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Determinants of Capital Structure in Chinese SMEs: Empirical Evidence from Company Panel Data

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Abstract

Although Chinese government has implemented a series of policies for improving the financial environment of small and medium-sized enterprises (SMEs) accessing external funds, to date, it is still unclear what factors determine the capital structure of Chinese SMEs. To address this issue, this paper investigates the relationship between firm characteristics and leverage for a sample of listed SMEs. Using by far the largest and latest panel data sets obtained from the Shenzhen Stock Exchange (SZSE) SMEs board, we find that the capital structure is positively related to tax rate, operating risk, profitability, growth opportunity, size, and tangibility. Asset specificity and state seem to have no significant impact on the leverage of Chinese SMEs.

Keywords: *SMEs, capital structure, leverage, debt ratio, debt finance, China*

1 Introduction

Small and medium-sized enterprises (SMEs) represent the vast majority of the population of firms in both developed, and developing countries and China is no exception. For example, the European Commission (2002) shows that 99.8% of European firms (around 20.5 million) are SMEs with 80.8 million employees (66% of the total European employment). In compared, according to the recent statistics, China's SMEs account for more than 98% of the total quantity and contribute 60% of the country's GDP, meanwhile 75% of the new products and 85% of the new employment are also from the SMEs[1]. Therefore, it can be argued that SMEs are the main engine of China's economic success (Chen, Firth & Rui, 1998; Allen, Qian & Qian, 2005), which has become the largest emerging market and the second largest economy in the world.

Despite their vitally significant role in China's economic development, a lack of appropriate external financing channels has become the major constraint in their own development (Shen, Xu & Bai, 2009), in particular for those of non-state owned firms. In response to this problem, the Chinese government has implemented a series of policies to improve the financial environment. However, to date, it is unclear that what factors affect Chinese SMEs' financing decisions. Solving this problem might

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See: http://finance.sina.com.cn/hy/20120426/100211929864.shtml

help to improve the financial environment smoothly. Therefore, understanding the determinants of SMEs' financing decisions in China is vitally important not only for academia but also for policy-makers. Accordingly, the primary objective of this study is to answer what motivates a SME to choose the uses of debt capital (i.e., the determinants of capital structure).

The earliest theoretical framework about corporate capital structure can be tracked back to the seminar work of Modigliani and Miller (1958) who first proposed the classic MM-Irrelevant theory asserting that firm value is independent of its capital structure in a non-fractions (e.g., no tax claims and no transaction costs) financial market. After that, several different different theories have been developed explaining the firms' financing decisions, including the trade-off theory (Modigliani & Miller, 1963; Miller, 1977), the agency cost theory (Jensen & Meckling, 1976), the signalling theory (Ross, 1977); the pecking order theory (Myers & Majluf, 1984), and the equity market timing theory (Baker & Wurgler, 2002). Based on these theories, studies in recent years suggest capital structure has been influenced by a set of firm level characteristics, such as tax rate, size, profitability, growth opportunities, financial risk, asset specificity, tangibility, ownership structure and so on.

However, both theoretical and empirical studies has focused on industrialised countries with limited attention to emerging markets (Chang, Chen & Liao, 2014; Chen, Jiang & Lin, 2014). Furthermore, the existing literature primarily focuses on the financial decisions of large companies relatively to those for SMEs, especially in developing countries. In the words of Zingales (2000), "*Empirically, the emphasis on large companies has led us to ignore (or study less than necessary) the rest of the universe: the young and small firms, who do not have access to public markets*".

To fulfil the research gap and enrich our understanding that how the factors that have been identifies from the previous studies in developed countries and large firms impact on firm capital structure in developing countries, this study employs a panel data set of 297 SMEs listed in China Shenzhen stock market over the period 2009 – 2013. Our results show that tax rate, firm risk, profitability, growth opportunity, size, and tangibility are joint determinants of Chinese SMEs' capita structure.

The rest of this paper is structured as follows: Section 2 contains the literature review and discusses hypotheses. Section 3 describes data and methodology. Section 4 reports the descriptive statistics and empirical results and Section 5 provides our conclusion.

2 Literature Review and Hypotheses

As aforementioned, based on a series of theories, previous empirical studies have shown that tax rate, firm risk, profitability, growth opportunities, size, asset specificity, tangibility, ownership; and so on play significant roles in shaping debt financing decisions. In what follows, we briefly review the results of previous research literature relating to the above factors, propose our hypotheses, and discuss how we will measure these variables. The summarized descriptions of these variables are provided in Table I.

Tax Rate

Previous researchers identify tax rate as an important factor on influencing companies' capital structure (Huang & Song, 2006). The impact of tax on capital structure is also the main theme of study by Modigliani and Miller (1958). Trade-off theory suggests that firms with high tax rates should use more debt financing because high tax rates is recognized as a mechanism of decreasing income payment for the authorities (also known as tax-shield). As a result, as increasing of a firms' tax rate, the more tax-shield gain will be obtained by the firm. However, many prior studies fail to find the significant tax effects firm financing behaviour (Makie-Mason, 1990). He also concludes that the reason of failure is the debt-equity ratios are cumulative of firm's separate decisions, and tax-shields might have a negligible effect on the marginal tax rate for most companies. After using discrete choice analysis and focus on the effect of taxes upon the debt-equity choice conditional on going public, he finds that tax rate is positively related to debt financing. Consistent with the trade-off theories, existing Chinese studies in terms of large size firms (e.g., Chen, 2004; Huang & Song, 2006; Chang et al., 2006) have revealed that non-debt tax-shields to be negatively related to debt ratio.

For small size firms, the above augment might be unsuitable as discussed by Pettit and Singer (1985) that smaller sized enterprises tend to be less profitable and use less tax-shields than large firms. In addition, they argue that using high leverage can greater potential for firm bankruptcy, particular for those of small business. Consequently, the potential higher bankruptcy costs as well as lower tax benefits work in the direction of reducing debt ratio for small business. However, this case is not applicable for Chinese listed SMEs since the protection will be provided by the authorities when they go into bankruptcy. Based on previous findings and theoretical arguments, we propose the following hypothesis:

Hypothesis 1 ***(H1):*** There is a positive relationship between tax rate and leverage of Chinese SMEs.

In this study, tax rate is defined as the corporate practical tax rate which is compulsory to report in firms' annual reports.

Firm Risk

Firms with high operating risk tend to have high probability of financial distress and volatile cash flows. Therefore, the higher risk of a firm, the more likely the firm will be exposed to costs of financial distress. According to trade-off theory, risky firms are expected to be negatively related with debt financing. By contrast, the pecking order theory predicts that risky firms tend to borrow more due to adverse selection effect. The empirical evidence on the relationship between leverage and firm risk shows a mixed result. Using a sample of firms in developed countries, several studies (e.g., Cassar & Holmes, 2003; Frank & Goyal, 2009) find a negative relationship between firm risk and leverage, supporting for the trade-off theory. By contrast, Jordan, Lowe and Taylor (1998) and Michaelas, Chittenden and Poutziouris (1999) observe that firm risk is positive related to leverage in context of UK SMEs.

Likewise, prior studies in China also report in consistent results. For example, Chen (2004) finds that firm risk is negatively related to leverage. Qian, Tian and Wirjanto (2009) report a positive relationship between firm risk and leverage. Interestingly, Chang et al. (2014) show that the relationship between firm risk and leverage remains positive for SOEs, whereas it becomes negative for non-SOEs. In this study, we use the Altman's Z-score (China version obtained from Altman, Zhang & Yen, 2007) to measure firm financial distress potential (RISK). Higher Z-score indicates lower firm potential financial distress. Given these inconsistent findings and theoretical frameworks, we present the following hypotheses:

Hypothesis 2a *(H2a):* There is a positive relationship between Z-score and leverage of Chinese SMEs.
Hypothesis 2b *(H2b):* There is a negative relationship between Z-score and leverage of Chinese SMEs.

Probability

Theoretical disagreement exists regarding the relationship between firm leverage and profitability. Trade-off theory suggests that profitable firm should use more debt financing because they have greater needs to shield income from firm tax. In this case, the relationship between profitability and leverage is positive. Align with this prediction, agency-based frameworks argue that profitable firms need higher leverage to restrain management discretion because they tend to have severe free cash-flow problems and debt can be deemed as a mechanism of disciplining to ensure managers

align their interests with owners (Jensen, 1986; Williamson, 1988). In contrast, pecking order theory suggests a contrary result that profitable firms tend to use less debt because they will use internal funds to support investment firstly and then move to external financing funds only if necessary.

Most empirical findings support a negative relationship between leverage and profitability in both developed countries (e.g., Friend & Lang, 1998; Titman & Wessels, 1988; Harris & Raviv, 1991; Rajan & Zingales, 1995) and emerging markets (e.g., Wiwattanakantang, 1999; Booth, Aivazian, Demirguc-Kunt & Maksimovic, 2001). Existing studies in China also show a robust negative relation between leverage and profitability (Chang et al., 2014). In this study, we disagree with the prediction derived from the trade-off theoretical framework and agency-based models for following two reasons. First, compared to large firms, SMEs in China have difficulty in obtaining external funds as we mentioned above. Second, Chinese SMEs' managers are usually the owners. They may be more likely to use internal funds to finance investment in order to avoid disciplining from banks. Hence, we propose the following hypothesis:

Hypothesis 3 ***(H3):*** Profitability should be negatively related to leverage of Chinese SMEs.

In this study, profitability is defined as operating profits scaled by net sales.

Growth Opportunity

Theoretical models generally predict a negative relationship between leverage and growth opportunities. Firms with high growth opportunities are less likely to suffer free cash-flow problems but tend to have high financial distress cost of debt. Trade-off theory asserts that firms with high growth opportunities should use less debt. The agency theoretical framework also suggests that firm leverage decreases with growth opportunities. Myers (1977) argue that high-growth firms may hold more options for future investment than those of low-growth firms. If high-growth firms need equity financing to exercise these options in the future, a firm with outstanding debt might pass up this opportunity because such as investment can effectively transfer wealth from the firm's owners to its debtholders.

Most of empirical research predominately supports the above theoretical arguments (Huang & Song, 2006). However, the several empirical findings in China show that growth opportunities are positively related to firm leverage (e.g., Chen, 2004; Tong & Green, 2005). The possible explanation is that Chinese firms with high growth opportunities may not be able to raise adequate equity fund to finance their investment because of the strict constraints of the Chinese authorities on equity issuance (Chang et

al., 2014). In addition, Myers (1977) argues that the agency problem can be mitigated if the firms use short-term rather than long-term debt. Thus, rapidly growth firms tend to fund their project through borrowing. In this study, we agree these arguments and present the following hypothesis:

Hypothesis 4 ***(H4):*** There is a positive relationship between growth opportunity and leverage of Chinese SMEs.

Following prior studies, we use Tobin's Q to measure growth opportunities of Chinese SMEs. Adam and Goyal (2008) argue that the Tobin's Q is the most reliable proxy in the US in terms of measuring firm growth opportunities. Huang and Song (2006) point out that Tobin's Q is the better proxy of future growth opportunities than others including sales growth, capital expenditure scaled by total assets, and research and development scaled by sales.

Firm Size

Both theoretical and empirical research has shown that there is a positive relationship between leverage and size. Compared to small firms, large firms tend to be more diversified and have stable cash flows, as a result their probability of financial distress and bankruptcy is small. In addition, large firms might also be able to take advantage of economies of scales in issuing debt, and even have bargaining power over lenders (Marsh, 1982; Huang & Song, 2006). Thus, the cost of issuing debt and equity is decreasing as firm size increasing. According to the trade-off theory, large firms should borrow more compared with small firms. Moreover, size may represent the information that outside investors have (Huang & Song, 2006). Fama and Jensen (1983) asset that large firms tend to supply more information to creditors than those of smaller firms. Myers and Majluf (1984) argue that small firms are more likely to have severe information asymmetries between owners and lenders. As a result, small firms are more difficulty to access external financing funds.

Both above arguments suggest that firm size should be positively related with leverage. Consistent with this prediction, most empirical studies in the US and China have shown that large firms are more likely to have higher leverage (Chang et al., 2014). Accordingly, we hypothesize that:

Hypothesis 5 ***(H5)***: There is a positive relationship between firm size and leverage of Chinese SMEs.

In this study, the firm size is measured by the natural logarithm of book values of total assets.

Nature of assets

Theoretical models generally state that tangibility should be positively related to leverage. According to the theory of financial distress, if a firm has a high proportion of tangible assets, it will use more debt financing than a firm with high percentage of intangible assets, because the former can lead to lower costs of financial distress in terms of bankruptcy. While, intangible assets tend to lose value if financial distress occurs. Agency theory also predict a positive relationship between tangibility and leverage. Jensen and Meckling (1976) point out that the issuance of debt may arise agency cost of debt as the firm shift to risker investment, and transfer wealth from debt-lenders to owners to exploit the option nature of equity. However, if a firm has high proportion of tangible assets, then these assets can be used as collateral, thus reducing the creditors' risk of suffering such agency cost.

Many previous empirical studies also have shown a positive relationship between tangibility and capital structure. For instance, using a sample of SMEs, Jordan et al. (1998) and Michaelas et al. (1999) find that SMEs with high tangibility also tend to borrow more. In contrast, prior empirical research of capital structure in context of Chinese firms have not report a consistent relationship (Chang et al., 2014). In terms of cases of Chinese SMEs, we propose that, compared to large size firms, the agency problem and asymmetric information are more pronounced, so collateral requirements become mandatory for SMEs seeking loans. If the SMEs have higher proportion of tangible assets with a high collateral value, then it is easier to obtain external funds. In this study, tangibility is measured as fixed assets scaled by total assets. We also include the asset specificity in the model, because firms producing unique products have high distress costs (Chang et al., 2014) and their tangle assets tend to have lower value due to the difficulty in disposing the assets. Since Chinese firms typically do not disclose research and development expenses, we use capital costs divided by total number of employees to measure asset specificity. Accordingly, we propose the following hypotheses:

Hypothesis 6 ***(H6):*** There is a positive relationship between tangibility and leverage of Chinese SMEs.

Hypothesis 7 ***(H7):*** There is a negative relationship between asset specificity and leverage of Chinese SMEs.

Ownership

For the majority of Chinese listed companies, an ultimate controlling shareholder exists. State-owned enterprises (SOEs) can more easily obtain financing sources, in particular bank loans, and support (e.g., subsidies). Easier access to bank loans can

lead to higher leverage. Although the high leverage may result in high financial distress potential, protection will be offered by the government to prohibit bankruptcy. In contrast, private firms have been facing severe financing problems since more bank loan resources are concentrated on SOEs (Bhattacharjee & Han, 2014). Consequently, SOEs in China tend to high levels of debt ratio. Consistent with this prediction, Qian et al. (2009), Li, Yue & Zhao (2009) find that the percentage holdings of SOEs exert a positive effect on leverage. However, SOEs may also face fewer constraints in equity issuance, thus can receive special treatments when applying for seasoned equity financing (Chang et al., 2014). Such a priority thus leading SOEs to borrowing less. In line with this argument, Firth, Lin & Wong (2008) and Chang et al. (2014) report a negative relationship between the dummy of SOE and leverage. To control for this state influence, we also add such a dummy variable that is 1 if a SME's ultimate owner is the government. Based on the two contradict arguments, we therefore present the following hypotheses:

Hypothesis 8a *(H8a):* There is a positive relationship between the state-control dummy and leverage of Chinese SMEs.

Hypothesis 8b *(H8b):* There is a negative relationship between the state-control dummy and leverage of Chinese SMEs.

Table 1 Variable definitions

Variables	Exp. sign	Definition
Dependent variable Leverage (DR)		Book leverage, is defined in terms of debt ratio and calculated as the book value of total debt divided by the book value of total assets
Explanatory variables Tax rate (*TAX*)	+	Official tax rate, reported in firm's year-book compulsorily
Firm risk (*RISK*)	+/–	China version of the Altman's z-score, based on Altman *et al*., (2007): $z = 0.517 - 0.460X_1 + 0.320X_2 + 0.388X_3 + 1.158X_4$ where $X_1 X_1$ is the total liabilities to total assets, $X_2 X_2$ is the ratio of net profit to total assets, $X_3 X_3$ is the ratio of working capital to total assets, and $X_4 X_4$ is the ratio of retained earnings to total assets.
Profitability (PROF)	–	Return on assets, calculated as operating profit divided by total assets
Growth opportunity (*GROWTH*)	+	Tobin's Q, calculated as the sum of book value of total liabilities and market value of equity divided by book value of total assets
Firm size (*SIZE*)	+	The natural logarithm of total assets at the end of year
Tangibility (*TANG*)	+	Tangibility, calculated as fixed assets divided by total assets
Asset specificity (*SPEC*)	–	Firm uniqueness, calculated as total capital costs divided by total number of employees
Ownership (STATE)	+/–	A dummy variable equals 1 if a firm is ultimately controlled by the government

3 Data and Methodology

Data Description

Our sample consisted of the firms listed on the Shenzhen Stock Exchanges SMEs Board between 2009 and 2013. We excluded firms in the finance industry from our total population because in general these firms have an extremely different structure of balance sheet in comparison with those non-financial firms. We also omit firms with special treatment (flagged with ST and *ST) status from our sample. ST and *ST firms are those that have financial or operational problem which may contaminate the results given the financial or operational trouble. The data were obtained and computed from the firms' annual reports. Data of share prices were collected from SINA Finance (http://vip.stock.finance.sina.com.cn/mkt/). Thus, the final sample, after considering any missing data, consists of a balanced panel of 297 firms with a total of 1,485 firm-year observations.

Table 2 of Panel B presents the distribution of the sample firms. According to industrial classification criteria that is obtained from SZSE[2], we divide our dataset into 11 different industries. As can be seen from the table, the manufacturing industry accounts for most of the sample, while the remaining industries together make up less than 22%.

Table 2 Sample selection

Panel A: Sample selection			
All firms in SZSE SMEs Board by the end of 2013	701		
Firms in the financial sector	(3)		
Firms flagged with ST and *ST firms	(6)		
Firms for which at least one year annual report are unavailable	(374)		
Firms for which data required in our analyses are unavailable	(21)		
Total number of sample firms	297		
Panel B: Industry classification			
Industry type	**Industry code**	**No. of firms**	**Percentage**
Agriculture, forestry, hunting and fishing	A	5	1.68%
Mining	B	3	1.00%
Manufacturing	C	232	78.11%
Utilities	D	2	0.67%
Construction	E	11	3.70%
Transportation	F	2	0.67%
IT	G	18	6.06%
Wholesale and retail	H	6	2.02%
Real estate	I	7	2.36%
Services	J	10	3.37%
Conglomerates	K	1	0.34%
Total		297	100%

2 http://www.szse.cn/main/files/2013/01/04/831350853137.html.

This table reports the sample selection procedure. The industrial classification criteria is obtained from SZSE.

Methodology

In this study, we employed panel data procedures to test the hypotheses formulated above. Hsino (1986) and Baltagi (1995) suggest several major advantage for using panel datasets for economic and financial research over cross-sectional and time-series datasets. First, the use of panel data increases the sample size considerably, thus increasing the degree of freedom, and diminishing the co-linearity among independent variables. Consequently, it improves the efficiency of econometric estimates. Second, panel data is more appropriate to study the dynamics of change. In order to estimate the influence of explanatory variables on leverage, we applied three estimation models, namely, pooled ordinary least squares (OLS), fixed effects (FE), and random effects (RE). The RE model estimates the coefficients under the assumption that the individuals or group effects are correlated with other independent variables and can be formulated. While, the FE model take into account the individuality of each firm included in the sample by allowing the intercept vary for each firm but assumes that the slope coefficients are constant across firms. This study also employed two tests, namely the Hausman test (Hausman, 1978), and Breusch and Pagan Lagrangian multiplier (BP-LM) test (Breusch and Pagan, 1980), to guide our choice of the preferred estimation.

The following three equations describe the pooled OLS, FE, RE estimation models, respectively.

OLS:

$$DR_{it} = \beta_0 + \beta_1 TAX_{it} + \beta_2 RISK_{it} + \beta_3 PROF_{it} + \beta_4 GROWTH_{it} + \beta_5 SIZE_{it} + \beta_6 TANG_{it} + \beta_7 SPEC_{it} + \beta_8 STATE_{it} + Industry + Year + \varepsilon_{it}$$

FE:

$$DR_{it} = \gamma_{0i} + \gamma_1 TAX_{it} + \gamma_2 RISK_{it} + \gamma_3 PROF_{it} + \gamma_4 GROWTH_{it} + \gamma_5 SIZE_{it} + \gamma_6 TANG_{it} + \gamma_7 SPEC_{it} + \gamma_8 STATE_{it} + Industry + Year + \mu_{it}$$

RE:

$$DR_{it} = \varphi_0 + \varphi_1 TAX_{it} + \varphi_2 RISK_{it} + \varphi_3 PROF_{it} + \varphi_4 GROWTH_{it} + \varphi_5 SIZE_{it} + \varphi_6 TANG_{it} + \varphi_7 SPEC_{it} + \varphi_8 STATE_{it} + Industry + Year + \varepsilon_{it} + \mu_{it}$$

where, $DRDR$ is debt ratio (leverage) which is measured as the book value total debt divided by the book value of total assets. Subscripts i and t denote firm (i = 1, 2 ,…, 297) and time (t = 2009, 2010, …, 2013), respectively. $\beta_0\beta_0$, $\gamma_{0i}\,\gamma_{0i}$, and φ_0 φ_0 are the constants. $\beta_{1-8}\,\beta_{1-8}$, $\gamma_{1-8}\gamma_{1-8}$, and $\varphi_{1-8}\varphi_{1-8}$ are estimated coefficients for explanatory variables. The detailed definitions of each of the variables (excluding industry dummies) used in this study are presented in Table I. $\varepsilon_{it}\varepsilon_{it}$ is stochastic error of firm i at time t. $\mu_{it}\mu_{it}$ is error term firm i at time t. To eliminate the effect of outliers, all the continuous variables are winsorized at the 1% and 99% levels.

4 Results and Discussion

Descriptive Statistics

Table 3 reports the descriptive statistics of debt ratio in Chinese SMEs over 2009 – 2013. It shows that the average debt ratio increased steadily over time. Particularly, the average of leverage increased from 35.35% in 2009 to 40.88% in 2013. The mean leverage is 38.30% for the whole observed years that is much higher to that of the Chinese firms reported in Chang et al. (2014) but much lower than that of Chinese listed companies reported in Huang and Song (2006). Finally, it shows that the volatility of leverage increase over time, form 18.36% in 2005 to 19.12% in 2013.

Table 3 Firm leverage in Chinese SMEs during 2009 – 2013

Year	N	Mean	Median	St. Dev	Min	Max
2009	297	0.3535	0.3257	0.1836	0.0375	0.7985
2010	297	0.3726	0.3558	0.1866	0.0375	0.7985
2011	297	0.3795	0.3741	0.1909	0.0375	0.7985
2012	297	0.4009	0.3953	0.1909	0.0375	0.7985
2013	297	0.4088	0.4133	0.1912	0.0375	0.7985
2009 – 2013	1,485	0.3830	0.3750	0.1895	0.0375	0.7985

This table reports the descriptive statistics of the debt ratio in Chinese SMEs during 2009 – 2013. The detailed definition is in Table 1. The variable measured at firm level are winsorized at 1% and 99% levels.

Table 4 presents the descriptive statistics for the explanatory variables used in our regression models. The average of tax rate is only 16.6% in our sample, much lower than the typical number of large firms as well as in other economies, implying that Chinese listed SMEs bear a lighter income tax burden (Chang et al., 2014). The mean of Z-score 1.1987 indicates that on average the listed SMEs are "healthy" in terms of financial management. The average profitability is 5.98%, which might imply that the Chinese SMEs exhibit good performance. Growth opportunity is proxied by Tobin's Q, the mean value of 2.15 suggests that Chinese SMEs have higher growth opportunities. Finally, the table shows that, in our sample, approximately 22% of listed SMEs are state-controlled, which is much lower than the number (78%) reported in Chang et al. (2014). The possible explanation is that most of Chinese listed companies are state-owned, and which tend to be large-sized.

Table 4 Summary statistics of explanatory variables for Chinese listed SMEs

	N	Mean	Median	St. Dev	Min	Max
TAX	1,485	0.1660	0.1500	0.0422	0.0750	0.2500
RISK	1,485	1.1987	1.1190	0.6399	−0.1930	3.2370
PROF	1,485	0.0598	0.0523	0.0567	−0.0776	0.2414
GROWTH	1,485	2.1498	1.7750	1.1775	0.9990	7.4900
SIZE	1,485	21.3423	21.2755	0.8460	19.6985	23.8870
TANG	1,485	0.2412	0.2231	0.1417	0.0043	0.6361
SPEC	1,485	10.4399	10.4031	0.8547	8.3371	13.0294
STATE	1,485	0.2222	0	0.4159	0	1

This table reports the descriptive statistics of the explanatory variables in Chinese SMEs during 2009 – 2012. Variable definitions are in Table 1. All the continuous variables measured at firm level are winsorized at 1% and 99% levels.

Correlation Matrix

Table 5 provides the Pearson correlation matrix between the main variables used in our analysis. It illustrates that debt ratio is positively and significantly correlated with tax rate, firm size, and tangibility, and state dummy, but exhibits negative and significant correlations with firm risk (Altman's Z-score) and profitability. The results are generally consistent with our predictions. While, we also find that growth opportunity is negatively correlated with leverage, suggesting high-growth SMEs use more debt. This finding is consistent with trade-off theory and agency theory. Asset specificity have a positive correlation with leverage. The result is contrary with our expectation.

Table 5 Pearson correlation coefficient matrix and VIF

	DR	TAX	RISK	PROF	GROWTH	SIZE	TANG	SPEC	STATE	VIF
DR	1.00									(2.66)
TAX	0.21***	1.00								1.16
RISK	−0.66***	−0.16***	1.00							6.61
PROF	−0.41***	−0.01	0.89***	1.00						6.06
GROWTH	−0.35***	−0.19***	0.51***	0.44***	1.00					1.52
SIZE	0.50***	0.25***	−0.14***	0.03	−0.33***	1.00				1.54
TANG	0.12***	0.07***	−0.27***	−0.19***	−0.09***	−0.01	1.00			1.58
SPEC	0.16***	0.05**	−0.19***	−0.12***	−0.11***	0.31***	0.53***	1.00		1.67
STATE	0.15***	0.05*	−0.11***	−0.04*	−0.01	0.14***	0.21***	0.29***	1.00	1.12

This table reports the Pearson correlation matrix and variance inflation factor (VIF) of selected variables of Chinese listed SMEs during 2009 – 2012. Variable definitions are in Table 1. All the continuous variables measured at firm level are winsorized at 1% and 99% levels. (2.66) is the mean VIF of all variables. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

Furthermore, the low correlations between each pair of variables roughly demonstrate that there are no potential multicollinearity problems for the regression

models. In order to detect multicollinearity problem formally, we calculate the variance inflation factors (VIFs). In this study, each variable's VIF and the mean of VIF 2.66 are below the rule-of-thumb critical value, which should not exceed ten, suggesting that the multicollinearity is not a problem for the subsequent regression analyses.

Empirical Results

To get preliminary results, we firstly employ the pooled OLS model, which based on the assumption that there are no groups or individual effects among the firms included in our sample, to estimate the coefficients of main explanatory variables on leverage in Chinese SMEs. The estimation results are reported in Table 6. As can be seen, tax rate, firm risk, profitability, growth opportunity, size, and asset specificity are significant in confidence level of 1%. In contrast, tangibility and state dummy are highly insignificant. The OLS model has high R^2 and adjusted R^2 indicating it explains a strong portion of variability. Furthermore, the significant F-statistics of 162.93 in the OLS regression suggests that the overall model fit is good.

Table 6 Ordinary least square (OLS) results

Variable	Std. Coeff.	Std. Err.	t-stat	Sig.
TAX	−0.3162	0.0759	−4.17	0.000***
RISK	−0.3639	0.0112	−32.55	0.000***
PROF	2.0138	0.1212	16.61	0.000***
GROWTH	0.0203	0.0029	6.95	0.000***
SIZE	0.0793	0.0043	18.61	0.000***
TANG	−0.0121	0.0251	−0.48	0.628
SPEC	−0.0198	0.0041	−4.88	0.000***
STATE	0.0107	0.0070	1.53	0.127
Industry	Included			
Year	Included			
Constant	−0.8259	0.0934	−8.85	0.000***
Obs.	1,485			
R-squared	0.7195			
Adjusted R-squared	0.7151			
F-stat	162.93			
Prob. > F-stat	0.0000***			

This table reports the cross-sectional OLS regression results of leverage of Chinese listed SMEs during 2009 – 2012. Variable definitions are in Table 1. Time and industry dummies are used for the regression (see Table 2 for industry classification). All the continuous variables measured at firm level are winsorized at 1% and 99% levels. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

However, pooled OLS model is commonly used in cross-sectional regression. Since, in this study, our sample contained dataset across firms and overtime, there might be cross-sectional effects on a set of group of firms or on each of firms. In order to account

for these effects, two more advanced techniques, namely, the random effects and the fixed effects models, are employed. Table 7 and Table 8 present the results of these two estimation models respectively. Under both estimation models firm risk, profitability, growth opportunity, size, tangibility, and asset specificity proved to be significant with a confidence level of 1%. Tax rate is significant while with lower confidence level (5%) only under fixed effects estimation model. Both the regressions show significant *F*-statistics (Wald c^2 for random effects model) indicating that the overall model fit is good.

Table 7 Random effects (RE) results

Variable	Std. Coeff.	Std. Err.	z	Sig.
TAX	0.0270	0.0766	0.35	0.725
RISK	−0.2436	0.0102	−23.98	0.000***
PROF	1.3707	0.1033	13.26	0.000***
GROWTH	0.0138	0.0025	5.51	0.000***
SIZE	0.0774	0.0056	13.69	0.000***
TANG	0.1546	0.0271	5.70	0.000***
SPEC	−0.0139	0.0050	−2.79	0.005***
STATE	0.0090	0.0127	0.71	0.476
Industry	Included			
Year	Included			
Constant	−1.0363	0.1297	−7.99	0.000***
Obs.	1,485			
R-squared (within)	0.3835			
R-squared (between)	0.7303			
R-squared (overall)	0.6805			
Wald x^2	1584.23			
Prob. > x^2	0.0000***			

This table reports the random effects regression results of leverage of Chinese listed SMEs during 2009 – 2012. Variable definitions are in Table 1. Time and industry dummies are used for the regression (see Table 2 for industry classification). All the continuous variables measured at firm level are winsorized at 1% and 99% levels. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

Table 8 Fixed effects (RE) results

Variable	Std. Coeff.	Std. Err.	t-stat	Sig.
TAX	0.1665	0.0819	2.03	0.042**
RISK	−0.1916	0.0106	−18.11	0.000***
PROF	1.1818	0.1035	11.42	0.000***
GROWTH	0.0133	0.0025	5.23	0.000***
SIZE	0.0819	0.0078	10.48	0.000***
TANG	0.2210	0.0303	7.28	0.000***
SPEC	−0.0052	0.0059	−0.88	0.379
STATE	–	–	–	–
Industry	–			
Year	Included			
Constant	−1.2557	0.1718	−7.31	0.000***
Obs.	1,485			
R-squared (within)	0.3984			
R-squared (between)	0.6162			
R-squared (overall)	0.5842			
F-stat	70.87			
Prob. > *F*-stat	0.0000***			

This table reports the fixed effects regression results of leverage of Chinese listed SMEs during 2009 – 2012. Variable definitions are in Table 1. Time dummies are used for the regression. All the continuous variables measured at firm level are winsorized at 1% and 99% levels. STATE is omitted to avoid multicollinearity.*, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

To select the most appropriate specification among OLS, RE, and FE models for our dataset, we orderly conduct two tests. First, the Breusch and Pagan Lagrangian multiplier test is performed to guide our choice between OLS and RE models. Panel A of Table 9 shows the result. Since Prob. > chibar2 is significant at 1% confidence level, we reject the null hypothesis of no random effects, implying the estimation results with the RE model are more robust than the pooled OLS. Then, we proceed to compare between RE and FE models using the Hausman test. The results are presented in Pabel B of Table 9. We find that the statistic (p-value = 0) rejects the null hypothesis of RE model is consistent and efficient. For this reason, we conclude that the estimation results with the FE model are more appropriate than the RE model.

Table 9 Selection of most appropriate model

Panel A: Breusch and Pagan Lagrangian multiplier (BP-LM) test

Items	Variance	St. Dev
DR	0.0359	0.1895
e	0.0035	0.0589
m	0.0056	0.0748
chibar2 (01)	840.02	
Prob. > chibar2	0.0000***	

Panel B: Hausman test

Variable	Fixed effects	Random effects	Var. (dif.)	Sig.
TAX	0.1665	0.0270	0.1395	0.041**
RISK	−0.1916	−0.2436	0.0519	0.005***
PROF	1.1818	1.3707	−0.1889	0.037**
GROWTH	0.0133	0.0138	−0.0005	0.001***
SIZE	0.0819	0.0774	0.0045	0.006***
TANG	0.2210	0.1546	0.0663	0.017**
SPEC	−0.0052	−0.0139	0.0086	0.004***
STATE	–	0.0090	–	–
Wald x^2	171.70			
Prob. > x^2	0.0000***			

This table reports the results for Breusch and Pagan LM test and Hausman test results. Variable definitions are in Table 1. Time dummies and industry dummies are used for the random effects regression. Only time dummies are used for the fixed effects regression. All the continuous variables measured at firm level are winsorized at 1% and 99% levels. STATE is omitted to avoid multicollinearity.*, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

Discussion

According to the empirical findings in Table 8, tax rate is positively and significantly related to leverage, suggesting that Chinese SMEs with high-tax rate are more likely to use debt financing. The results confirm our hypothesis H1, and are consistent with the trade-off theory. Our findings are also similar to other studies pertaining to the determinants of capital structure in existing Chinese studies in contest of large size firms (e.g., Chen, 2004; Huang & Song, 2006; Chang et al., 2014). Therefore, this indicates that Chinese SMEs are not different in using of tax shields with those of large firms.

Firm risk is measured by Altman's Z-score, as can be seen, it exhibits a statistically negative impact on the leverage measure at 1% confidence level. This means that Chinese SMEs with higher financial distress potential (i.e., lower Z-score) tend to more debt financing, consistent with H2b as well as the pecking order theory and classic empirical studies of SMEs in the UK (e.g., Jordan et al., 1998; Michaelas et al., 1999). According to the pecking order theory, risky firms tend to borrow more due to adverse selection effect. In addition, the bankruptcy costs for Chinese SMEs might be relatively low due to the government protection of avoiding insolvency and exist of the "shell resource" in China's financial market. Therefore, this might motivate firms to use more debt financing in order to arise high tax benefit.

A significant positive relationship can be seen between profitability and leverage, supporting trade-off theory and agency theory. Profitable firm should use more debt because they have greater needs to shield income from firm tax. Agency-based frameworks also argue that profitable firms need higher leverage to restrain management discretion because profitable firms tend to have severe free cash-flow problems and debt can be deems as a mechanism of disciplining to ensure managers align their interests with owners (Jensen, 1986; Williamson, 1988). However, this find is contradict with our prediction and most of existing empirical studies in both developed countries and emerging markets (see Section 2.3). Several Chinese studies also reveal a negative relation between leverage and profitability (Chang et al., 2014). Beyond agency theory and trade-off theory, we provide another possible explanation that Chinese SMEs need more external funding to expand investments and strengthen their market position because the profit margin[3] is high.

Tobin's Q is employed to measure firm's growth opportunities here. In line with H4, we can show evidence that growth opportunity is significantly and positively associated with the firm debt ratio, which may indicate that rapid growth Chinese SMEs must fund their projects primarily through external financing. This finding

[3] Notice that, in this study, we use ratio of operating profit over total assets to measure profitability. This measurement can reflect the product profit at large extent.

is also consistent with several empirical studies in China (e.g., Chen, 2004; Tong & Green, 2005) but most of empirical research in developed countries. The possible explanation is that Chinese SMEs with high growth opportunities may not be able to raise adequate equity fund to finance their investment because of the strict constraints of the Chinese authorities on equity issuance (Chang et al., 2014).

Consistent with H5, we find that the variable size has a positive and significant impact on the leverage. This result is inline with the implications of the trade-off theory suggesting that large firms should use more debt because they have high ability to diversify the risk and to take the benefit of tax shields on interest payments. Moreover, large firms may also be able to take advantage of economies of scales in issuing debt, and even have bargaining power over lenders (Marsh, 1982; Huang & Song, 2006). Thus, the cost of issuing debt is decreasing as firm size increasing. This make firms having high motivation to borrowing more. Our findings also support most empirical research in the US and China which have shown that large firms tend to have higher leverage (Chang et al., 2014).

Tangibility is significantly and positively related with leverage in the fixed effects model, supporting the findings of other studies pertaining to the determinants of SME's capital structure in developed countries (e.g., Jordan et al., 1998; Michaelas et al., 1999) as well as in China in contest of large firms (e.g., Chen, 2004; Huang and Song, 2006; Qian et al*.,* 2009; Chang et al., 2014). Firms with high proportion of tangible assets usually have low expected cost of financial distress and few debt-related agency problems. Both the trade-off theory and agency cost theory suggest that firm leverage increases with tangibility of assets. For SMEs, they might face more server agency problem and asymmetric information, and the collateral requirements might become mandatory for SMEs seeking loans. If the SMEs have considerable tangible assets with high collateral values, then it will be easier to obtain external funds.

Furthermore, we find that asset specificity is negatively associated with leverage but statistically insignificant. One possible explanation is that although the proxy is a measure of the capital-labour mix of a firm, it may not adequately capture cross-sectional variation in specialization of capital (Robicheaux, Fu & Ligon, 2008). In order to avoid the multicollinearity, the state-controlled dummy is omitted in the FE specification. However, both the OLS and RE regressions report a non-significant relationship between STATE and leverage.

In summary, the discussion in this section indicates that tax rate, potential financial distress (firm risk), profitability, growth opportunity, size and tangibility are joint determinants of Chinese SMEs' capita structure.

Regression Diagnostics

In Section 4.2, we tested the multicollinearity for our sample. In addition, we need to handle other important issues – heteroscedasticity and biased standard errors. Without taking account for these problems, the standard errors that are calculated in the above regressions can be either under or overestimate the true variability of the coefficient estimates if the residuals are correlated across observations. Petersen (2009) argues that panel datasets is common employed in finance research, in these datasets, the residuals might be correlated across firms or across time. He also point outs that "*the ways that previous researchers have addressed possible biases in the standard errors varies widely and in many cases is incorrect*". For example, 42% of the recent papers did not adjust the standard errors for possible dependence in the residuals, and the remaining 58% of papers did not apply the correct methods to adjust standard errors (Petersen, 2009).

In this section, we re-estimate the pooled OLS, RE, and FE panel regressions; and in accordance with Petersen (2009), we correct the standard errors by clustering at the firm level[4]. The estimation results are reported in Appendix A. Subsequently, we re-perform Breusch and Pagan LM test and Hausman test. The Hausman test is the robust version[5] here. Appendix B reports the test results. As can be seen, both the *p*-value for these two tests are equal to 0, indicating that fixed effects model is the most preferred specification. The results of FE models are essentially similar to those presented in Table 8 and discussed above, but tax rate found less significant. Hence, our findings in Table 8 are valid. We also find that the standard errors presented in FE model of Appendix A are larger than those of reported in Table 8, indicating that our standard errors calculated without correcting to cluster at the firm level are biased downward[6]. Overall, the discussion in this section suggest that our findings and discussions in the above sections are valid.

Conclusion

The difficulty of Chinese SMEs obtaining external finances has attracted a great deal of attention from the government and academics, as well as the general public due to their important role in economic growth. In order to make SMEs borrowing easier, Chinese government has implemented a series of policies. However, it is clear from previous

[4] The standard errors which clustered at the firm level are robust to heteroscedasticity (Petersen, 2009). Therefore, it is unnecessary to calculate the standard errors that are robust to heteroscedasticity, furtherly. In general, finance research papers report White standard errors, however they are not robust to within-cluster dependence (Petersen, 2009).

[5] The standard Hausman test that is built in most statistical packages requires the random-effects estimator to be efficient, which requires that α_i and $\varepsilon_{it} \sim$ i.i.d. (Cameron & Trivedi, 2005). However, this assumption is invalid when cluster-robust standard errors differ substantially from ordinary standard errors, which is usually the case in panel data set estimations (Petersen, 2009). Here, a robust version of the Hausman test is needed (Wooldridge, 2002).

[6] The biased standard errors will lead to the *t*-statistics biased upward. In this case, the hypotheses might be incorrectly rejected or accepted, thus influencing the interpretations.

literature that little is known about the determinants of capital structure in Chinese SMEs. This empirical study attempted to solve this issue by employing 297 firms listed on the SZSE SMEs Board during 2009 – 2013. The investigation is performed using panel techniques, namely, pooled ordinary least squares, random effects, and fixed effects. We also performed two tests, namely Breusch and Pagan Lagrangian multiplier test and Hausman test to guide our choice of the preferred estimation. This study has employed the book-value based debt ratio as an explained variable.

According to the results of our empirical analysis, tax rate is positively related with the debt ratio. This finding is consistent with the prediction of trade-off theory. We employ Altman's Z-score to measure firm risk. The negative relationship between this variable and the debt ratio indicates that Chinese SMEs with higher financial distress potential are more likely to use debt, consistent with the predictions of pecking order theory rather than with the hypothesis of trade-off theory. In addition, the government protection of avoiding insolvency and the "shell resource" in China's financial market also might motivate firms to use more debt in order to arise high tax benefit. The leverage is positively related to profitability, which is consistent with predictions of the trade-off theory and the agency theory. Beyond that, another possible explanation is that Chinese SMEs need more external funding to expand investments and strengthen their market position. In line with this, we also show evidence that growth opportunity is significantly and positively associated with the leverage. There is a positive and significant relationship between firm size and debt ratio. This result is consistent with the implications of the trade-off theory suggesting that large firms should use more debt because they tend to have high ability to diversify the risk and to take the benefit of tax shields on interest payments. Tangibility is significantly and positively related with leverage, supporting the predictions of both the trade-off theory and agency cost theory.

Chang et al. (2014) argue that in China, the state influence is inevitable. However, in this study, both the pooled OLS and RE regressions show a non-significant relationship between the state-controlled dummy and debt ratio. In addition, no significant association is found between the leverage and asset specificity.

Accordingly, the present findings have important implications for policy-makers, creditor, and SME managers. For instance, the positive relationship between the debt ratio and firm risk reveal that the government should further deregulate interest rates, with the aim of creating a safe banking system. In terms of creditors, they should recognise that SMEs which borrowing more usually have high financial distress potential. Controlling the proportion of these loans in the total assets and adjusting the degree of overall risk are important to avoid going into insolvency. Firm managers should aware that it is important to supply well-prepared (i.e., high quality of financial information) reports to their creditors to mitigate the asymmetric information, because this is a main reason for their difficulties in accessing external funds, in particular

bank loans. Finally, this study contributes valuable comparisons to the theoretical and empirical results to be found in existing literature.

Appendices

Appendix A Panel data results with robust standard errors

	OLS		RE		FE	
Variable	Std. Coeff.	Std. Err.	Std. Coeff.	Std. Err.	Std. Coeff.	Std. Err.
TAX	−0.2146*	0.1293	0.1008	0.0917	0.1636*	0.0994
RISK	−0.3788***	0.0340	−0.2520***	0.0346	−0.1921***	0.0300
PROF	2.1665***	0.3484	1.4694***	0.3091	1.2002***	0.2553
GROWTH	0.0182***	0.0038	0.0121***	0.0027	0.0117***	0.0028
SIZE	0.0829***	0.0072	0.0777***	0.0071	0.0744***	0.0086
TANG	−0.0624	0.0426	0.1314***	0.0380	0.2181***	0.0417
SPEC	−0.0205***	0.0067	−0.0166***	0.0058	−0.0063	0.0064
STATE	0.0124	0.0130	0.0137	0.0157	–	–
Constant	−0.8383***	0.1592	−0.9649***	0.1620	−1.0847***	0.1953
Obs.	1,485		1,485		1,485	
R-squared (within)	–		0.3809		0.3960	
R-squared (between)	–		0.7220		0.6251	
R-squared (overall)	0.7031		0.6649		0.5899	
F-stat	160.95		617.65		34.39	
Prob. > *F*-stat	0.0000***		0.0000***		0.0000***	

This table reports the OLS, RE, and FE regression results of leverage of Chinese listed SMEs during 2009 – 2012. Variable definitions are in Table 1. Time and industry dummies are used for the OLS and RE regressions; fixed effects estimates consider only time dummies (see Table 2 for industry classification). All the continuous variables measured at firm level are winsorized at 1% and 99% levels. STATE in the FE model is omitted to avoid multicollinearity. The standard errors are adjusted for clustering at the firm level. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

Appendix B Breusch and Pagan LM test and Robust Hausman test

Panel A: Breusch and Pagan Lagrangian multiplier (BP-LM) test		
Items	Variance	St. Dev
DR	0.0359	0.1895
e	0.0035	0.0589
m	.0057	0.0756
chibar2 (01)	842.22	
Prob. > chibar2	0.0000***	
Panel B: Robust Hausman test		
x^2 (7)	81.14	
Prob. > x^2	0.0000***	

This table reports the results for Breusch and Pagan LM test and Hausman test (robust version) results. Variable definitions are in Table 1. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

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