THE INFLUENCES OF OWNERSHIP STRUCTURE: EVIDENCE FROM CHINA

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ABSTRACT

This paper examines that the impact of firm-specific characteristic on firm capital structure in Chinese-listed companies and attempts to solve a few puzzles existing in previous related studies. The key factors include state ownership, institutional ownership, and the risk of default. From the analyses of all samples, our results confirm that the expected default risk is important in explaining debt decision, but the influence of ownership structure is not significant. However, after separating high- and low-level from the firm leverage we find that the ownerships of state and institutions have a positive effect on corporate leverage in high-leveraged companies but not in low-leveraged firms. In addition, the positive impacts of external governance commonly occur in large firms. The observed findings provide some important implications for the role of external governance in Chinese-listed companies.

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INTRODUCTION

Booth et al. (2001) investigate capital structure determinants for ten developing countries, not including China, and find that the effects of the various factors on capital structure differ across countries, with the exception of profitability. It is interesting to explore how these influential factors affect the leverage decisions taken by Chinese firms, as China is the largest developing country and the largest foreign direct investment (FDI) receiver in the world today (Sun and Tong, 2003). China is a rising star, and has attracted huge quantities of foreign capital since its capital markets were opened up to investors around the world in the 1990s. A large number of foreign investors have given rise to a huge capital inflow, not only in terms of infrastructure, but also in capital markets, and especially in the stock market. Such increases in foreign capital, however, might affect the corporate capital structure and further affect corporate investment decisions. In addition, while China has gradually lifted a ban in relation to its capital markets and is gradually moving towards a market economy, it is essentially still a command economy, and hence the government is usually the largest shareholder and even the controlling shareholder in many enterprises. This is a distinguishing feature of the ownership structure of Chinese firms compared to corresponding firms in the emerging and developed markets.

The major difference in terms of capital structure between China and other countries might be associated with the higher degree of state ownership. In general, the managers of most firms with a high degree of state ownership are ineffectively monitored, and

hence the agency cost is higher than in firms with less state ownership. In an attempt to reduce the agency cost, firms have the propensity to raise more debt as a financing channel.[1] In addition, the high degree of state ownership can help increase the leverage capacity of firms because of the guarantee provided by the government. Therefore, state ownership could be positively related to firm leverage. On the other hand, funds are needed for the transition from command economy to market economy in China. As mentioned above, the numbers of foreign investors and institutional investors in China have been increasing since 1990. Institutional investors are in general better at monitoring their executives, and accordingly have lower agency costs (McConnell and Servaes, 1990; Pound, 1991); thus, they are expected to exhibit a negative relationship with leverage. Marked differences exist between China and other developed countries in terms of the degree of state ownership and the abundance of FDI in Chinese companies, which might lead to the capital structure of Chinese firms being different from firms in other countries.

Our motivation for studying the capital structure of Chinese firms arises mainly from the exceptional ownership structure in China. The first question this paper addresses is whether state ownership affects the capital structure of Chinese firms. Additionally, the Chinese economy is still in a stage of transition and is an emerging market, and firms in emerging markets may face more uncertainty in terms of their returns. Consequently, from the perspective of risk management, we investigate how the manager of a Chinese firm decides upon the company's debt policies in the face of speedy expansion of the economic environment, as the risk control behavior might differ from that of most firms in other developed countries. It is interesting to observe the way in which Chinese companies adjust their debt ratio as they face variations in business risk.

Our paper extends that of Huang and Song (2006) regarding the association between state ownership or institutional ownership and capital structure by incorporating the KMV model (proposed by S. Kealhofer, J. A. Mcquown, and O. A. Vasicek in 1989, denominated KMV hereafter) into our specification and examining further group samples in terms of leverage and firm size. We demonstrate that the influences of state ownership and institution ownership are commonly apparent in high-leveraged companies, and in particular, that the effects are significantly positive and only occur in large firms.

This paper is organized as follows: In the next section we review past studies and set up our hypotheses on the impact of state ownership, institutional ownership, and default risk on a firm's capital structure. Section three defines the variables and describes the empirical method, and in Section four, the data are described and the main empirical results presented. Finally, Section five concludes the paper.

LITERATURE REVIEW

Regarding risk, China is one of Asia's emerging markets. Firms in China, like those in other countries in the emerging markets, face more risk and suffer higher distress probabilities when they have higher leverage ratios. However, on the other hand, firms in China might face less risk in terms of a financial crisis because the government is the controlling shareholder for most firms. Therefore, the business risk of Chinese firms may have a much smaller effect on the capital structure compared to firms that are not state-owned (Huang and Song, 2006). When considering the impact of business risk on the capital structure, previous literature almost invariably uses the standard deviation of earnings as a proxy, as in Booth et al. (2001); however, this might overestimate business risk and hence might not be a good proxy.[4] In this study we consider the impact of expected default risk, as it is commonly believed that the extent of leverage is associated with a firm's credit rating, and hence direct estimation of the probabilities of default is more accurate than the standard deviation of earnings used in previous studies. Zou and Adams (2005) indicate that firms with high state ownership bring about higher credit risks as the loan repayment schedules are not guaranteed, while Kisgen (2006) finds that

in contrast with a firm not close to a change in credit rating, those that are close to an upgrade or downgrade issue less debt in response to credit rating.

To sum up the above, the relationship between capital structure and credit risk is apparent, which prompts us to consider expected default risk rather than business risk in terms of the standard deviation of the return on assets. To the best of our knowledge, however, there has been little research into the effects of expected default risk on capital structure. Consequently, in this study we substitute the expected default risk for the standard deviation as a proxy for business risk. Moreover, in most of the previous literature, the expected default risk has been assessed on the basis of accounting using a linear probability model, such as the probit model or the logit model. Alternatively, the discriminated analysis model and/or neural network model have also been applied in prior studies.[5] However, most previous studies use the logit model to estimate the default risk probability given the business risk (in terms of the standard deviation of earnings) and other factors. Previous research on the impact of business risk on leverage generally uses volatility as a proxy, as in Titman and Wessels (1988), Wald (1999), and Booth et al. (2001). Most of these studies indicate that business risk or volatility is negatively related to leverage, the only exception being Hsia (1981), who identifies a positive relationship between business risk and leverage.

In order to mitigate the measurement error, we directly estimate the probabilities of expected default using the KMV model, which is expected to provide a better estimation of risk than other indicators, for example, the standard deviation of earnings, or the percentage change in operating income, and so on. The reason for adopting the KMV model is the greater prediction power of that model in comparison with Moody's Risk Calc. model, as assessed by Oderda and Jung (2003), who report that the KMV model has the advantages of an instantaneous (no time lag) and better prediction power. As a result, instead of using the standard deviation of earnings as in previous research, in this study we consider default risk using the KMV model. Lastly, it is likely that the relationship between expected default risk and leverage is positive, because China's economy has exhibited high growth in recent years, and enterprises anticipate excellent prospects. That is to say, Chinese firms tend to raise debt ratios even if they expect to face higher default risk the next year. In our study, we indeed find evidence of this positive relationship, which might be attributable to the state-owned characteristic of Chinese firms. We also find that Chinese firms with higher expected default risk have more leverage, a trait that is not present in the firms of other countries.

As for state-owned enterprises (SOE), most Chinese firms are state-owned, and the agency cost of equity might rise due to the possibility of expropriation by the controlling shareholders (state ownership) as well as their negligence in terms of monitoring managers. Firms with an ownership concentration, such as state-owned enterprises, often experience a divergence between cash flow rights and control rights, which could cause shareholder–manager interest conflicts (Berkman et al., 2002). In order to reduce the agency cost of equity, firms should increase their debt financing. In addition, a firm's degree of leverage might increase with the government's support and provision of a government guarantee. The non-dilution motive leads to the use of more debt by firms with a large divergence between cash flow rights and control rights (Du and Dai, 2005). The extent of state ownership is therefore expected to be positively related to leverage (leverage-increasing effects). Berger et al. (1997) confirmed the positive relationship between managerial shareholdings and leverage. On the contrary, the reduce-debt-for-tunneling effect, however, predicts leverage-decreasing effects, for the reason that earnings are needed for debt repayment if firms raise more debt, and thereby the probability of expropriation (tunnelling) is reduced (Du and Dai, 2005). Friend and Lang (1988) find a negative relationship between the two, but Both Huang and Song (2006) and Zou and Xiao (2006) indicate that the relationship between the extent of state ownership and leverage is not significant. To sum up, the relationship between the extent of management by shareholders and leverage is still disputed.

Another factor that might affect the extent of leverage is the institutional shareholdings. In general, when more shares are owned by institutions, the monitoring of managers is more effective and hence can raise a firm's value, which accordingly results in equity prevailing over debt as a financing channel. Mohd et al. (1998) indicate that institutional shareholdings have a significant negative impact on leverage. However, Berger et al. (1997) demonstrate a positive relationship between ownership structure and leverage, so that the agency costs of equity are minimized, which is advocated by agency theory (see Jensen and Meckling, 1976). In contrast to the findings of Mohd et al. (1998) and Berger et al. (1997), both Huang and Song (2006) and Zou and Xiao (2006) are unable to find evidence of a significant relationship between institutional shareholdings and leverage in Chinese firms. Due to the unclear empirical results regarding the impact of state and institutional ownership on a firm's leverage, we accordingly have no prior expected sign for leverage.

In comparison with the abundance of studies on the determinants of capital structure in developed markets, few focus on developing countries. However, Wiwattanakantang (1999), Booth et al. (2001), Zou and Xiao (2006), and Huang and Song (2006) study the determinants of capital structure in emerging markets. Specifically, Huang and Song (2006) find that the higher the leverage of firms, the larger their size, as well as their fixed assets, and also that the higher the leverage, the lower the profitability, as well as the growth opportunities, among Chinese firms. In particular, they find no significant evidence that state ownership and institutional ownership are correlated with leverage, and report that Chinese firms do not prefer long-term debt. Our paper differs from those of Huang and Song (2006) and Zou and Xiao (2006) in that we adopt a different proxy for business risk, estimating the expected default risk using the KMV model rather than using the standard deviation of earnings.

Another discrepancy is the empirical methodology. In contrast to the studies of Huang and Song (2006) and Zou and Xiao (2006), the panel data regression model is used in our study rather than the traditional OLS regression model. In addition, for further investigation, we divide our sample into various sub-samples on the basis of leverage and firm size, which is not the case in the studies by Huang and Song and Zou and Xiao. Unlike previous studies, we not only substitute expected default risk for the standard deviation, but also discuss smaller sub-sample groups using panel data regression, which allows us to address some of the puzzles raised by prior studies. In so doing, we mainly find that the expected default probability is positively associated with leverage in Chinese firms, whereas most previous studies including Huang and Song (2006) and Zou and Xiao (2006) depict evidence of a negative relationship between the two.[6] We believe that our results are more reliable than those of Huang and Song at this point because the correlation coefficients between them are both positive:[7] that is, Chinese firms with a higher expected default risk usually raise more debt. This finding might be a unique characteristic of Chinese firms and deserves to be noted. Another finding from this study is that the impact of state ownership and institutional ownership on leverage mostly occurs in highly-leveraged firms, which contributes to the literature.

VARIABLES DEFINITIONS AND EMPRICAL MODELS

The (long-term) leverage used in this study is defined as the ratio of the book value of (long-term) total debt to the book value of total assets. Huang and Song (2006) employ various definitions of leverage, including the total and long-term debt ratios in terms of book value and market value, respectively. However, they find that there are no significant differences among them. Consequently, we mainly use the ratio of the book value of total debt to the book value of total assets as our dependent variable (D/A) and the ratio of the book value of long-term debt to the book value of total assets (LD/A) for our robustness check. Another reason we take the long-term debt ratio into account is based on the work of Wald (1999), in which the author asserts that the long-term debt

ratio is a more stable measurement for a firm's capital structure than the total debt ratio.

Moreover, based on the work of Rajan and Zingales (1995), it is found that firm size is positively associated with the debt/assets ratio due to the larger firm having lower bankruptcy costs. Accordingly, the highly-leveraged firms, in turn, are divided into full-sample firms, large-scale firms and small-scale firms, based on the median of the total assets, and the firms with low levels of leverage are divided in the same way. Specifically, we attempt to examine the impact of a variety of firm sizes on the capital structure. Therefore, we have a total of 14 cases in our empirical study.

Independent Variables

State Ownership and Institutional Ownership

In our study, the state ownership is defined as the proportion of shares owned by the government and the institutional ownership is measured as the ratio of shares owned to outstanding shares by the domestic, foreign, and founding institution investors.

Expected Default Risk

According to the viewpoint of Spanò (2004), because the marketable risk, which include the currency, interest rate or commodity price risks, affects the risk of default, the reason for risk control motivates firm's manager to change financial decisions for the sake of avoiding the costly bankruptcy. Given the relevant, this paper adopts the KMV model to evaluate the default stake and to investigate the variation of debt decision. The model derives the actual probability of default dependent upon the option pricing theory of Black and Scholes (1973) and Merton (1974). It can effectively measure the probability of future bankruptcy.[8] The estimated process involved in deriving the EDF is explained in Appendix.

Other Control Variables

To isolate the effects of both ownerships structure and default risk on firm capital structure, this paper controls some relevant variables. These variables have been shown in other contexts to affect firm capital structure and financial behaviors. Such variables include firm profitability, firm size, growth opportunities, and intangible assets.

Firm Profitability

It is generally assumed that a firm with high earnings might have higher leverage because the firm can obtain a tax-shield gain due to the deductions based on debts. That is, the leverage is positively related to the earnings (Williamson, 1988). However, Myers and Majluf (1984) confirmed the negative relationship and found support for the pecking order hypothesis. More recently researches, Huang and Song (2006), Zou and Xiao (2006), Rao et al. (2007) and Gunasekarage et al. (2007) also found a negative relationship between lending and profitability. In our study, we use the ROA (defined as earnings before tax divided by total assets) as a proxy for profitability to study the relationship with the leverage, and a negative relationship between them is hypothesized.

Firm Size

In views of the bankruptcy cost and credit rating, firm size is expected to have a positive relationship with leverage (see, e.g., Agrawal and Nagarajan, 1999; Booth et al., 2001; Huang and Song, 2006). In addition, from the perspective of asymmetric information, Rajan and Zingales (1995) also argue a positive relationship between firm size and

leverage. Therefore, we define firm size in terms of the natural logarithm of total assets, and a positive relationship is hypothesized in this study based on the empirical results of most of the previous studies.

Growth Opportunities

A high-growth firms might be reluctant to lend more and be inclined to issue equity due to the debt covenants resulting in underinvestment problem.[9] Moreover, from the perspectives of agency cost of debt and the pecking order theory, the growth opportunities are expected to have a negative relationship with the leverage (see, e.g., Huang and Song, 2006; Zou and Xiao, 2006; Booth et al., 2001; Wald, 1999).[10] consequently, this study measure the growth opportunities using the market to book ratio of equity and hypothesize that a high-growth firm should borrow less.

Tangible Assets

The tangible assets can be meant that the firm has a lower probability of default risk. If the statement is true, the lender should have a tendency to lend more, and the agency cost of debt resulting from the increased debt can be reduced because the firm provides enough collateral. In this study, we expect that the tangible assets should be positively associated with leverage (see, e.g., Myers and Majluf, 1984, Harris and Raviv, 1990, Zou and Xiao, 2006). In contrast, because more collateral can decrease the problem of information asymmetry, firms should tend to issue equity. To solve the ambiguous problem, the fixed assets and the inventory together and divide the combined amount by total assets as a proxy for the tangible assets is also examined in our study, and a positive relationship is hypothesized.

Regression Models

As for the independent variables, we include year dummies (DY), profitability (ROA), size (SIZE), growth opportunities (MB), tangibility (TAN), expected default risk (EDF), state ownership (GOVR), and institutional shareholding (INST) in this study. Furthermore, for both the debt/assets ratio and long-term debt/assets ratio, we firstly divide our samples into two sub-samples, namely, full sample firms and high/low-leverage sample firms (based on the median of leverage). The reasons why we divide our sample firms into high/low-leverage firms mainly based on the formal theoretical model, which maximize the firm's value, derived in the paper by Fattouth et al. (2005). They indicated that the impact of determinants (e.g. firm size) on the level of leverage is nonlinearities, arising from asymmetric information. This finding provides us the rationale to separately discuss the highly-leverage firms and firms with low leverage. Another reason that forces us to focus on the highly-leverage firms is the firms with higher leverage usually cause larger possibilities to financial distress. In addition, Ofek (1993) also indicated that high/low-leverage firms respond different in the face of poor performance regarding leverage decision.

This study uses panel data regression, which combines cross sectional and time series data, to study the relationships among capital structure and key variables in Chinese firms. The advantages of panel data over cross-sectional or time series data are that they are capable of studying dynamic behavior and taking individual firm heterogeneity into account, besides increasing the sample size and having more degrees of freedom and more efficiency. In addition, the panel data regression can also increase the variation in the explanatory variables due to larger number of observations included and it can also mitigate or overcome the biases resulting from the omitted variables. The basic regression specification employed is as follows:

$$D_{it}/A_{it} = \sum_{i=02}^{05} \alpha_i DY_i + \beta_0 ROA_{it} + \beta_1 SIZE_{it} + \beta_2 MB_{it} + \beta_3 TAN_{it} + \beta_4 EDF_{it} + \beta_5 GOVR_{it} + \beta_6 INST_{it} + \varepsilon_{it} \quad (1)$$

$$LD_{it}/A_{it} = \sum_{i=02}^{05} \alpha' DY_i + \beta'_0 ROA_{it} + \beta'_1 SIZE_{it} + \beta'_2 MB_{it} + \beta'_3 TAN_{it} + \beta'_4 EDF_{it} + \beta'_5 GOVR_{it} + \beta'_6 INST_{it} + \upsilon_{it} \quad (2)$$

where DY, ROA, SIZE, MB,TAN, EDF, GOVR, INST denote the year dummies, firm performance, firm size, growth opportunities, tangibility, expected default risk, state ownership, and institutional ownership, respectively.

EMPIRICAL RESULTS

We conduct our analysis with the Chinese listed companies over the 2002 to 2005 sample period. In fact, the sample period for which we collect data extends from 2000 to 2005, which allows us to calculate the ROA for the previous three years. When estimating the expected default risk on the basis of market value, it is used to estimate the annual standard deviation of the ROA by the moving window method. After eliminating omission data, there are 767 listed firms included (financial firms are excluded) and all variables used in this study are collected and compiled from the China Stock Market and Accounting Research Database (CSMAR).[11]

Descriptive statistics for the variables are presented in Table 1. As revealed by Table 1, the variance of the leverage ratio is somewhat larger for both the debt/assets ratio and the long-term debt/assets ratio. That is to say, the extent of debt financing differs among Chinese firms. In addition, that the long-term debt/assets ratio is less than the total debt/assets ratio confirms the observation of Chen (2004). In other words, Chinese firms in general do not prefer long-term debt.[12] As for the profitability and growth opportunities, the performance of Chinese firms is quite different due to the large standard deviation observed. In the correlation analysis, we found that profitability and the leverage ratio exhibit a significantly negative relationship. This confirms the pecking order hypothesis. A significant negative correlation between the firm size and leverage ratio is also found, which supports the view of asymmetric information. A significant positive correlation appears between the expected default risk and leverage ratio, which suggests that Chinese firms with higher business risk tend to resort to debt financing. It is also noted that the highly significant correlation (-0.885) between state ownership and institutional ownership could be a potential problem in the regression analysis.

The full-sample results are reported in Table 2 and represent the debt and assets ratio equation and long-term debt and assets equation, respectively. Furthermore, the high and low leverage results are separately shown in Table 3. In Table 2, the entire year dummies are positive and significant at the 5% level, which indicates that the leverage is increasing with each year. However, the phenomenon appears to exist in the firms with a low degree of leverage only, which is evidenced from Tables 4 and 5, in which each Table contains four parts, including the total debt ratio/small-scale firm sample, the total debt ratio/large-scale firm sample, the long-term debt ratio/small-scale firm sample, and the long-term debt ratio/large-scale firm sample. This accordingly might imply that Chinese firms still appear to depend on debt financing even though the capital market in China is gradually maturing.

Regarding profitability, the negatively significant coefficient shown in Table 2 is consistent with the pecking order hypothesis, which is also confirmed in Titman and Wessels (1988), Friend and Lang (1988), Wald (1999), Brailsford et al. (2002), and Huang and Song (2006). However, for the long-term debt part, a profitable firm is predicted to raise more long-term debt. This is consistent with the predictions of

TABLE 1. DESCRIPTIVE STATISTICS

Variables	Mean	S.D.	Min	Max
D/A	0.5369	0.8176	0.0000	43.0754
LD/A	0.3043	0.7956	0.0000	43.0754
ROA	-0.0023	0.2512	-8.7534	0.4570
SIZE	21.2026	0.9311	17.1219	24.7761
MB	3.4338	9.5049	-201.1393	306.1472
TAN	0.3937	0.2005	0.0000	0.9533
EDF	0.0125	0.0847	0.0000	1.0000
GOVR	0.3028	0.2605	0.0000	0.8858
INST	0.2809	0.2557	0.0000	0.8638

Notes: The definitions for each variable are as follows: total debt/assets (D/A),long-term debt/assets (LD/A), profitability (ROA), size (SIZE), growth opportunities (MB), tangibility (TAN), expected default risk (EDF), state ownership (GOVR), and institutional shareholding (INST).

tax-based models, and might suggest that a profitable firm in China usually finances its investment with long-term debt. In order to investigate this in more detail, we move to high/low leverage firm cases in Table 3. The empirical results for the total debt ratio panels are more stable relative to those of the long-term debt ratio panels. For most total debt ratio panels, there are still significant negative signs on the coefficients, but for the long-term debt ratio panels, the signs appear mixed.

For firms with high leverage, there is less debt as they earn more regardless of what the firm's size is. The mixed results occur in the firms with low leverage, in which large-sized firms have less debt as they have more earnings. By contrast, small-sized firms have more long-term debt as they have more earnings. So, for the long-term debt part, we can argue that the positive sign obtained in Table 2 in fact is mainly dominated by the small-scale firms with little leverage. Intuitively, the small-scale firms with little leverage, when faced with markets characterized by high demand, tend to finance their long-term investment projects with debt financing in order to expand their capacity themselves when they have made more profits. Thus we can also say that in China a small-scale firm with low leverage may have a tendency toward more long-term debt due to the incentive to have a tax shield, but that this is not the case with a large-scale firm.

TABLE 2. THE REGRESSIVE RESULTS FROM TOTAL LIABILITY AND LONG-TERM DEBT IN FULL SAMPLE

Variables	Total Debt	Long Term Debt
DY_{02}	0.0719**	0.0499
	(0.0320)	(0.0315)
DY_{03}	0.1472***	0.0998***
	(0.0334)	(0.0328)
DY_{04}	0.1942***	0.1339***
	(0.0351)	(0.0346)
DY_{05}	0.2751***	0.1951***
	(0.0367)	(0.0361)
ROA_{it}	-0.1658***	0.1892***
	(0.0622)	(0.0612)
$SIZE_{it}$	-0.5169***	-0.3997***
	(0.0518)	(0.0510)
MB_{it}	-0.0012	0.0012
	(0.0012)	(0.0012)
TAN_{it}	-0.2100	-0.1063
	(0.1561)	(0.1537)
EDF_{it}	1.6838***	1.4746***
	(0.2033)	(0.2003)
$GOVR_{it}$	-0.4538	-0.4321
	(0.3570)	(0.3517)
$INST_{it}$	-0.4475	-0.4283
	(0.3492)	(0.3440)
R sq. adj.	0.4266	0.4123
Numbers	767	

** *Significant at eht 5 percent level.*
*** *Significant at eht 1 percent level.*
Notes: The estimated standard errors are shown in the parentheses, and the Hausman test indicates that the fixed effect prevails.

TABLE 3. THE REGRESSIVE RESULTS FROM HIGH- AND LOW- LEVERAGE IN FULL SAMPLE

	High Leverage		Low Leverage	
Variables	Total Liability	Long Term Debt	Total Liability	Long Term Debt
DY_{02}	-0.0048	-0.0069	0.1200***	0.0814
	(0.0059)	(0.0062)	(0.0512)	(0.0508)
DY_{03}	-0.0221***	-0.0288***	0.2635***	0.1786***
	(0.0061)	(0.0064)	(0.0538)	(0.0534)
DY_{04}	-0.0297***	-0.0397***	0.3456***	0.2374***
	(0.0065)	(0.0068)	(0.0567)	(0.0563)
DY_{05}	-0.0357***	-0.0393***	0.4784***	0.3404***
	(0.0067)	(0.0071)	(0.0594)	(0.0590)
ROA_{it}	-0.4934***	-0.5437***	-0.1555*	0.2123***
	(0.0382)	(0.0401)	(0.0794)	(0.0788)
$SIZE_{it}$	0.1503***	0.2329***	-0.8120***	-0.6164***
	(0.0119)	(0.0125)	(0.0762)	(0.0755)
MB_{it}	0.0005	0.0010	-0.0007	0.0018
	(0.0006)	(0.0006)	(0.0016)	(0.0015)
TAN_{it}	0.0557	0.0361	-0.3597	-0.2270
	(0.0297)	(0.0312)	(0.2458)	(0.2439)
EDF_{it}	0.5512***	0.6906***	1.3420***	1.2529***
	(0.1889)	((0.1982)	(0.2636)	(0.2615)
$GOVR_{it}$	0.2929***	0.4763***	-1.0162	-0.8803
	(0.0632)	(0.0663)	(0.5889)	(0.5842)
$INST_{it}$	0.3459***	0.5712***	-1.1403	-0.9482
	(0.0610)	(0.0640)	(0.5823)	(0.5777)
R sq. adj.	0.8697	0.7390	0.4200	0.4030
Numbers	296	296	471	471

** *Significant at eht 5 percent level.*

*** *Significant at eht 1 percent level.*

Notes: The estimated standard errors are shown in the parentheses, and the Hausman test indicates that the fixed effect prevails.

The negative sign with regard to the size of the firm is different from that in most earlier studies such as Agrawal and Nagarajan (1999), Booth et al. (2001), and Huang and Song (2006). However, finance theories also predict the negative sign in regard to size based on the concept of asymmetric information. A larger firm should reveal more information to the general investors (outside investors) and hence the firms' financial statements will tend to be more transparent. Consequently, a larger firm should use more debt financing (Rajan and Zingales, 1995). It is, nonetheless, found that a significant positive sign appears in the case of the highly-leveraged firms, which meets the bankruptcy cost hypothesis and is confirmed by Agrawal and Nagarajan (1999), Booth et al. (2001), and Huang and Song (2006). The new finding from our study is that the

bankruptcy cost hypothesis only holds for most highly-leveraged firms and large-scale firms with low levels of leverage.

As for growth opportunities and tangibility, no significant coefficients are found in Table 2, a result which is similar to the finding in regard to tangibility in Huang and Song (2006). It seems that the Chinese firms' capital structure is not affected by growth opportunities and tangibility. However, as we switch to the sub-sample results in Tables 4 and 5, growth opportunities seldom have a significant effect on the leverage except for a positive sign on the large-scale firms with low levels of leverage and firms with high levels of leverage, which is consistent with the finding of Kester (1986), but is contrary to the finding of Huang and Song (2006) as well as Zou and Xiao (2006). In our study, as for tangibility, most large-scale firms account for the positive effect, especially for the firms with low leverage. We thus conclude that the positive effect observed in most of the earlier studies, such as Myers and Majluf (1984), and Harris and Raviv (1990), is only observed in the large-sized firms. As for growth opportunities, the positive effect found here might result from the inefficiency on the Chinese stock market and thereby have more information asymmetry exists between outside investors and managers and hence use more debt and issue less equity. Tangibility effect is rather mixed. The only consistent result found in our study is the positive effect of large firms with low leverage. This finding support the agency cost of debt. Our findings suggest that Chinese firms do not support the pecking order hypothesis for growth opportunities but support the asymmetric information.

With regard to the impact of the expected default risk, a positive sign prevails on the expected default risk coefficient in almost all sample cases. This might imply that the higher the default probability, the higher will be the leverage (this is confirmed by the positive correlation coefficient). We find the positive effect is found in the small firms with high leverage and large firms with low leverage. This finding is consistent with that of Hsia (1981), but is contrary to the work of Huang and Song. It should be noted that Chinese firms have this sole characteristic, which is hardly ever found in other countries including developing countries.

As for state ownership and institutional ownership in terms of the full sample, no significant impact is found on the capital structure, which is consistent with the finding of Huang and Song (2006) as well as Zou and Xiao (2006). However, when we switch to the highly-leveraged firms, all of the institutional ownership appears to be highly positively significant at the 1% level regardless of the full sample firms or sub-sample firms. As for the firms with low levels of leverage, only in large-scale firms does the institutional ownership appear to have a significantly positive impact on the leverage decision. In general, people do believe that the more a firm's share is owned by the institutions, the better credit or performance the firm has (McConnell and Servaes, 1990; Pound, 1991). It would probably be helpful for firms to borrow more from bond markets or financial institutions. As for state ownership, we also find that this variable has a positive impact on the leverage of highly-leveraged firms regardless of whether they are full-sample firms or sub-sample firms.

On the contrary, for the firms with low levels of leverage, only large scale firms appear to have a highly significant positive impact on the total debt ratio. This finding is consistent with that of Berger et al. (1997), which indicates that Chinese firms that are large in size have a tendency to reduce their agency cost of equity by raising more debt. This implies that either a high degree of state ownership or institutional ownership can help to advance the leverage capacity of firms through both the guarantee provided by the government and increased monitoring on the part of institutional investors. For these two factors, we discover that the impact of the state ownership as well as institutional ownership on the leverage is mostly felt by the highly-leveraged firms, and hence we experience a measure of success in solving the puzzle that has existed in the studies by Huang and Song as well as Zou and Xiao.

TABLE 4. THE REGRESSIVE RESULTS FROM LARGE- AND SMALL- FIRMS IN THE GROUP OF HIGH LEVERAGE

	Total Liability		Long Term Debt	
Variables	Large firms	Small firms	Large firms	Small firms
DY_{02}	0.0056 (0.0070)	0.0019 (0.0102)	0.0112 (0.0067)	0.0019 (0.0097)
DY_{03}	-0.0141 (0.0078)	-0.0142 (0.0102)	0.0061 (0.0075)	-0.0196** (0.0098)
DY_{04}	-0.0108 (0.0090)	-0.0284*** (0.0104)	0.0105 (0.0086)	-0.0278*** (0.0100)
DY_{05}	-0.0097 (0.0097)	-0.0191 (0.0109)	0.0059 (0.0094)	-0.0257*** (0.0104)
ROA_{it}	-0.8083*** (0.0697)	-0.4248*** (0.0553)	-0.6263*** (0.0671)	-0.3840*** (0.0530)
$SIZE_{it}$	0.2383*** (0.0142)	0.2589*** (0.0213)	0.1465*** (0.0137)	0.1713*** (0.0204)
MB_{it}	0.0298*** (0.0027)	0.0005 (0.0007)	0.0274*** (0.0026)	0.0002*** (0.0006)
TAN_{it}	0.0595 (0.0378)	0.0648 (0.0468)	0.0417 (0.0363)	0.1056** (0.0448)
EDF_{it}	0.0063 (0.1928)	1.7994*** (0.3799)	-0.1873 (0.1853)	1.8030*** (0.3637)
$GOVR_{it}$	0.2589*** (0.0578)	1.0616*** (0.1868)	0.1022 (0.0555)	0.7161*** (0.1788)
$INST_{it}$	0.3434*** (0.0550)	1.1774*** (0.1885)	0.1597*** (0.0529)	0.7690*** (0.1805)
R sq. adj.	0.7934	0.7420	0.9035	0.8608
Numbers	158	138	158	138

** *Significant at eht 5 percent level.*

*** *Significant at eht 1 percent level.*

Notes: The estimated standard errors are shown in the parentheses, and the Hausman test indicates that the fixed effect prevails.

TABLE 5. THE EMPIRICAL RESULTS FROM LARGE- AND SMALL- FIRMS IN THE GROUP OF LOW LEVERAGE

	Total Debt		Long Term Debt	
Variables	Large firms	Small firms	Large firms	Small firms
DY_{02}	0.0093 (0.0049)	0.1607 (0.1195)	-0.0050 (0.0055)	0.1123 (0.1211)
DY_{03}	0.0223*** (0.0054)	0.3343*** (0.1223)	0.0017 (0.0061)	0.2194 (0.1240)
DY_{04}	0.0271*** (0.0060)	0.3767*** (0.1237)	0.0005 (0.0068)	0.2502** (0.1254)
DY_{05}	0.0445*** (0.0067)	0.5242*** (0.1275)	-2.8E-06 (0.0075)	0.3811*** (0.1293)
ROA_{it}	-0.5964*** (0.0429)	-0.0592 (0.1220)	-0.3471*** (0.0484)	0.2889*** (0.1237)
$SIZE_{it}$	0.1668*** (0.0081)	-1.9860*** (0.1770)	0.1177*** (0.0091)	-1.5017*** (0.1794)
MB_{it}	0.0034*** (0.0008)	0.0005 (0.0024)	0.0014 (0.0009)	0.0028 (0.0024)
TAN_{it}	0.1106*** (0.0255)	-1.1829** (0.5150)	0.1793*** (0.0288)	-0.8922 (0.5220)
EDF_{it}	0.4780*** (0.0674)	0.6676 (0.4251)	0.3586*** (0.0761)	0.7515 (0.4309)
$GOVR_{it}$	0.2489*** (0.0439)	-3.0405 (4.7846)	0.0734 (0.0496)	-2.1528 (4.8499)
$INST_{it}$	0.2773*** (0.0435)	-3.1102 (4.8118)	0.0967** (0.0491)	-2.0916 (4.8775)
R sq. adj.	0.8328	0.4641	0.9463	0.4064
Numbers	280	191	280	191

*** Significant at eht 5 percent level.*

**** Significant at eht 1 percent level.*

Notes: The estimated standard errors are shown in the parentheses, and the Hausman test indicates that the fixed effect prevails.

To sum up, as for the effect of profitability on the firm's leverage, we answer the puzzle in the previous literature. Specifically, the tax shield hypothesis only holds in the case of the long-term debt ratio of firms with low levels of leverage that are small in size whereas the highly-leveraged firms go counter to the tax shield hypothesis while being supported by the pecking order hypothesis. As for the size effect, a new finding in our study is that the bankruptcy cost hypothesis only holds for most highly-leveraged firms, and only large-scale firms that have low levels of leverage. As regards the growth

opportunities, our findings suggest that Chinese firms do not support the pecking order hypothesis. Moreover, we also find that the higher the expected default risk, the more leverage that will exist in Chinese firms. This finding is contrary to the work of Huang and Song (2006) as well as Zou and Xiao (2006), which also examine the Chinese firms' capital structures. In addition, we succeed in finding that the effects of state ownership and institutional ownership on the leverage of firms are mostly felt only in the cases of the highly-leveraged firms. As for leverage choices, the impacts of determinants on high/low leverage firms are divergent, which is consistent with predictions based on the theoretical model in the Fattouth et al. (2005).

CONCLUSIONS

This paper aims to examine that the impact of state ownership as well as institutional ownership on the leverage decision in Chinese listed companies. Our results show that the effects are only significant in the case of large-sized firms. In addition, a positively significant relationship is found between expected default risk and the debt/assets ratio, a finding rarely observed in other studies. Why do Chinese firms have this special characteristic? It is probably because the government is still the controlling shareholder in most Chinese firms. An over-investment or an investment with negative net returns based on debt financing might arise due to the forgetfulness of the controlling shareholder in monitoring the managers.[13] Consequently, the firms might take a chance on a highly-risky investment or a bad investment, and as a result experience a loss of assets. Moreover, our results also confirm that a Chinese firm with high expected default risk is usually highly-leveraged. The credit rating might not be closing to the threshold of an upgrade or a downgrade. In particular, large firms with highly-leveraged firms tend to have a more debt financing and highly-leveraged firms usually reduce their debt ratio when they make more money.

Several policy implications may be derived from our empirical results. Firstly, the firms with highly leverage are generally vulnerable to financial distress or economic shocks, then in an attempt to reduce debt ratios becomes a goal of China industry policy. In so doing, the first target should be the firms with small scale, but for those highly leverage firms, large size firms become first priority instead. In addition, a highly leverage firm with low earnings could be another target as the firm tends to have higher leverage. The firms with highly state ownership or highly institutional ownership have a propensity towards using high leverage. In an attempt to reduce the degrees of leverage, the firms with highly state ownership or highly institutional ownership should also be considered as a target when the government makes related policies.

ENDNOTES

[1] Notice that a higher degree of leverage might give rise to a higher agency cost of debt.

[2] The models used in Bradley et al. (1984), Diamond (1989), Chang (1999), and Stulz (1990) are based on the static trade-off model, whereas Brennan and Kraus (1987), Narayanan (1988), and Heinkel and Zechner (1990) follow the pecking order model proposed by Myers and Majluf (1984).

[3] The static trade-off model predicts the trade-off between benefits and costs debt financing. The costs of debt financing include bankruptcy costs and agency costs of debt and the benefits of debt financing consist of tax-shield gain and effective monitoring on the managers resulting in decreases in agent costs (Zou and Xiao, 2006; Myers, 1977). The pecking order hypothesis argues that the higher asymmetry information, the higher agency costs of equity.

[4] The standard deviation, by definition, includes positive and negative volatility effects. From the viewpoint of risk, the negative shock should be more of a concern than a positive one. Moreover, the standard deviation accounts for total risk, but the expected default risk is in response to

financial risk.

[5] As for measuring the expected default risk, Altman (1968), Ohlson (1980) and Altman et al. (1994) have previously used discriminant analysis, the logit model, and the neural network model, respectively.

[6] It is, nonetheless, note that the standard deviation of earnings used in Huang and Song (2006) as well as Zou and Xiao (2006) rather than expected default risk.

[7] The correlation coefficient between the debt/assets ratio (the long term debt/assets ratio) and default risk is 0.481 (0.335) at the 1% significance level.

[8] Bharath and Shumway (2004) suggested the use of the option pricing model, incorporating the volatility of the firms' assets, as a better approach to forecasting the financial risk of a firm. Hao (2006) found that the standard call-option approach significantly out-performed the other models, whilst Hillegeist et al. (2004) further demonstrated that the market-based model was capable of providing more information than the accounting-based model.

[9] Another reason for a negative relation arises from the asset substitution effect (Titman and Wessels, 1988).

[10] For a firm lacking investment opportunities, debt financing can prevent managers from engaging in privileged consumption.

[11] In China, to date, tradable shares comprise about 60% of shares of Chinese-listed firms. Furthermore, the percentage of tradable shares is still going up over time. In other words, the number of tradable shares is increasing.

[12] Zou and Xiao (2006) indicated that three reasons of lower in the long-term debt ratio in China. One of the reasons is to decrease credit risk for banks.

[13] The debt financing arises mainly from the banking rather than the bond market due to the immature bond market in China.

APPENDIX

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.

$$\frac{dV_A^t}{V_A^t} = udt + \sigma_A dZ_t \qquad (1)$$

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 σ_A is the volatility of the asset returns. Thus, we can state the above equation in accordance with the option pricing model as follows:

$$V_E = V_A N(d_1) - Xe^{-r_f t} N(d_2) \quad (2)$$

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

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

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; σ_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; rf is the one-year risk-free rate in the central bank of China; N(d1) expresses the hedging ratio with a cumulative probability density function; N(d2) 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 σ_A, can be calculated from Equations (2) and (4). 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:

$$DD = \frac{\ln\left(\frac{V_A}{X}\right) - \ln\left(u - \frac{\sigma_A^2}{2}\right)t}{\sigma_A \sqrt{t}} \quad (5)$$

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:

$$EDF_t = P\left[r_A^t \leq X_A^0 \right] = P\left[r_A^t \leq V\right] \quad (6)$$

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

$$\ln V_A^t = \ln V_A^0 + (u - \frac{\sigma_A^2}{2})t + \sigma\sqrt{t}\varepsilon \quad (7)$$

where ε denotes a random factor of asset returns.

We replace Equation (7) into Equation (6) after hypothesizing that the asset returns follow normal distribution. After arranging the related term, we obtain the default

probability EDF_t, as follows:

$$EDF_t = Pr\left[V_A^t \le X_t \middle| V_A^0 = V_A\right]$$

$$= Pr\left[\ln V_A^0 + \left(r - \frac{\sigma_A^2}{2}\right)t + \sigma\sqrt{t}\,Z_t \le \ln X_t\right]$$

$$= Pr\left[Z_t \le -\frac{\ln\left[\frac{V_A^0}{X_t}\right] + \left[r - \frac{\sigma_A^2}{2}\right]t}{\sigma\sqrt{t}}\right]$$

$$= N(-d_2) \qquad (8)$$

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