effectiveness of these reforms have begun to appear in the literature (Allen, Qian, and Qian, 2005; Chen, Su, and Zhou, 1998). For the Chinese stock market, one of the most important policy changes was the rapid conversion of its socialist planned economy into a market economy. However, the majority shareholders for most of China's listed state-owned enterprises (SOE's) are state agencies that lack experience in monitoring and controlling public firms. Although government institutions are aimed at improving commercial legal and judicial system; however, China's commercial legal and judicial system are not as transparent as those in developed markets (Davidson, Gelardi, and Li, 2006; Winkle, Huss, and Chen, 1994; and Zhou, 1988). Therefore, the apparent lack of control and monitoring from investors, regulatory agencies, and the lack of transparency in financial disclosure have provided considerable discretion for managing earnings (Aharon, Lee and Wong, 2000).

Accrual accounting is the standard practice for most companies, since it provides an accurate description of the company's current condition. However, in addition to improving firms' financial reporting and disclosure, it can also provide opportunities for managers to use discretionary accruals to manipulate their financial statements. Therefore, many studies use discretionary accruals as a proxy for earnings management and suggested that managers have incentives to manipulate their firms' earnings in order to reduce the effect of negative signals (Sweeney, 1994; Burgstahler and Dichev, 1997; Jaggi and Lee, 2002). Koch (1981) indicated that firms with increased technical default probability had a propensity for making income-increasing accounting changes. Sloan (1996) posited that high-accrual firms would experience lower future earnings performance, while Peltier-Rivet (1999) and Jaggi and Lee (2002) indicated that the larger a firm's debt-equity ratio, the more likely the firm was to adopt income-increasing accounting procedures. However, there are less studies linking earnings management to the probability of default

among firms. Hence, we chose to investigate this relationship in China in our study.

After the massive 1997 financial crisis, many Asian countries aimed to strengthen corporate governance, transparency and disclosure levels in order to decrease the managers to manipulate financial statement (Ho and Wong, 2001). Jensen and Meckling (1976) formalized the relationship between agency problems and top management compensation, indicating that higher top management compensation could mitigate agency problems. A large amount of empirical literature followed Jensen and Meckling's study, and found that companies with higher incentive compensation have better performance (Crystal 1991; Jensen and Murphy, 1990; Kaplan 1994; Patton and Baker 1987).

Jensen and Meckling (1976) indicated that good corporate governance procedures not only increase companies' performance but decrease the probability of default among firms. However, studies documenting the association between default risk and top management compensation are much rarer. Only Cyert, Kang and Kumar(2002) have explored the negative association between default risk and CEO compensation. The corporate scandal in the emerging markets is more which have arisen. In China, Sun and Zhang (2006) pointed out that about 20 percent of publicly listed firms have been convicted by China Securities Regulations Committee (CSRC) for serious frauds and scandals since the Chinese stock market was established in the early 1990s. In our study, we extend Cyert et al. (2002) understood how giving top management higher compensation could effectively mitigate the default probability of firms in China. In addition, we also explore the possibility that higher top management compensation could decrease managerial use of discretionary accruals to manipulate financial statements and expand companies' default risk.

Although the practice of using discretionary accruals, either to increase or reduce income, is essentially aimed at managing earnings, there are, nevertheless, differences in the attitudes of executives and the results of their financial statements. Indeed, Epps (2006) notes that income-increasing and income-reducing discretionary accruals have different relationships with corporate governance practices. For the purpose of consistency and in order to determine the impacts of finance-oriented earnings management, we will explore the linkage between discretionary accruals, top management compensation, and default risk, in terms of different discretionary accruals (positive vs. negative).

Our study makes several contributions to the literature in this field. Firstly, we provide evidence of the relationship between discretionary accruals (earnings management), top management compensation, and default risk, thus complementing the findings of prior studies. Secondly, we examine listed firms in the Chinese stock market to explore such relationships. It is common knowledge that investments in unsafe and deficient markets are accompanied by higher risk. Therefore, the relationship between top management compensation, earnings management behavior of firms, and default risk is of considerable interest to all investors. Finally, we also examine whether the relationship between top management compensation, discretionary accruals, and default risk is the same under different categorizations. The empirical results of all of these issues should help investors to make appropriate investment decisions.

We use the random effects panel regression model, as opposed to the ordinary least square (OLS) estimation in this study, since the panel data regression is able to supply more accurate inferences for the parameters and reduce any collinearity that may exist amongst the explanatory variables. Our results show that there is a greater risk of default where firms have greater positive discretionary accruals and less top management compensation. Furthermore, higher CEO compensation could mitigate the positive relation between discretionary accruals and firms' bankruptcy risk. That is to say, companies with higher CEO compensation have less incentive to manipulate financial statements, and thus, less risk of bankruptcy.

The remainder of this paper is organized as follows. Section 2 describes the literature review and develops our hypotheses. Section 3 describes the data sources and empirical methodology adopted for this study. Section 4 provides the descriptive statistics and presents the empirical results and analysis, with the final section summarizing the conclusions drawn from this study.

## LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

### China Economic Environment

China has been transformed into the greatest economic society in the world and, thus, there are many studies which have examined topics relating to mainland China (Allen et al., 2005; Bailey et al., 2003; Kang et al., 2002; and Liu et al., 2002). Following this trend, many international investors have put a lot of capital into the Chinese stock market. In addition, many studies have showed spillover effects, indicating that international financial markets are becoming more affected by changes in the Chinese stock market. Therefore, the influence of the Chinese economy is gaining in importance (Bekaert and Harvey, 2000; Wang et al., 2002). However, the commercial legal/judicial system in China is not yet mature (Hamilton and Biggart, 1988; Whitley, 1994) and it is much easier for managers in Chinese firms to manipulate their earnings.

This unfamiliar legal environment with suspect financial systems gives rise to uncertainty and risk for the foreign investor. China, with its distinctive political, institutional, and cultural characteristics, may have to be analyzed using different methods (Hamilton and Biggart, 1988; Whitley, 1994). A growing body of literature has indicated China's emerging economic might not be analyzed properly in conventional Western terms (Aoki, 1984, 1990; Biggart and Hamilton, 1992; Boisot and Child, 1988; Goto, 1982). This provides evidence that foreign investors may have difficulty becoming familiar with the Chinese economic environment.

As has been seen, the problems of corporate governance in China are quite serious. Hence, we see the firms in China as an appropriate target for research as China may ultimately provide an example for other countries with incomplete legal and financial systems. Moreover, related findings will potentially provide ideas for the design of appropriate corporate governance practices within developing economies.

### Default Risk

Many models attempting to forecast the probability of business failure have been developed throughout the years. The earliest and most-cited studies predicting the default probability of firms include the financial ratio analysis model of Beaver (1966) and the Z-score model of Altman (1968). These models are capable of providing accurate predictions of corporate bankruptcy, but have been subjected to numerous revisions. Altman (2000) provides a detailed description of the construction of the second generation credit risk model, and adds several enhancements to the original model.

There are many other approaches to the prediction of bankruptcy risk which attempt to overcome the shortcomings of the earlier models (Männasoo, 2007; Ohlson, 1980; Shumway, 2001; Walker, 2005). However, there has been a general tendency in these studies to use historical data to predict the default risk. This approach may not be capable of adequately reflecting the actual probability of bankruptcy in the changing market (Hillegeist et al., 2004). Furthermore, since a firm's risk of bankruptcy is correlated with the properties of its lines of business, and debt ratios cannot effectively mirror the actual probability of default. Thus, the use of historic ratios as a substitute for default risk would seem to be inappropriate.

Dacorogna, Oderda and Juna (2003) demonstrated that the forecasting ability and time-varying characteristics of the KMV model were superior to those of other models (The KMV model is detailed in Appendix A). Domingues (2004) also suggested that the KMV model seemed to be particularly appropriate for application to publicly-traded companies, since the equity values in this model are

determined by the market. Apart from its ability to react appropriately to the condition of the firm, the KMV model can also provide important information for investors. Therefore, in an effort to overcome the shortcomings of the aforementioned models, we use the KMV model in this study to compute the default risk and to provide an optimal description of the probability of bankruptcy.

Earnings Management

Accrual accounting is the standard practice used to mitigate timing and matching problems inherent in cash flows so that earnings more closely reflects firm performance. Dechow (1994) indicated that accrual accounting gave management some discretion over the recognition of accruals. The discretion might be used by management to signal meaningful information that would otherwise not be communicated. Signaling was expected to improve the ability to measure firm performance from earnings since management presumably has superior information about their firm's cash generating ability (Healy and Palepu, 1993; Holthausen, 1990; Holthausen and Leftwich, 1983; Watts and Zimmerman, 1986). Therefore, a credible signal would reduce information asymmetry and result in more efficient contracting.

However, with the advantages of the accrual accounting there was introduced a set of problems, such as earnings management; accordingly, numerous studies use discretionary accruals as a proxy for earnings management. Watts and Zimmerman (1986) found that management used their information advantage to opportunistically manipulate accruals. Healy and Wahlen (1999) showed that managers used accruals to manage earnings and alter firms' reported economic performance to mislead outsiders such as investors, debt holders and government institutions. Thus, outsiders had a less reliable view of firm performance. In addition, many studies reported that financially distressed firms had more incentive to manage their earnings. Jaggi and Lee (2002) showed that managers of financially distressed firms often engaged in earnings management, either to deliver good news or to reduce the effects of bad news on their finances. Peltier-Rivet (1999) also argued that firms with a larger debt-equity ratio have a tendency to adopt income-raising accounting procedures. This suggests, therefore, that there is some relationship between earnings management and the probability of default. However, studies have rarely explored such an association. Accordingly, in this study, we will investigate this relationship in an attempt to provide evidence to supplement these studies. Thus, our first hypothesis is as follows:

> *Hypothesis 1:* Ceteris paribus, the relationship between discretionary accruals and default risk will be positive.

Top Management Compensation

A growing amount of empirical literature indicated that top management compensation was potentially linked to the effectiveness of governance mechanisms (Cheng and Firth; 2006; Cyert et al., 2002; Brunello et al., 2001; Firth et al., 2006; Izan et al., 1998). The indications were that better compensation plans give managers sufficient incentive to maximize shareholder wealth, decrease the motivation to manipulate financial statements, and reduce "agency problems". Furthermore, many studies provided empirical evidence of a positive relationship between top management compensation and company performance (Coughlan and Schmidt, 1985; Murphy, 1985, 1986; Jensen and Murphy, 1990; Abowd, 1990; Leonard, 1990; Kaplan 1994).

Jensen and Meckling (1976) proposed the "agency theory" which suggests conflicts of interest between various contracting parties such as shareholders, company managers, and debt holders. The conflicts of interest include both the maximization of corporate performance and the reduction of default risk of the firms. Many studies have found that conflicts of interest can be reduced by policies such as thorough top management compensation plans (Abowd, 1990; Leonard, 1990; Kaplan 1994). However, these studies have always focused on motivating managers to maximize corporate performance and have ignored the problem of enabling managers to reduce the probability of the default risk. Up to now, only Cyert et al. (2002) have attempted to construct a model concerning the relationship between top management

compensation and the probability of default risk. They also provided empirical evidence indicating that top management compensation is negatively related to the firm's bankruptcy risk, to support their theory.

In our study, we follow up Cyert et al.'s (2002) study, investigating whether any relationship exists between top management compensation and default risk in publicly-listed firms in China. Our second hypothesis is therefore presented as follows:

> *Hypothesis 2:* Ceteris paribus, the linkage between top management compensation and default risk will be negative.

Furthermore, we also explore the possibility that higher top management compensation could decrease manager use of discretionary accruals to manipulate financial statements and expand companies' default risk. Our third hypothesis is therefore presented as follows:

> *Hypothesis 3:* Ceteris paribus, the relationship between compensation to encourage top management compared to discretionary accruals together with default risk will be negative.

## DATA AND METHODOLOGY

### Data Description

Our discussion of the relationship between default risk, discretionary accruals, and shareholder concentration is based upon data obtained from the Chinese Stock Market and Accounting Research (CSMAR) database. This sample is comprised of all publicly-listed enterprises in the Shanghai and Shenzhen Stock Exchange. As the China Securities Regulatory Commission (CSRC) requests all publicly-listed firms in these stock markets to compile their corporate governance data (such as top management compensation) and to compute discretional accruals using prior cash flow since 2001, our sample span covers the five-year period, from 2001 to 2005.

Only those companies which conform to our selection criteria have been used in our analysis. Firstly, we confined ourselves to firms that have their financial year-end in December of each year. This ensures that the information obtained from the financial statements is available each year. Secondly, we chose only those firms on which there is complete data (the book value of total debts and assets, the equity market value, the stock price volatility, and so on) covering the years 2001 to 2005, to fully satisfy the related computation associated with the KMV model. This selection process yields a total of 471 firms, and 2,355 firm-year observations.

Our sample is then sub-divided into groups based upon discretionary accruals (positive vs. negative) to determine whether the effects present in all groups are the same. In this way, we can more clearly understand influences in different situations.

### Empirical Models

We employ the Multivariate Random Effects Balanced Panel Regression Method to examine the effects of discretionary accruals, top management compensation, and other financial variables on the default risk for publicly-listed firms in China. We begin by constructing an annual time series model of top management compensation, discretionary accruals, and corporate default risk using the KMV model to assess the firms' probability of default. The KMV model calculates the actual probability of default based upon the option pricing theory of Black and Scholes (1973) and Merton (1974). The computation of 'expected default frequency' (EDF) is based on the company's capital structure, the volatility of its asset returns, and the current asset value. The related process of deriving EDF is expressed in Appendix A.

Guided by related theories drawn from the aforementioned prior studies, the control variables are comprised of the debt ratio, the reciprocal of the current ratio, ROA, and total assets. Calendar year

dummy variables are also included to specify the potential time effects on default risk. The empirical model is described as follows:

$$RISK_{it} = \beta_0 + \beta_1 DISACC_{it} + \beta_2 COMPEN_{it} + \beta_3 DISACC_{it} \times COMPEN_{it} + \beta_4 DEBT_{it} + \beta_5 ROA_{it} + \beta_6 ASSET_{it} + \beta_7 DIRECT_{it} + \beta_8 Y02_{it} + \beta_9 Y03_{it} + \beta_{10} 04_{it} + \beta_{11} 05_{it} + \varepsilon_{it} \quad (1)$$

where $RISK_{it}$ is the $i^{th}$ firm's default risk computed from the KMV model in year $t$; $DISACC_{it}$ represents the $i^{th}$ firm's absolute discretionary accruals estimated from the modified Jones model in year $t$ (the related process of deriving discretionary accruals is expressed in Appendix B); $COMPEN_{it}$ refers to the cash compensation of the three highest paid employees in the $i^{th}$ firm in year $t$; $DEBT_{it}$ is the $i^{th}$ firm's debt ratio in year $t$; $ROA_{it}$ indicates the $i^{th}$ firm's return on assets in year $t$; $ASSET_{it}$ expresses the $i^{th}$ firm's log total assets in year $t$; $DIRECT_{it}$ indicates to the size of the board of directors in the $i^{th}$ firm in year $t$; $Y02_{it}$, $Y03_{it}$ and $Y04_{it}$, $Y05_{it}$, are (0,1) dummy variables controlling for the effects of calendar years; if the data is extracted from year 2002, then $Y02_{it}$ is 1, otherwise 0, and so on for the years 2003-2005.

In conducting our study, we were interested in the relationships between discretionary accruals (earnings management), top management compensation, and default risk. The coefficient on the earnings management measure, *DISACC*, captures the connection between firms' manipulation of financial statements (discretionary accruals) and the probability of default risk. There has been widespread use of discretionary accruals as a substitute for earnings management in studies on the relationship between corporate governance and earnings manipulation (Defond and Jiambalvo, 1994; Epps, 2006; Teoh et al., 1998a, b). In view of this, we follow the example of Kothari et al. (2005); calculating the discretionary accruals whilst including a performance-measurement variable, return on assets (ROA), into the modified Jones model. Furthermore, it was argued by both Holthausen and Larcker (1996) and Teoh et al. (1998a) that different industries may have divergent levels of accruals. Our estimate of discretionary accruals therefore also takes into account different industrial affiliations. When the coefficient of *DISACC* is positive, the indication is that firms are more energetically involved in earnings manipulation and have an increased risk of bankruptcy, thus providing support for Hypothesis 1.

The coefficient of top management compensation, *COMPEN*, we use the compensation of the three highest paid employees as a proxy to find the link between top management compensation and the default risk of the firms. When the coefficient of *COMPEN* is negative, the indication is that firms with more compensation to top management have a decreased risk of bankruptcy, which provides support for Hypothesis 2. The coefficient on the interaction between the discretionary accruals and top management compensation (*DISACC*×*COMPEN*) captures the relationship between discretionary accruals, top management compensation, and default risk. If the coefficient of *DISACC*×*COMPEN* is negative, the indication is that firms which give more compensation to top management decrease the manipulation of financial statements and further decrease risk of bankruptcy, which provides support for Hypothesis 3.

## EMPIRICAL RESULTS AND ANALYSIS

Summary Statistics

Our sample was comprised of 471 firms, giving a total of 2,355 firm-year observations from 2001 to 2005. Table 1a presents the descriptive statistics for the pooled sample of all firm-year observations. From Table 1a, we find that the mean of firms' probability of default risk (*RISK*) is 0.0060, which means firms' default risk in China is not very high. The mean of *DISACC* is 0.0538, which indicates on average firms' discretionary accruals comprise 5.38 percent of the prior total assets. On average *COMPEN* is 12.76, which is to say that every year firms' top management get 12.76 million cash compensation.

Different signs of discretionary accruals reflect the dissimilar administrative behavior of top management (Healy, 1985). Accordingly, we classify the data into two sub-groups based upon the sign of each firm's

five-year average of discretionary accruals. The results in Table 1b show that the firms in the 'positive discretionary accruals' group would manipulate the accruals more than those in the 'negative discretionary accruals' group. In addition, the 'positive discretionary accruals' group has higher asset scale than the 'negative discretionary accruals' groups.

Table 1a: Summary of Descriptive Statistics for All Firms ( N=2355)

| Variable | Mean | Median | Std. Dev. | Min.. | Max. |
|---|---|---|---|---|---|
| *RISK* | 0.0060 | 7.33E-09 | 0.0708 | 0.0000 | 1.0000 |
| *DISACC* | 0.0538 | 0.0339 | 0.0715 | 0.0000 | 1.1862 |
| *COMPEN* | 12.7592 | 12.8213 | 0.8727 | 10.0750 | 16.0804 |
| *DEBT* | 0.5900 | 0.5461 | 0.9881 | 0.0273 | 43.0750 |
| *ROA* | 0.0168 | 0.0278 | 0.1152 | -1.7491 | 1.0847 |
| *ASSET* | 14.2694 | 14.2589 | 0.9287 | 10.5763 | 17.8683 |
| **DIRECT** | 9.6400 | 9.0000 | 2.2700 | 0.0000 | 19.0000 |

Table 1b: Summary of Descriptive Statistics for All Firms, by Discretionary Accruals

| *Variable* | Positive Discretionary Accruals (N=1103) | | | Negative Discretionary Accruals (N=1252) | | |
|---|---|---|---|---|---|---|
| | Mean [b] | Std. Dev. | Median | Mean | Std. Dev. | Median |
| **RISK** | 0.0059 | 0.0702 | 1.01E-08 | 0.0061 | 0.0713 | 4.90E-09 |
| **DISACC** | 0.0557 * | 0.0816 | 0.0318 | 0.0522 | 0.0613 | 0.0367 |
| **COMPEN** | 12.7648 | 0.8718 | 12.8320 | 12.7543 | 0.8738 | 12.8171 |
| **DEBT** | 0.5783 | 0.4530 | 0.5555 | 0.6004 | 1.2869 | 0.5354 |
| **ROA** | 0.0194 | 0.1160 | 0.0275 | 0.0144 | 0.1145 | 0.0284 |
| **ASSET** | 14.3111 ** | 0.9127 | 14.3082 | 14.2326 | 0.9415 | 14.2062 |
| **DIRECT** | 9.6100 | 2.3500 | 9.0000 | 9.6600 | 2.1900 | 9.0000 |

[a] *$RISK_{it}$ is the $i^{th}$ firm's default risk computed from the KMV model in year t; $DISACC_{it}$ represents the $i^{th}$ firm's absolute discretionary accruals estimated from the modified Jones model in year t; $COMPEN_{it}$ refers to the cash compensation of the three highest paid employees in the $i^{th}$ firm in year t; $DEBT_{it}$ is the $i^{th}$ firm's debt ratio in year t; $ROA_{it}$ indicates the $i^{th}$ firm's return on assets in year t; $ASSET_{it}$ expresses the $i^{th}$ firm's log total assets in year t; $DIRECT_{it}$ indicates to the size of the board of directors in the $i^{th}$ firm in year t; $Y02_{it}$, $Y03_{it}$ and $Y04_{it}$, $Y05_{it}$, are (0,1) dummy variables controlling for the effects of calendar years; if the data is extracted from year 2002, then $Y02_{it}$ is 1, otherwise 0, and so on for the years 2003-2005.*

[b] *The two-tailed t-test was adopted to examine the means according to discretionary accruals (positive vs. negative).*

[c] ** indicates significance at the 10% level; ** indicates significance at the 5% level.*

## Empirical Analysis

The empirical results for the total sample are presented in Table 2, which reports the coefficient estimates of the balanced panel multivariate regression model using the full 2,355 firm-year observations. After controlling for all other variables, the estimated coefficient of DISACC is positive and statistically significant, indicating that those firms which engage more vigorously in earnings manipulation have an increased risk of bankruptcy, thereby providing further support for Hypothesis 1. The result of *COMPEN* on default risk is negative and significant, providing support for our Hypothesis 2, and supporting the idea that companies which give higher CEO compensation suffer less default risk, in accordance with Cyert et al. (2002). The interaction term of *DISACC×COMPEN* is also negative and significant, providing support for Hypothesis 3, and indicating that higher CEO compensation could mitigate a positive relationship between discretionary accruals and firms' bankruptcy risk.

Table 2: Regression Results: Full Firms ( N=2355)

| *Variables* [a] | *Predicted Sign* | **Coefficient** [b] **(*t*-statistic)** |
|---|---|---|
| *Constant* | | 0. 0583 |
| | | (1. 6009) |
| *DISACC* | + | 0. 6158** |
| | | (2. 3289) |
| *COMPEN* | - | -0. 0041* |
| | | (-1. 7639 ) |
| *DISACC*COMPEN* | - | -0. 0418** |
| | | (-2. 0068) |
| *DEBT* | + | 0. 0269*** |
| | | (20. 0487) |
| *ROA* | - | -0. 0322*** |
| | | (-2. 9669) |
| *ASSET* | - | -0. 0019 |
| | | (-0. 8571) |
| *DIRECT* | ? | 0. 0007 |
| | | (1. 0203) |
| *Y02* | ? | -0. 0010 |
| | | (-0. 2875) |
| *Y03* | ? | -0. 0026 |
| | | (-0. 7344) |
| *Y04* | ? | 0. 0036 |
| | | (0. 9845) |
| ***Y05*** | ? | 0. 0035 |
| | | (0. 9484) |

[a] *$RISK_{it}$ is the $i^{th}$ firm's default risk computed from the KMV model in year t; $DISACC_{it}$ represents the $i^{th}$ firm's absolute discretionary accruals estimated from the modified Jones model in year t; $COMPEN_{it}$ refers to the cash compensation of the three highest paid employees in the $i^{th}$ firm in year t; $DEBT_{it}$ is the $i^{th}$ firm's debt ratio in year t; $ROA_{it}$ indicates the $i^{th}$ firm's return on assets in year t; $ASSET_{it}$ expresses the $i^{th}$ firm's log total assets in year t; $DIRECT_{it}$ indicates to the size of the board of directors in the $i^{th}$ firm in year t; $Y02_{it}$, $Y03_{it}$ and $Y04_{it}$, $Y05_{it}$, are (0,1) dummy variables controlling for the effects of calendar years; if the data is extracted from year 2002, then $Y02_{it}$ is 1, otherwise 0, and so on for the years 2003-2005.*

[b] ** indicates significance at the 10% level; ** indicates significance at the 5% level; and *** indicates significance at the 1% level.*

The coefficient of *DEBT* is positive and significant, implying that those firms with poor solvency will have a higher probability of default; this is in line with the findings of Opler and Titman (1994). The effect of *ROA* on default risk is negative and significant, indicating that with an increase in the operational performance of firms, there will be a corresponding reduction in default risk. This is consistent with Vasiliou et al. (2003).

Where appropriate, the effects of calendar years are included as dummy intercepts within the panel regression. In general, it would seem that those firms with more aggressive earnings management behavior run a higher risk of default. The firms which gave CEO higher compensation could decrease the risk of default and provide the CEO with less incentive to manipulate earnings. The empirical results showing the relationship between default risk, discretionary accruals, and CEO compensation, for sub-groups based upon the sign of their discretionary accruals (+ or −) are provided in Table 3.

The estimated coefficient of *DISACC* is positive and significant for the positive discretionary accrual group, but not significant for the negative discretionary accruals group. This indicates that when firms use discretionary accruals to raise their apparent performance level, it will also raise the risk of default. This relationship does not hold for firms with negative discretionary accruals. It may be that managers using discretionary accruals to reduce a firm's performance are doing so in accordance with the accounting principal of 'conservatism', and may be regarded as conservative behavior.

Table 3: Panel Regression Estimation Results for the Total Sample, by Discretionary Accruals

| Variables [a] | Predicted Sign | Positive Discretionary Accruals (n = 1103) | | Negative Discretionary Accruals (n = 1252) | |
|---|---|---|---|---|---|
| | | Coeff. [b] | t-statistic | Coeff. [b] | t-statistic |
| Constant | | 0.0334 | 0.6886 | 0.0596 | 1.2881 |
| DISACC | + | 0.7701 ** | 2.0545 | 0.3652 | 1.0123 |
| COMPEN | - | -0.0092 *** | -2.7757 | -0.0008 | -0.2843 |
| DISACC*COMPEN | - | -0.0520 * | -1.7657 | -0.0278 | -0.9780 |
| DEBT | + | 0.0711 *** | 13.8853 | 0.0185 *** | 15.7730 |
| ROA | - | 0.0566 *** | 3.1640 | -0.1051 *** | -8.2682 |
| ASSET | - | 0.0032 | 1.1921 | -0.0048 * | -1.7355 |
| DIRECT | ? | 0.0002 | 0.1912 | 0.0009 | 1.0117 |
| Y02 | ? | -0.0059 | -1.0235 | 0.0062 | 1.5662 |
| Y03 | ? | -0.0095 | -1.6179 | 0.0047 | 1.1567 |
| Y04 | ? | -0.0060 | -1.0294 | 0.0140 *** | 3.1625 |
| **Y05** | ? | -0.0051 | -0.8196 | 0.0073 * | 1.6647 |

[a] *$RISK_{it}$ is the $i^{th}$ firm's default risk computed from the KMV model in year t; $DISACC_{it}$ represents the $i^{th}$ firm's absolute discretionary accruals estimated from the modified Jones model in year t; $COMPEN_{it}$ refers to the cash compensation of the three highest paid employees in the $i^{th}$ firm in year t; $DEBT_{it}$ is the $i^{th}$ firm's debt ratio in year t; $ROA_{it}$ indicates the $i^{th}$ firm's return on assets in year t; $ASSET_{it}$ expresses the $i^{th}$ firm's log total assets in year t; $DIRECT_{it}$ indicates to the size of the board of directors in the $i^{th}$ firm in year t; $Y02_{it}$, $Y03_{it}$ and $Y04_{it}$, $Y05_{it}$, are (0,1) dummy variables controlling for the effects of calendar years; if the data is extracted from year 2002, then $Y02_{it}$ is 1, otherwise 0, and so on for the years 2003-2005.*

[b] ** indicates significance at the 10% level; ** indicates significance at the 5% level; and *** indicates significance at the 1% level.*

The effects of *COMPEN* and *DISACC×COMPEN* are negative and significant for the positive discretionary accrual group, with the impact being insignificant for firms with negative discretionary accrual. We can infer from this that higher CEO compensation in firms with higher positive discretionary accrual could moderate top managers' manipulation of their earnings statements and lower the level of firms' default risk. Furthermore, for the two sub-groups, the coefficient of *DEBT* is significantly positive, whilst the impact of *ROA* is significantly negative. These results are similar to those presented in Tables 2. The marginal significant and negative influence of *ASSET* on the risk of bankruptcy for the negative discretionary accrual group suggests that when firm size is small, it has a higher probability of default as suggested by Vassalou and Xing (2004). Again, it seems appropriate to have time effects included as dummy intercepts in the regression. Overall, firms using positive discretionary accruals are generally faced with a higher risk of default. However, these conditions would not be apparent in the negative discretionary accruals group.

## CONCLUSIONS

The prior literature suggests that if managers wish to deceive investors, they will invariably engage in the management of their earnings reports. In a country with asymmetric information and unsound legal and financial systems, which is the situation currently prevailing in mainland China; there is a particular risk of severe agency problems, whilst corporate financial frauds are also very common. Given that such scandals cause considerable harm to creditors and investors, the appropriate realization of the risk of all participants in Chinese security market is an issue of major concern.

In our study, we explore the relation of firms' earnings management behavior, top management compensation, and the probability of default. The results show firms' earnings management behavior could increase their probability of default. In addition, higher top management compensation not only mitigates firms' probability of default, but also lessens firms' use of discretionary accruals to manipulate financial statements resulting in higher default risk.

Furthermore, in order to investigate whether different earnings management behavior have different impacts on default risk, we separated our sample into two sub-groups based upon positive discretionary accruals (use of discretionary accrual to increase income) vs. negative discretionary accruals (use of

discretionary accrual to decrease income). In line with many prior studies, the results reveal that only for firms with positive discretionary accruals, there is a relationship existing among earnings management behavior, top management compensation, and default risk.

Giving the relatively high financial risks involved with investing in China, creditors and investors (or would-be creditors and investors) need to understand firms' characteristics in advance, in order to protect their own interests. Once again, we suggest investing in firms with lower discretionary accruals and higher top management compensation; i.e., investors and creditors would be advised to put their money into firms with better corporate governance structures. If this is done, they can effectively avoid, or reduce, the risk of potential default.

## APPENDICES

Appendix A: KMV Model

We use the KMV model – a model developed by the KMV Company in 1993 – to estimate and measure the default risk for the firms used in this study. The KMV model calculates the 'expected default frequency' (EDF) based on the firm's capital structure, the volatility of the asset returns, and the current asset value in accordance with the option pricing model of Black and Scholes (1973) and Merton (1974). This model is best applied to publicly-traded companies for which the value of equity is determined by the market.

There are three steps involved in deriving the actual probability of default. Firstly, we estimate the asset value and the volatility of the asset returns. Financial models usually consider the market value of assets, not the book value, since the latter represents only the historical cost of the physical assets, net of depreciation. Secondly, we calculate the default point. According to the KMV model, default occurs when the asset value reaches a level somewhere between the values of total liabilities and short-term debt. This point, which is referred to as the default point (*DPT*), is considered within the KMV model as the sum of the short-term debt plus half of the long-term debt. Thirdly, we calculate the 'distance to default' (*DD*), an index measure of default risk, which is the number of standard deviations between the mean of the distribution of the asset value and *DPT*. We then scale the *DD* to the actual probability of default using a default database. The estimation procedure is as follows.

$$\frac{dV_A^t}{V_A^t} = ud_t + \sigma_A dZ_t \tag{1A}$$

where $V_A^t$ is the total market value of the assets for the firm at time $t$ for China; $u$ is the expected rate of return; and $\sigma_A$ is the volatility of the asset returns. Thus, we can state the above equation in accordance with the option pricing model as follows:

$$V_E = V_A N(d_1) - Xe^{-rt} N(d_2) \tag{2A}$$

$$d_1 = \frac{ln(\frac{V_A}{X}) + (r_f + \frac{\sigma_A}{2})t}{\sigma_A \sqrt{t}}, \quad d_2 = d_1 - \sigma_A \sqrt{t} \tag{3A}$$

$$\sigma_E = \frac{V_A}{V_E} N(d_1)\sigma_A \tag{4A}$$

where $V_A$ is the market value of assets for the firm listed in the China Stock Exchange; $V_E$ is the equity market value for the Chinese listed company; $\sigma_E$ represents the volatility of the equity returns; $X$ is the book value of the total debt on the balance sheet; $t$ represents the time to maturity of the debt; $r_f$ is the one-year risk-free rate in the central bank of China; $N(d_1)$ expresses the hedging ratio with a cumulative probability density function; $N(d_2)$ is the probability that the market value of assets are greater than the liability at maturity $t$, a cumulative density probability function.

The implied market value and volatility of the asset, $V_A$ and $\sigma_A$, can be calculated from Equations (2A) and (4A). We also need to compute the 'distance to default' (*DD*). Given that the total debt is regarded as the default point (*DPT*) for the firm, after being standardized by the standard deviation of asset returns, its *DD* can be expressed as:

$$DD = \frac{ln(V_A) - ln(u - \frac{\sigma_A^2}{2})t}{\sigma_A \sqrt{t}} \tag{5A}$$

The implied default risk for any period $t$ – that is, the probability that the market values of the assets will be lower than those of the liabilities at maturity – is measured in accordance with the risk-neutral method. The procedure is as follows:

$$EDF_t = Pr\left[V_A^t \le X_t \middle| V_A^0 = V_A\right] = Pr\left[ln\, V_A^t \le ln\, X_t\right] \tag{6A}$$

After being represented in compliance with the Ito Process, the market values of the assets can be expressed, in logarithmic form, as follows:

$$ln\, V_A^t = ln\, V_A^0 + \left(u - \frac{\sigma_A^2}{2}\right)t + \sigma\sqrt{T}\varepsilon \tag{7A}$$

where $\varepsilon$ denotes a random factor of asset returns.

We replace Equation (8A) into Equation (7A) after hypothesizing that the asset returns follow normal distribution. After arranging the related term, we obtain the default probability $EDF_t$, as follows:

$$\begin{aligned} EDF_t &= \Pr\left[V_A^t \le X_t \middle| V_A^0 = V_A\right] = \Pr\left[\ln V_A^0 + \left(u - \frac{\sigma_A^2}{2}\right)t + \sigma\sqrt{T}Z_t \le X_t\right] \\ &= \Pr\left[Z_t \le -\frac{\ln\left[\frac{V_A^0}{X_t}\right] + \left[r - \frac{\sigma_A^2}{2}\right]t}{\sigma\sqrt{t}}\right] = N(-d_2) \end{aligned} \tag{8}$$

Appendix B: Model to Predict Discretionary Accruals

In the study, we use the below model to predict discretionary accruals, which is stated as follows.

$$\frac{ACC_{it}}{TA_{it-1}} = \alpha_0\left(\frac{1}{TA_{it-1}}\right) + \alpha_0\left[\frac{\left(\Delta REV_{it} - \Delta REC_{it}\right)}{TA_{it-1}}\right] + \alpha_2\left(\frac{PPE_{it}}{TA_{it-1}}\right) + \alpha_3 ROA_{it} + \alpha_4 Y02_{it} + \alpha_5 Y03_{it} + \alpha_6 Y04_{it} + \alpha_7 Y05_{it} + \varepsilon_{it} \quad (1B)$$

where $ACC_{it}$ is the $i^{th}$ firm's accruals in year $t$, which is defined as the earnings minus the cash flow from operations, both are drawn from the cash flow statement; $REV_{it}$ denotes the $i^{th}$ firm's net revenue in year $t$; $\Delta REV_{it}$ represents the $i^{th}$ firm's change in revenue in year $t$; that is, it is equal to $REV_{it} - REV_{it-1}$; $REC_{it}$ refers to the $i^{th}$ firm's net revenue in year $t$; $\Delta REC_{it}$ stands for the change in sales in year $t$, namely, it is identical to $REC_{it} - REC_{it-1}$; $PPE_{it}$ indicates the $i^{th}$ firm's gross property, plant, and equipment in year $t$; $ROA_{it}$ expresses the $i^{th}$ firm's return on assets in year $t$, which is defined by the net income scaled by lagged total assets; $TA_{it}$ is the $i^{th}$ firm's total assets in year $t$; $Y02_{it}$, $Y03_{it}$, $Y04_{it}$ and $Y05_{it}$ are the $i^{th}$ firm's (0,1) dummy variables controlling for the effect of calendar years; $\varepsilon_{it}$ is the $i^{th}$ firm's error term of model (1B) in year $t$.

Although previous papers have used the time-series approach for each firm (Jones, 1991) or the cross-section (DeFond and Subramanyam, 1998; Cohen and Lays, 2006) models to estimate the accruals, both approaches have their limitations. The time series approach assumes the state of the parameter follows temporal stationary whereas the cross-sectional method supposes the homogeneity is being across firms. Our study uses random effects panel regression model to estimate the accruals model, which contain both cross-sectional and time series dimensions.

The estimated parameters obtained from Equation (1B) are used to evaluate expected nondiscretionary accruals ($NDACC_{it}$). The related equation is set as follows.

$$NDACC_{it} = \hat{\alpha}_0\left(\frac{1}{TA_{it-1}}\right) + \hat{\alpha}_1\left[\frac{\left(\Delta REV_{it} - \Delta REC_{it}\right)}{TA_{it-1}}\right] + \hat{\alpha}_2\left(\frac{PPE_{it}}{TA_{it-1}}\right) + \hat{\alpha}_3 ROA_{it} + \hat{\alpha}_4 Y02_{it} + \hat{\alpha}_5 Y03_{it} + \hat{\alpha}_6 Y04_{it} + \hat{\alpha}_7 Y05_{it} \quad (2B)$$

where the definition of the independent variables are identical to those in equation (2B). Then the discretionary accruals ($DACC_{it}$) equals to the actual accruals minus the predicted accruals (($ACC_{it}$ / $TA_{it-1}$) - $DACC_{it}$ ).

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