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Abstract

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Keywords

listed, chinese, evidence, decision, leverage, firms, structure, effect, ownership

Disciplines

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The effect of ownership structure on leverage decision: new evidence from Chinese listed firms

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This paper examines the effect of state control and ownership structure on leverage decision of firms listed in Chinese stock market. Our results show that state-owned enterprises (SOEs) have higher leverage ratios than non-SOEs, and SOEs in regions with a poorer institutional environment have higher leverage ratios than SOEs in better regions. We also show that the largest shareholding (percentage of shares held by the large shareholder) in the SOEs has a negative relationship with the leverage ratio, while largest shareholding in Non-SOEs has a non-linear relationship with short-term and long-term debt ratio. Finally, this study also shows that share split reform and the improvement of institutional environment both weaken the negative relationship and strengthens the positive relationship between largest shareholding and leverage of SOEs and Non-SOEs to some extent. This paper documents how the financing behaviour of SOEs is more influenced by government intervention, while the financing behaviour of non-SOEs is more market oriented.

Keywords: capital structure; ownership structure; state ownership; largest shareholding; regional institutional development

JEL Classification: G30, G32

Introduction

This paper investigates the effect of state control and ownership structure on the leverage decision of Chinese firms. Agency cost theory, as proposed by Jensen and Meckling (1976), suggests that agency cost and ownership structure have important impacts on a firm's capital structure. One recent stream of the capital structure literature has examined how shareholders' rights affect a firm's capital structure decisions (Friend and Lang, 1988; Berger, 1997). However, this body of literature mainly focuses on firms in the US and UK, where ownership is dispersed among many external small shareholders and control is concentrated in the hands of

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managers from inside the business (Berle and Means, 1932). These features mean that the predominant agency cost arises between shareholders and managers, due to the separation of ownership and control (Jensen and Meckling, 1976). Recent studies suggest that ownership concentration in hands of a few large shareholders is more prevalent in the corporate world outside the US and UK, especially in many transition economies such as China (La Porta *et al.*, 1999; Claessens, 2000; Faccio and Lang, 2002). Firms in these countries have a different ownership structure compared to their counterparts in the US, including high ownership concentration and a high proportion of state-owned enterprises (SOEs), and they also function in a specific institutional environment. Taking account of these variables, this paper argues that the specific character of ownership structure, control and institutional environment has a quite distinct influence on firms' capital structures.

The investigation of the relationships between state ownership, the largest shareholding, institutional development and the capital structure decisions of Chinese SOEs and non-SOEs is important because, as a typical transition economy, and as the largest developing country, China has distinct institutional features.

The first important institutional feature is that state ownership dominates listed companies in China (Sun and Tong, 2003). Since 2005 when Chinese government started to implement share split reform, the percentage of state ownership started to decline. However, government still maintains its ownership control and exerts great influence on the capital structure of Chinese listed firms. Second, similar to many other Asian countries, listed companies in China have a highly concentrated ownership structure, so ownership structure, especially the largest shareholding also have an important influence on the capital structure choices of Chinese listed firms as it can affect agency incentives (Booth *et al.*, 2001). Thirdly, the investor protection legal system in China is still imperfect, for example, China does not provide comprehensive laws and regulations regarding external investors, or cannot effectively implement the existing laws of administrating operation of the corporate or securities markets (Kaoto and Long, 2005). Finally, the share split reform, which was a major event in Chinese capital market and also markedly changed the ownership structure of Chinese listed firms, so this event provide us a quite new dataset to examine the influence of ownership structure on capital structure decision before and after the reform¹. Therefore, China will provide unique dataset to examine the effect of state ownership and ownership structure on capital structure decision under weak legal protection of minority shareholders.

Prior research indicates a link between ownership structure, institutional development and the leverage decision of a firm. For example, Shleifer and Vishny (1994) suggest that direct state ownership is often associated with the pursuit of political objectives at the expense of other stakeholders in the firm. Consistent with their view, Dewenter and Malatesta (2001), using a sample of the world largest 500 firms, indicate that SOEs are more highly leveraged and perform less well than comparable private firms. The literature also shows that a country's development of its legal and institutional frameworks affects local firms' capital structure decisions. La Porta *et al.* (1997; 1998; 2002) found that the source of laws and their implementation quality have a significant impact on corporate financing decision making. Demirguc-Kunt and Maksimovic (1999) conducted an empirical analysis by using a sample from 30 developing and developed countries, and found that when the legal system is inefficient or costly to use, short-term debt is more likely to be employed than long-term debt, because banks under an inefficient legal system prefer to issue short-term loans to reduce credit risk.

There are also literatures investigating the relationship between state ownership, institutional development and leverage of Chinese firms in recent years. For example, Li *et al.* (2009) investigated the relationship between ownership, institutional development and the leverage decision of Chinese non-listed firms, and found that state ownership was positively associated with firms' leverage capability and access to long-term debt, and firms in better developed regions were associated with reduced use of long-term debt. Firth *et al.* (2009) investigated the financial decision of Chinese non-listed private firms, and he found that having the state as a minority owner helps private firms obtain bank loans, especially for large firms and firms located in regions with a less developed banking sector. Kasseeah (2008) investigated the financial decision of Chinese listed manufacture firms, and he found that the leverage of firms in high FDI recipient and firms who receive more state subsidy is not influenced by profitability.

Despite prior research, questions remain regarding: 1) how state ownership and the largest shareholding affect firms' capital structure, 2) whether these factors have different influences on SOEs (which the state ultimately controls) and non-SOEs (which non-state entities ultimately control), 3) how the interaction between the largest shareholding and institutional development influences the capital structure of SOEs and non-SOEs, and 4) whether share split reform influences firm's capital structure decisions.. This paper provides new evidence to answer these questions, using a recent panel data of Chinese SOEs and non-SOEs.

This paper contributes to the relevant literature along the following dimensions: first, our paper adds to the research on the effect of state versus private ownership on capital structure.² In particular, we examine the impact of the largest shareholding, state ownership and institutions on the financial decision of both SOEs and non-SOEs. Second, our paper presents fresh evidence on how largest shareholding and institutional development affects firm's leverage decisions, Li *et al.* (2009) investigated the effect of ownership structure and institutions on leverage, but in their paper, they ignores the impact of largest shareholding, and also they use survey data of non-listed firms. So our paper is the first paper to investigate the effect of largest shareholding on leverage of SOEs and Non-SOEs. Third, this is the first paper that examines the influence of the share split reform on firm's capital structure decision, by comparing the capital structure decisions of both SOEs and Non-SOEs before and after the share split reform. Finally, this paper examines the effect of minority state shareholding on the capital structure decisions in non-SOEs, and compares it to the effect of the largest state shareholding in state-controlled firms.

Our findings indicate that Chinese SOEs have higher leverage ratios than non-SOEs. SOEs in regions with a poorer institutional environment have higher leverage ratios than SOEs in better regions. While government intervention may have ownership discrimination against non-SOEs, this study shows that the political connections that come through minority state ownership help non-SOEs to access external bank loans. We also show that the largest shareholding (measured as the proportion of shares held by the large shareholder) in SOEs has a negative relationship with leverage ratio, while the largest shareholding in non-SOEs has a non-linear relationship with short-term and long-term debt ratio. We also found that share split reform not only reduced the ownership concentration and increased the leverage ratio of both SOEs and Non-SOEs. Share split reform and improvements of institutional environment also weaken the negative relationship and strengthen the positive relationship between largest shareholding and leverage of SOEs and Non-SOEs to some extent. We document that the financing behaviour of SOEs is more

influenced by governmental intervention, while the financing behaviour of Non-SOEs is more market oriented.

The remainder of this paper is organized as follows: Section 2 presents a literature review and develops several testable hypotheses. Section 3 describes how the variables are measured and what methodology we chose. Section 4 presents our main empirical results and offers some interpretations. Last, Section 5 summarizes the main conclusions of the research.

Literature review and hypotheses

After the seminal work of Modigliani and Miller (1958), two main capital structure theories have emerged during the past 40 years, including the *trade-off* theory (Modigliani and Miller, 1963; Jensen and Meckling, 1976; Miller, 1977) and the *pecking order* theory (Myers and Majluf, 1984). The trade-off theory states that a value-maximizing firm will pursue an optimal capital structure by considering the marginal costs and benefits of each additional unit of financing. As an alternative to the trade-off model, the pecking order hypothesis of corporate leverage is based on asymmetric information problems. It predicts that firms will prefer internal financing to issuing security, and if forced to resort to external financing, will use debt before equity.

The more recent body of literature indicates that the firm-specific and country-specific factors in firms' leverage choices differ across countries (for example, Jong *et al.*, 2007; Akhtar and Oliver, 2009; Delcours, 2007), and particularly focuses on the effect of state ownership and regional institutions on firms' capital structure decisions, and more especially on the role of Chinese state ownership. Brandt and Li (2003) and Cull *et al.* (2009) found evidence suggesting that private firms in China are denied access to bank loans and that they resort to more expensive trade credits instead. Li *et al.* (2009) found that state ownership was positively associated with firms' leverage decision and use of long-term debt, and that firms in better developed regions are associated with reduced access to long-term debt. Firth *et al.* (2009) found that having the state as a minority owner helps private firms to obtain external bank loans, especially for large firms and firms located in regions with a less well-developed banking sector. Overall, this body of literature argues that SOEs have a higher leverage than non-SOEs, and that this represents so-called ownership discrimination. In addition, we also find a Chinese publication paper arguing that listed SOEs in China have a lower leverage ratio than Non-SOEs (Xiao, 2009).

Based on the current literature reviewed in this section, we applied these theories to Chinese listed SOEs and non-SOEs in order to develop testable hypotheses.

State ownership

The role of state ownership is still a controversial topic in Chinese economic structural reform. Chinese SOEs may be more likely to have a higher debt ratio than other firms for two reasons. First, the role of the Chinese government in corporate financing decisions is pivotal, given its dual roles as a large shareholder of SOEs, as well as the owner of all major banks (Li *et al.*, 2009). Therefore, the Chinese government tends to put pressure on the banking system to lend primarily to SOEs, and stipulates preference loan rates (from which banks rarely deviate) with little regard for financial considerations (Gordon and Li, 2003; Allen *et al.*, 2005; García-Herrero *et al.*, 2005). Second, SOEs and State-owned commercial banks (SOCBs)

have similar organisational structures and administrative styles, inherited from a time before the reforms that accompanied the “open-door policy”. This shared interest has created an environment where lending by SOCBs is still partially determined by political reasons, rather than commercial motives (Park and Sehart, 2001). In this environment, non-SOEs in China will always face “ownership discrimination” when they apply for bank loans. Thus, we propose the following hypothesis to examine the effect of state ownership on the capital structure of Chinese firms:

H1a: A positive relationship exists between state ownership and the leverage decision of a firm, so SOEs in China have higher leverage ratios than non-SOEs.

Evidence also exists indicating that the political connections between non-SOEs and banks are also helpful for securing loans. For example, Firth *et al.* (2009) suggest that private, unlisted firms that have a state minority shareholder have access to more bank loans. This paper further argues that such political connections are also important for Chinese listed non-SOEs. Thus, we propose the following hypothesis:

H1b: Non-SOEs with a state minority shareholder carry more debt, especially in the form of more bank loans, compared to other non-SOEs.

Huge development gaps are evident in different regions in China, so this research also seeks to determine whether the capital structures of Chinese SOE and non-SOEs are influenced by a regional effect.³ Research on Chinese non-listed firms indicates that firms in better developed regions are associated with reduced access to long-term debt (Li *et al.* 2009). While another study on Chinese listed manufacture firms found no important differences in financing across regions (Kasseeah, 2008). However, no extant literature investigates the regional development effect on capital structure between SOEs and non-SOEs in China.

The Chinese government tends to pressure the banking system to lend primarily to SOEs, and more government interventions occur in poorly developed regions compared to well-developed regions (Fan *et al.* 2007). Therefore, we argue that SOEs in poorly developed regions should have more debt. Compared with SOEs, the financing behaviour of non-SOEs in China is more market oriented. This makes it easier for non-SOEs in better developed regions to raise both equity and debt financing, which leads to a statistically insignificant relationship between regional development and the leverage capability of non-SOEs. Thus, we propose the following hypothesis:

H1c: Regional institutional development has a negative relationship with the leverage decision of SOEs.

H1d: Regional institutional development has no relationship with the leverage decision of non-SOEs.

Largest shareholding

Considering the effect of the largest shareholding on firm leverage, the extant literature contains two contrary hypotheses: the *incentive* hypothesis and the *expropriation* hypothesis. First, the incentive hypothesis holds that a positive relationship exists between the largest shareholding and leverage capability. This hypothesis argues that the predominant agency problem arises between shareholders and managers, due to the separation between ownership and control. Therefore, ownership concentration in the hands of a few large shareholders could reduce the

agency cost between shareholders and managers (the so-called first type agency problem), due to “the active monitoring hypothesis” (Jensen and Meckling, 1976). According to the *active monitoring* hypothesis, the largest shareholder has an incentive to monitor and influence managers to protect their investments (Friend and Lang, 1988). In contrast, the expropriation hypothesis suggests that when large shareholders effectively control a corporation, agency problems arise mainly between large controlling shareholders and external minority shareholders (the so-called second type agency problem). The largest shareholder will pursue their own private benefits in the expropriation of minority shareholders (Shleifer and Vishny, 1997; La Porta *et al.*, 1998). These private benefits of control have been widely documented, and may be substantial, especially in countries with less-effective minority investor protection such as China (Nenova, 2000; Dyck and Zingales, 2002). Therefore, under the second hypothesis, the largest shareholders may prefer equity financing to obtain private benefits from minority shareholders.

So far, no extant literature investigates the relationship between largest shareholding and leverage of Chinese firms, especially the different effect of largest shareholding on leverage of Chinese SOEs and Non-SOEs. We expect that the largest shareholding will influence capital structure decisions differently in SOEs and non-SOEs. The most serious agency problems of Chinese SOEs lie with the application of principals (Zhang, 1998): Chinese SOEs have a specific corporate governance model with a multilayered principal–agent framework and ambiguous clarification of ultimate property rights. This can be characterized as an “agent monitoring agent” situation, and under this framework, the principal is the state, where all the central government, provincial governments, local officials and so on, serve as agents of the state. These agents also hold the control rights in the name of the state — but they are not the residual claimants. Thus, no one in the chain of the principal–agent relationships has the incentive to pursue profit maximization for the real principal (Shi, 2009). Consequently, the largest shareholder of the SOEs has little incentive to monitor managers. On the other hand, the expropriation effect is more severe in China than in Western countries, due to the highly concentrated ownership structure and lack of protection of the interest of minority shareholders. Therefore, Chinese listed firms — especially Chinese SOEs — have built-in incentives for raising equity (Zou *et al.*, 2006). Thus, we expect to find a negative relationship between the leverage capability of a firm and the largest shareholding of an SOE, and propose the following hypothesis:

H2a: A negative relationship exists between the largest shareholding and the leverage decision of a Chinese SOE firm.

Different from the SOEs, non-SOEs are ultimately controlled by the private sector, so largest shareholder of the non-SOEs may have more incentive to monitor the entrenchment of managers. Therefore, we believe that although the largest shareholders of non-SOEs may also prefer equity financing due to the expropriation effect, at least to some extent, they will also have incentives to use more debt when they hold more shares, and thus we propose the following hypothesis:

H2b: The largest shareholding has a non-linear relationship with the leverage decision of non-SOEs.

Recent literature also suggests that the concentration of shares held by other top shareholders (apart from the controlling shareholder) could reduce the opportunistic

behaviour of controlling shareholders. Pagano and Roell (1999) and La Potra et al. (1999) found that the existence of several large shareholders can either supervise the managers effectively, or internalize the private benefits of control rights and reduce the “tunnel” action of the largest shareholder. We used the percentage of shareholding of the top two to five shareholders as a monitoring power for constraining the behaviour of the largest shareholders in this research, and propose the following hypothesis:

H2c: A positive relationship exists between the proportion of shares held by the top two to five shareholders (apart from the controlling shareholder) and the firm’s leverage.

Recent literature also shows that the effect of the largest shareholder on capital structure may also be influenced by regional institutional environment. For example, Dyck and Zingales (2002) argue that better protection of investors could lead to a decrease in the private interest of largest shareholders. So we argue that a better institutional environment can produce better protection of the interest of small shareholders and an improved corporate governance mechanism, and thus reduce the opportunistic behaviour of the largest shareholders. Consequently, the improvement of institutional environments can either weaken the negative relationship between the largest shareholding of both SOEs and non-SOEs and firms’ leverage, or strengthen the positive relationship between the largest shareholding and the leverage capability of non-SOEs. Thus we propose two further hypotheses:

H2d: the improvement of legal and institutional environments can either weaken a negative relationship between largest shareholding and leverage of both SOEs and Non-SOEs, or strengthen a positive relationship between largest shareholding and the leverage of Non-SOEs.

As discussed above, prior to the share split reform, which was implemented during 2005 and 2006, shares of Chinese listed firms were divided into non-tradable and tradable shares. The former is mainly held by central and local government through their bureaucratic agencies (SOEs) or legal-persons (Non-SOEs), while the latter can be held by any of the above or private entities. This is known as split share structure. The split share structure has often been blamed for leading to severe agency problems between largest non-tradable shareholders and minority tradable shareholders (Yeh, *et al.* 2009) and reducing firms’ corporate governance quality and performance efficiency (Sun and Tong, 2003). For example, Firth *et al.* (2006) argue that holding restricted shares gives less incentive for the controlling state shareholders to monitor executives to ensure that they maximize stock value. Following the reform, not only the agency conflict between controlling shareholders and minority shareholders was reduced, but also the controlling shareholders have a great incentive to monitor behavior of managers, and to ensure that they maximize shareholders’ wealth. Therefore, we expect that the share split reform can strengthen the positive relationship or weaken the negative relationship between largest shareholding and leverage of both SOEs and Non-SOEs, and we propose the following hypotheses:

H2e: the share split reform can either weaken a negative relationship between largest shareholding and leverage of both SOEs and Non-SOEs, or strengthen a positive relationship between largest shareholding and the leverage of Non-SOEs.

Methodology and measurement of variables

Data collection

All the financial data used in this study were gathered from the China Stock Market and Accounting Research Database (CSMAR) that was developed by the Shenzhen GTA Information Technology Company and the University of Hong Kong, and the China Centre for Economic Research Database (CCER) that was developed by SinoFin Information Technology Company and Peking (Beijing) University. As indicated by previous studies, both the CCER and CSMAR are the most important databases on the Chinese capital market (Kato and Long, 2005; Firth *et al.*, 2006, 2007).

We excluded: 1) financial firms,⁴ 2) ST or PT firms, 3) negative-equity firms and 4) firms whose relevant data were incomplete or could not be acquired. This paper defines SOEs as firms whose ultimate owner are central or local governments, and non-SOEs as firms whose ultimate owner are individuals or non-governmental organizations. According to the instruction of China Securities Regulatory Commission (CSRC), the “ultimate owner” of a publicly listed company as: (1) the largest shareholder; or (2) the shareholder with a greater voting power than the largest shareholder; or (3) the shareholder with shareholding or voting rights above 30% of the total shares or voting rights in the company; or (4) the shareholder who can determine over half of the board members. A final number of 8,376 firm-year observations from the Chinese capital market were available for analysis during the period 2002–2009, of which 5,854 were SOEs (755 firms) and 2,522 were non-SOEs (356 firms).

Measuring variables

This study used four different measures of capital structure for the dependent variables: total debt ratio (TDR), short-term debt ratio (STDR), long-term debt ratio (LTDR) and bank ratio (BR). More specifically, the calculation of the four dependent variables is:

LEV = total debt to total assets

STDR = total short-term debt to total assets

LTDR = total long-term debt to total assets

BR = total bank financing to total assets.

The definitions and calculations of the independent variables are:

state ownership (STATE) = defined as a dummy variable — we ascribed a value of 1 to state-owned firms and a value of 0 to non-state owned firms.

largest shareholding (LARGEST) = shares controlled by the largest shareholder compared to total shares.

(LAREGST²) = squared largest shareholding, this variable is used to examine the non-linear relationship between largest shareholding and the dependent variables. If the regression coefficients of LARGEST and LAREGST² are both statistically significant, but have different sign, we can conclude that there is a non-linear relationship, either U-shaped or reverse U-shaped relationship, between largest shareholding and capital structure.

top two to five large shareholders (TOP) = shares held by the top two to five shareholders compared to total shares.

institutional environment index (INDEX) = we adopted the marketization index for China’s provinces, compiled by Fan *et al.* (2009). (See Appendix A for

detailed description for the index, and see Appendix B for descriptive statistics for the index for each province in China). As the data in Fan et al. (2009) only covers the period from 1997 to 2007, following Li et al. (2009), we use the values of 2002 to 2006 indices for our firms in years 2002 to 2006, and use the value of 2007 indices for our firms in years 2007 to 2009.

state minority (STATEMI) = defined as a dummy variable — we ascribed a value of 1 to non-SOEs that have state shareholders as a minority shareholder, and a value of 0 to non-SOEs that have no state shareholders as a minority shareholder.

The control variables used in this research are:

asset structure (ASSET) = total fixed assets to total assets.

effective tax rate (TAX) = total tax paid by the firm to total assets.

size (SIZE) = log 10 of total assets.

profitability (ROA) = ratio of pre-tax profits to total assets.

In addition, year dummies and industry dummies are also included in our regressions as control variables.

Descriptive statistics

Table 1 presents the descriptive statistics of the main dependent and independent variables for our sample firms. This Table shows that Chinese SOEs had an average debt ratio of 50.8 percent, which is significantly higher than that of Non-SOEs (41.4 percent). Therefore, hypothesis H1a is supported by the result of the univariate test here. With respect to debt maturity, the mean for the short-term debt ratio of SOEs was 41.84 percent (non-SOEs: 36.37 percent), and the mean for the long-term debt ratio of SOEs was just 8.91 percent (non-SOEs: 5.07 percent). This indicates that Chinese SOEs also have both higher short-term and long-term debt ratios than non-SOEs. In addition, the average bank debt ratio of SOEs was about 23.33 percent of total assets (non-SOEs: 18.72 percent). Chinese SOEs have more bank loans than non-SOEs, indicating that SOEs have an advantage in acquiring external bank loans. Overall, compared to SOEs, Chinese non-SOEs have lower leverage ratios and a lower bank loan ratio.

Table 1 also shows that the average largest shareholding of SOEs was quite high, at 41.50 percent (non-SOEs: 34.84 percent). These results indicate that Chinese listed companies have a much more concentrated ownership structure, within which, the ownership structure of SOEs is even more concentrated than non-SOEs. Compared to the high proportion of shares controlled by the largest shareholders, shares held by the top two to five shareholders were relatively small (just 13.62 per cent for SOEs and 18.10 per cent for non-SOEs), indicating that if the top two to five shareholders are considered a monitoring power for constraining the behaviour of the largest shareholders, such monitoring power for listed firms in China (especially for SOEs) may be ineffective. In addition, Table 1 also shows us that the average institutional environment index for Non-SOEs is higher than SOEs, indicating that more Non-SOEs located in well developed regions than their counterparts.

Table 1 Descriptive statistics of main dependent and independent variables

	Type	No. of firms	Mean	Median	Maximum	Minium	T-Stat
LEV	SOEs	755	0.508	0.521	0.997	0.002	22.697****
	non-SOEs	356	0.414	0.417	0.994	0.023	

STDR	SOEs	755	0.418	0.418	0.994	0.002	13.809***
	non-SOEs	356	0.364	0.359	0.944	0.009	
LTDR	SOEs	755	0.089	0.047	0.719	0.000	16.126***
	non-SOEs	356	0.0510	0.018	0.447	0.000	
BR	SOEs	755	0.233	0.230	0.805	0.000	13.524***
	non-SOEs	356	0.187	0.181	0.616	0.000	
LARGEST	SOEs	755	0.415	0.408	0.850	0.017	17.487***
	non-SOEs	356	0.348	0.314	0.852	0.032	
TOP	SOEs	755	0.136	0.099	0.582	0.002	-14.393***
	non-SOEs	356	0.181	0.167	0.562	0.002	
ASSET	SOEs	755	0.366	0.345	0.985	0.000	11.235***
	non-SOEs	356	0.312	0.292	0.972	0.000	
INDEX	SOEs	755	8.045	8.940	11.710	0.630	-10.533***
	non-SOEs	356	8.932	9.360	11.710	0.630	
TAX	SOEs	755	0.012	0.007	0.321	-0.074	0.3682
	non-SOEs	356	0.011	0.008	0.122	-0.050	
SIZE	SOEs	755	6.155	2.279	866.475	0.141	22.690***
	non-SOEs	356	2.427	1.331	137.609	0.140	
ROA	SOEs	755	0.039	0.037	0.906	-3.036	-3.753***
	non-SOEs	356	0.047	0.046	0.442	-2.743	

Notes: LEV is measured as the ratio of total liabilities over total assets.

STDR is the ratio of short-term liabilities over total assets.

LTDR is the ratio of long-term liabilities over total assets.

BR is the total bank loans over total assets.

LARGEST is the proportion of shares held by the largest shareholder.

TOP is the proportion of shares held by the top two to five shareholders.

ASSET is total tangible assets over total assets.

INDEX is the legal and institutional environment index established by Fan (2007).

TAX is the total tax paid by the firm to total assets.

SIZE is the firm's total assets in billions of RMB yuan.

ROA is ratio of pre-tax profits to total assets.

* Statistically significant at the 10% level of significance.

** Statistically significant at the 5% level of significance;

*** Statistically significant at the 1% level of significance.

Results and discussion

Regression models

According to the hypotheses and variables described in the previous section, we estimate the following reduced form of our basic models for regressions:

$$Y_{i,t} = \beta_0 + \beta_1 STATE_{i,t} + \beta_2 LARGEST_{i,t} + \beta_3 LARGEST_{i,t}^2 + \beta_4 TOP_{i,t} + \beta_5 INDEX_{i,t} + \beta_6 CONTROLS_{i,t} + \varepsilon_{i,t} \quad \text{Equation (1)}$$

$$Y_{i,t} = \beta_0 + \beta_1 LARGEST_{i,t} + \beta_2 LARGEST_{i,t}^2 + \beta_3 TOP_{i,t} + \beta_4 INDEX_{i,t} + \beta_5 CONTROLS_{i,t} + \varepsilon_{i,t}$$

Equation (2)

$$Y_{i,t} = \beta_0 + \beta_1 LARGEST_{i,t} + \beta_2 LARGEST_{i,t}^2 + \beta_3 TOP_{i,t} + \beta_4 INDEX_{i,t} + \beta_5 STATEMI_{i,t} + \beta_6 CONTROLS_{i,t} + \varepsilon_{i,t}$$

Equation (3)

Equation (1) is the regression of the full sample. Equation (2) is the regression of SOEs. Equation (3) is the regression of the non-SOEs. For firm i in year t , the capital structure measures are: leverage ratio (LEV), short-term debt ratio (STDR), long-term debt ratio (LTDR) and bank ratio (BR). Our basic empirical models are panel data regressions. We expected that firms within a province would be more likely to have similar characteristics, and thus be more likely to be correlated with one another. This intra-province correlation has to be taken into account in parameter estimations.⁵

4.2 Full sample results

Table 2 presents the regression results using the full sample and model specification,⁶ as given in Equation 1. As shown in Table 2, state ownership is statistically significantly and positively associated with the firm's leverage ratio and bank ratio, which is consistent with both hypothesis H1a and the findings in the research of Dewenter and Malatesta (2001) and Li *et al.* (2009), which also show that SOEs tend to have higher leverage ratios. This result also indicates that the dual roles of the Chinese government as the owner of SOEs and of the four largest domestic banks results in investments of SOEs being supported by the government through heavily subsidised bank loans, leading to excessive leverage in SOEs (Li *et al.* 2009).

Our results indicate that the largest shareholding has a statistically significantly negative relationship with firm leverage ratios and long-term debt ratio of Chinese firms. The negative relationship between the largest shareholding and leverage ratio indicates that the agency conflict between large controlling shareholders and external minority shareholders in China is severe, because China is still a transition economy and investor protection by the legal system is imperfect.

Inconsistent with hypothesis H2c, our regressions indicate that the top two to five shareholders do not adequately monitor the opportunistic behaviour of the largest shareholders, because the coefficients of the variable TOP are all statistically significantly (negative). We argue that this may be because the concentration of shares held by the top two to five shareholders are relatively low, so they may have no voice in the firm's capital structure decisions. On the other hand, the largest shareholders can easily buy off some of the top two to five shareholders, because they hold a relatively small proportion of outstanding shares.

Our results also show that the regional institutional environment index has a statistically significantly negative relationship with leverage ratio and long-term debt ratio of Chinese listed firms. We argue that this is because local governments tend to intervene more often in firms in regions with a low institutional market index (Fan *et al.*, 2007). The influence of government intervention on firm's leverage decision is as follows: first, the government intervention can reduce the possibility of companies' default through financial subsidy, so it will be easier for companies to obtain long-term borrowings; second, it helps firms to get loans by exerting effect on bank's lending decisions, and most of the loans are long-term loans so as to weaken the

influence of officials' replacement on borrowing cost (Fan *et al.*, 2003). Third, it facilitates issuance of long-term debt through maintaining predictable value of currency (Demirguc-Kunt and Maksimovic, 1999). Consequently, firms in regions with a lower market index may be more influenced by government intervention, and have more long-term debt and more bank loans.

Table 2 Regression coefficients of full sample firms

Var	LEV	STDR	LTDR	BR
C	-0.751 <i>0.000</i>	-0.084 <i>0.027</i>	-0.666 <i>0.000</i>	-0.399 <i>0.000</i>
STATE	0.065 *** <i>0.000</i>	0.051 *** <i>0.000</i>	0.014*** <i>0.000</i>	0.023 *** <i>0.000</i>
LARGEST	-0.016 * <i>0.058</i>	0.085 * <i>0.092</i>	-0.069 ** <i>0.016</i>	0.026 <i>0.545</i>
LARGEST ²	-0.205*** <i>0.001</i>	-0.255 *** <i>0.000</i>	0.051 <i>0.142</i>	-0.229 *** <i>0.000</i>
TOP	-0.054*** <i>0.001</i>	-0.093*** <i>0.000</i>	0.037*** <i>0.001</i>	-0.103*** <i>0.000</i>
INDEX	-0.003 *** <i>0.000</i>	-0.001 <i>0.602</i>	-0.003 *** <i>0.000</i>	-0.001 <i>0.126</i>
ASSET	-0.072*** <i>0.000</i>	-0.216 *** <i>0.000</i>	0.143 *** <i>0.000</i>	0.159 *** <i>0.000</i>
TAX	0.132 *** <i>0.000</i>	0.046 *** <i>0.002</i>	0.084 *** <i>0.000</i>	0.060 *** <i>0.000</i>
SIZE	0.139 *** <i>0.000</i>	0.062 *** <i>0.000</i>	0.077 *** <i>0.000</i>	0.067 *** <i>0.000</i>
ROA	-0.627 *** <i>0.000</i>	-0.528 *** <i>0.000</i>	-0.098 *** <i>0.000</i>	-0.433 *** <i>0.000</i>
R ²	0.254	0.184	0.252	0.183
F-Stat	177.753	117.588	176.027	116.797

Notes: LEV is measured as the ratio of total liabilities over total assets.

STDR is the ratio of short-term liabilities over total assets.

LTDR is the ratio of long-term debt over total assets.

BR is the ratio of total bank loans over total assets.

The STATE dummy is set to equate to 1 if the firm is an SOE, and 0 otherwise.

LARGEST is the proportion of shares held by the largest shareholder.

LARGEST² is the square of the proportion of shares held by the largest shareholder.

TOP is the proportion of shares held by the top two to five shareholders.

INDEX is the legal and institutional environment index established by Fan (2007).

ASSET is the ratio of total fixed assets to total assets.

TAX is the total tax paid by the firm to total assets.

SIZE is the 10 logarithm of total assets.

ROA is ratio of pre-tax profits to total assets.

Year dummies and industry dummies are included in each regression, but not reported.

P-values are displayed in italics.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.

Regression results for SOEs and non-SOEs

In order to compare the determinants of capital structure between SOEs and non-SOEs, we conducted a further comparable analysis on SOEs and non-SOEs separately, using Equation 2 and Equation 3. The regression results are reported below in Table 3, where SOEs columns present the regression results of SOEs, using LEV, STDR, LTDR and BR as dependent variables, and non-SOEs columns present the regression results of non-SOEs, using LEV, STDR, LTDR and BR as dependent variables.

Table 3 shows some interesting results. First, we find that the variable STATEMI have a statistically positive relationship with the four dependent variables of the Non-SOEs. Suggesting that Non-SOEs with state as a minority shareholder appear to have more access to bank loans, so political connections are important for Non-SOEs, thus hypothesis H1b is also supported. Our result is also consistent with the finding of Firth *et al.* (2009). Our results also indicate that the institutional environment index has a statistically significantly negative relationship with the leverage ratio and long-term debt ratio of SOEs, which is consistent with hypothesis H1c. However, institutional environment has no statistically significant relationship with leverage ratios of Non-SOEs; thus hypothesis H1d is also proved here. We argue that the negative relationship between institutional environment index and leverage of SOEs is because financing behavior of SOEs in China is greatly influenced by government intervention, and the governmental intervention is more severe in poorly developed regions than in well developed regions (Fan *et al.* 2007).

As expected, our regression results show that the largest shareholding has a statistically significantly negative relationship with leverage ratio and short-term debt ratio of SOEs, which is consistent with hypothesis H2a. In contrast, the largest shareholding has a reverse U-shaped relationship with short-term debt ratio and a U-shaped relationship with long-term debt ratio of Non-SOEs, so hypothesis H2b is also supported here. These results occur because controlling shareholder of Non-SOEs has more incentive to monitor the opportunistic behavior or managers than their counterparts in SOEs.

Table 3 Regression coefficients of SOEs and non-SOEs

Var	LEV		STDR		LTDR		BR	
	SOEs	non-SOEs	SOEs	non-SOEs	SOEs	non-SOEs	SOEs	non-SOEs
C	-0.582 <i>0.000</i>	-0.993 <i>0.000</i>	0.119 <i>0.008</i>	-0.512 <i>0.000</i>	-0.701 <i>0.000</i>	0.483 <i>0.000</i>	0.345 <i>0.000</i>	-0.473 <i>0.000</i>
LARGEST	-0.068 * <i>0.069</i>	0.065 <i>0.475</i>	-0.024*** <i>0.007</i>	0.237 *** <i>0.007</i>	-0.046 <i>0.228</i>	-0.171 *** <i>0.000</i>	0.035 <i>0.510</i>	-0.076 <i>0.292</i>
LARGEST ²	-0.127 * <i>0.074</i>	-0.130 <i>0.267</i>	-0.132 * <i>0.064</i>	-0.350*** <i>0.002</i>	0.006 <i>0.897</i>	0.218 *** <i>0.000</i>	-0.250 *** <i>0.000</i>	-0.023 <i>0.810</i>
TOP	-0.038 * <i>0.063</i>	-0.035 <i>0.230</i>	-0.065*** <i>0.002</i>	-0.089 *** <i>0.001</i>	0.024 * <i>0.050</i>	0.055*** <i>0.000</i>	-0.089 *** <i>0.000</i>	-0.097 *** <i>0.000</i>
INDEX	-0.0039 *** <i>0.000</i>	-0.0007 <i>0.672</i>	-0.0012 <i>0.293</i>	0.0011 <i>0.489</i>	-0.0029 *** <i>0.000</i>	-0.0018 <i>0.162</i>	-0.0010 <i>0.316</i>	-0.0006 <i>0.669</i>
ASSET	-0.068 *** <i>0.000</i>	-0.065 *** <i>0.000</i>	-0.233 *** <i>0.000</i>	-0.137 *** <i>0.000</i>	0.164 *** <i>0.000</i>	0.072 *** <i>0.000</i>	0.171 *** <i>0.000</i>	0.132 *** <i>0.000</i>
TAX	0.127 ***	-0.691 **	0.038 **	-0.554 **	0.088 ***	-0.135	0.062 ***	-1.771 ***

Var	LEV		STDR		LTDR		BR	
	SOEs	non-SOEs	SOEs	non-SOEs	SOEs	non-SOEs	SOEs	non-SOEs
	<i>0.000</i>	<i>0.011</i>	<i>0.013</i>	<i>0.035</i>	<i>0.000</i>	<i>0.276</i>	<i>0.000</i>	<i>0.000</i>
SIZE	0.131 ***	0.158 ***	0.049 ***	0.098***	0.082 ***	0.059 ***	0.063 ***	0.075***
	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>
ROA	-0.713 ***	-0.415 ***	-0.595 ***	-0.353 ***	-0.117 ***	-0.063 ***	-0.523 ***	-0.165 ***
	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.003</i>	<i>0.000</i>	<i>0.000</i>
STATEMI		0.060 ***		0.044 ***		0.016 ***		0.027 ***
		<i>0.000</i>		<i>0.000</i>		<i>0.000</i>		<i>0.000</i>
R ²	0.224	0.226	0.191	0.155	0.256	0.162	0.181	0.178
F-stat	112.610	45.673	91.972	28.791	133.705	30.206	86.309	33.973

Notes: LEV, STDR, LTDR, BR, LARGEST, LARGEST², TOP, INDEX, ASSET, TAX, SIZE and ROA have the same meaning as indicated in the notes to Table 2.

The dummy variable STATEMI is set to equate to 1 if the non-SOEs have state shareholders as minority shareholders and 0 otherwise.

The year dummies and industry dummies are included in each regression, but not reported.

SOEs columns present the regression results of SOEs, using LEV, STDR, LTDR and BR as dependent variables.

Non-SOEs columns present the regression results of non-SOEs, using LEV, STDR, LTDR and BR as dependent variables.

Standard errors are displayed in parentheses below coefficients; p-values are displayed in italics.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.

The Interaction Results of Institutional and the Largest Shareholder for Both SOEs and non-SOEs

As discussed above, we expect that the negative (positive) effect of largest shareholding on capital structure should be weakened (strengthened) in areas with a better institutional environment. In standard setups, the above relation can be explored by adding interaction terms between ownership variables and the level of institutional development to our Eq (2) and Eq (3). Since our measures of institutional development slowly change over time and also vary only at the regional level, the interaction terms between largest shareholding variable and the level of institutional development are highly correlated with the largest shareholding. We opt to employ sub-samples to investigate the interaction effects.

The regional division criterion widely used to measure institutional development variation in China is the division between eastern (coastal), central and western regions.⁷ The eastern region (the coastal provinces), is considered to have the better developed credit market and legal system, due to its advantageous geographical positioning and well-developed market economy. Based on this regional division criterion, we further separate the full sample into four subsamples: 1) SOEs in well-developed regions, 2) SOEs in poorly developed regions, 3) non-SOEs in well-developed and 4) non-SOEs in poorly developed regions. We then conducted further

regressions using the four subsamples to test the interaction effects. The results are reported in Table 4, in which panel A presents the regression results of SOEs in well-developed and poorly developed regions, and panel B presents the regression results of non-SOEs in well-developed and poorly developed regions.

As shown in Table 4, panel A, largest shareholding has a statistically negative relationship with leverage ratio and short-term debt ratio of SOEs in poorly developed regions, and in well developed regions, such negative relationships become insignificant. This result indicate that the improvement of institutional development weakens the negative relationship between largest shareholding and leverage ratio of SOEs, which is consistent with H2d, Interestingly, we find that largest shareholder have an U-shaped relationship with long-term debt ratio of SOEs in well developed regions, and a reverse U-shaped relationship with long-term debt ratio of SOEs in poorly developed regions. Indicating that controlling shareholder of SOEs tend to choose more long-term debt in well developed regions than in poorly developed regions when they hold more shares.

Panel B in Table 4 shows that in well developed regions, largest shareholding has a reverse U-shaped relationship with short-term debt ratio, and a U-shaped relationship with long-term debt ratio. But in poorly developed regions, no significant relationship between largest shareholder and firm leverage ratios was found. Since the positive relationship is strengthened in well developed regions, our hypothesis H2d is also supported. In addition, Table 4, panel B also shows that the positive relationship between state minority shareholding and leverage ratios of Non-SOEs was found in both well developed and poorly developed regions, indicating that political connection is important for Non-SOEs to get bank loans.

Table 4 Regression results of SOEs and non-SOEs in well-developed and poorly-developed regions

<i>Panel A: Regression results of SOEs in well-developed and poorly-developed regions</i>								
Var	LEV		STDR		LTDR		BR	
	Well	Poorly	Well	Poorly	Well	Poorly	Well	Poorly
C	-0.431 <i>0.000</i>	-0.880 <i>0.000</i>	0.136 <i>0.019</i>	0.096 <i>0.179</i>	-0.567 <i>0.000</i>	-0.978 <i>0.000</i>	-0.235 <i>0.000</i>	-0.535 <i>0.000</i>
LARGEST	-0.075 <i>0.339</i>	-0.026 * <i>0.078*</i>	0.056 <i>0.480</i>	-0.143 * <i>0.083</i>	-0.134 *** <i>0.004</i>	0.118* <i>0.054*</i>	0.027 <i>0.690</i>	0.061 <i>0.453</i>
LARGEST ²	-0.064 <i>0.474</i>	-0.182 <i>0.100</i>	-0.209 ** <i>0.022</i>	0.049 <i>0.664</i>	0.147 *** <i>0.007</i>	-0.234 *** <i>0.001</i>	-0.193** <i>0.015</i>	-0.297 *** <i>0.002</i>
TOP	-0.057 ** <i>0.030</i>	0.041 <i>0.186</i>	-0.083 *** <i>0.002</i>	0.001 <i>0.988</i>	0.023 <i>0.135</i>	0.039* <i>0.056</i>	-0.087 *** <i>0.000</i>	-0.064 ** <i>0.019</i>
ASSET	-0.125 *** <i>0.000</i>	0.073 *** <i>0.000</i>	-0.263 *** <i>0.000</i>	-0.154 *** <i>0.000</i>	0.136*** <i>0.000</i>	0.227 *** <i>0.000</i>	0.131 *** <i>0.000</i>	0.259*** <i>0.000</i>
TAX	0.124 *** <i>0.000</i>	-1.942*** <i>0.000</i>	0.044*** <i>0.005</i>	-1.466*** <i>0.000</i>	0.079*** <i>0.000</i>	-0.482*** <i>0.003</i>	0.062*** <i>0.000</i>	-2.224*** <i>0.000</i>
SIZE	0.114 *** <i>0.000</i>	0.152*** <i>0.000</i>	0.047*** <i>0.000</i>	0.048*** <i>0.000</i>	0.067*** <i>0.000</i>	0.105*** <i>0.000</i>	0.051*** <i>0.000</i>	0.079*** <i>0.000</i>
ROA	-1.007 *** <i>0.000</i>	-0.385*** <i>0.000</i>	-0.845*** <i>0.000</i>	-0.330*** <i>0.000</i>	-0.160*** <i>0.000</i>	-0.054** <i>0.021</i>	-0.699*** <i>0.000</i>	-0.257*** <i>0.000</i>
R ²	0.244	0.289	0.240	0.150	0.219	0.333	0.160	0.282
F-Stat	80.097	68.544	78.271	29.764	69.687	84.417	47.181	66.164

Panel B: Regression results of non-SOEs in well-developed and poorly-developed regions

Var	LEV		STDR		LTDR		BR	
	Well	Poorly	Well	Poorly	Well	Poorly	Well	Poorly
C	-1.109 <i>0.000</i>	-0.731 <i>0.000</i>	-0.615 <i>0.000</i>	-0.281 <i>0.084</i>	-0.495 <i>0.000</i>	-0.449 <i>0.000</i>	-0.450 <i>0.000</i>	-0.631 <i>0.000</i>
LARGEST	0.028 <i>0.797</i>	0.108 <i>0.515</i>	0.331*** <i>0.001</i>	-0.040 <i>0.796</i>	-0.302*** <i>0.000</i>	0.151** <i>0.035</i>	-0.128 <i>0.146</i>	0.105 <i>0.420</i>
LARGEST ²	-0.038 <i>0.788</i>	-0.254 <i>0.214</i>	-0.399*** <i>0.004</i>	-0.149 <i>0.444</i>	0.359*** <i>0.000</i>	-0.107 <i>0.225</i>	0.008 <i>0.941</i>	-0.164 <i>0.308</i>
TOP	-0.013 <i>0.681</i>	-0.065 <i>0.276</i>	-0.066 ** <i>0.038</i>	-0.133 ** <i>0.019</i>	0.052 *** <i>0.001</i>	0.068*** <i>0.008</i>	-0.108*** <i>0.001</i>	-0.044 <i>0.345</i>
ASSET	-0.113 *** <i>0.000</i>	0.082** <i>0.026</i>	-0.188*** <i>0.000</i>	0.001 <i>0.988</i>	0.071*** <i>0.000</i>	0.082*** <i>0.000</i>	0.127*** <i>0.000</i>	0.150*** <i>0.000</i>
TAX	-0.854 *** <i>0.009</i>	-0.396 <i>0.418</i>	-0.905*** <i>0.004</i>	0.128 <i>0.782</i>	0.052 <i>0.731</i>	-0.522** <i>0.013</i>	-1.737*** <i>0.000</i>	-1.755*** <i>0.000</i>
SIZE	0.171 *** <i>0.000</i>	0.125*** <i>0.000</i>	0.109*** <i>0.000</i>	0.078*** <i>0.000</i>	0.062*** <i>0.000</i>	0.046*** <i>0.000</i>	0.074*** <i>0.000</i>	0.087*** <i>0.000</i>
ROA	-0.374 *** <i>0.000</i>	-0.506*** <i>0.000</i>	-0.300*** <i>0.000</i>	-0.468*** <i>0.000</i>	-0.074*** <i>0.000</i>	-0.038 <i>0.224</i>	-0.128*** <i>0.000</i>	-0.265*** <i>0.000</i>
STATEMI	0.067 *** <i>0.000</i>	0.041*** <i>0.001</i>	0.053*** <i>0.000</i>	0.021* <i>0.072</i>	0.014*** <i>0.000</i>	0.019*** <i>0.000</i>	0.024*** <i>0.002</i>	0.032*** <i>0.000</i>
R ²	0.272	0.168	0.197	0.120	0.192	0.137	0.184	0.179
F-Stat	42.420	10.664	27.900	7.217	27.006	8.366	25.719	11.436

Notes: LEV, STDR, LTDR, BR, LARGEST, LARGEST², TOP, ASSET, TAX, SIZE, ROA and STATEMI have the same meaning as described in the notes to Table 2 and Table 3.

The year dummies and industry dummies are included in each regression, but not reported.

Well columns present the regression results in well-developed regions, using LEV, STDR, LTDR and BR as dependent variables.

Poorly columns present the regression results in poorly developed regions, using LEV, STDR, LTDR and BR as dependent variables.

Standard errors are displayed in parentheses below coefficients; p-values are displayed in italics.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.

The effect of share split reform on capital structure of both SOEs and non-SOEs

In order to examine the effect of share split reform on firm's capital structure decision, we further compares the capital structure of SOEs and Non-SOEs before and after the share split reform. The results are reported in Table 5, in which panel A presents the summary statistics of SOEs and non-SOEs before and after the share split reform, panel B presents the regression results of SOEs before and after the share split reform, while panel C presents the regression results of non-SOEs.

Panel A in Table 5 shows that both SOEs and Non-SOEs employ more leverage, short-term debt and long-term debt after the share split reform than before. Whereas both SOEs and Non-SOEs employ similar levels of bank loans before and after the share split reform. The result also indicates that both largest shareholding and the shares held by top two to five shareholders are significantly lower after the share split reform than before, suggesting that the share split reform reduces the ownership concentration of Chinese firms.

As shown in panel B Table 5, largest shareholding has a negative relationship with leverage ratio, short-term debt ratio and bank ratio of SOEs before the share split reform, while after the reform, largest shareholding appears to have a reverse U-shaped relationship with leverage and bank ratio of SOEs, which is consistent with our hypothesis H2e. These results indicate that after the reform, largest shreholder of SOEs have more incentive to monitor the opportunistic behavior of managers and less incentive to pursue their private benefit against the minority shareholders, because the reform reduces the agency conflict between controlling shareholders and minority shareholders and improves the corporate governance quality of SOEs.

Panel C in Table 5 shows that no non-linear relationship was found between largest shareholding and the dependent variables before the share split reform, but largest shareholding have non-linear relationship with short-term debt ratio and long-term debt ratio of Non-SOEs after the share split reform. In addition, the statistically significantly nagative relationship between largest shareholding and bank ratio becomes insignificant after the share split reform. These results also indicate that the share split reform strengthens the positive relationship, and weakens the negaitive relationship between largest shareholding and leverage of Non-SOEs, which is also consistent with H2e.

Table 5 Regression results of SOEs and non-SOEs before and after the share split reform

<i>Panel A Summary statistics of SOEs and Non-SOEs before and after the share split reform</i>								
		SOEs		Non-SOEs				
		Before	After	Before	After			
Capital structures								
LEV	Mean	0.479	0.535	0.398	0.426			
	T-test		-12.489***		-4.082***			
STDR	Mean	0.401	0.435	0.353	0.372			
	T-test		-7.557***		-3.006***			
LTDR	Mean	0.077	0.100	0.045	0.054			
	T-test		-8.036***		-2.961***			
BR	Mean	0.231	0.234	0.188	0.186			
	T-test		-0.785		0.337			
Ownership structures								
Largest	Mean	0.457	0.375	0.379	0.324			
	T-test		19.973***		8.990***			
Top	Mean	0.142	0.129	0.195	0.170			
	T-test		4.317***		4.951***			
<i>Panel B Regression results of SOEs before and after the share split reform</i>								
Variable	LEV		STDR		LTDR		BR	
	Before	After	Before	After	Before	After	Before	After

C	-0.613 <i>0.000</i>	-0.546 <i>0.000</i>	-0.014 <i>0.827</i>	0.210 <i>0.000</i>	-0.597 <i>0.000</i>	-0.755 <i>0.000</i>	-0.180 <i>0.002</i>	-0.453 <i>0.000</i>
LARGEST	-0.284 *** <i>0.002</i>	0.059* <i>0.094</i>	-0.251*** <i>0.006</i>	0.112 <i>0.210</i>	-0.036 <i>0.501</i>	-0.052 <i>0.359</i>	-0.177** <i>0.028</i>	0.148* <i>0.052</i>
LARGEST ²	0.118 <i>0.248</i>	-0.264** <i>0.015</i>	0.128 <i>0.197</i>	-0.278** <i>0.013</i>	-0.007 <i>0.896</i>	0.012 <i>0.857</i>	-0.009 <i>0.917</i>	-0.379*** <i>0.000</i>
TOP	-0.030 <i>0.282</i>	-0.033 <i>0.264</i>	-0.036 <i>0.187</i>	-0.081*** <i>0.007</i>	0.003 <i>0.850</i>	0.046** <i>0.016</i>	-0.099*** <i>0.000</i>	-0.077*** <i>0.003</i>
INDEX	-0.001 <i>0.238</i>	-0.004*** <i>0.001</i>	0.001 <i>0.387</i>	-0.002* <i>0.083</i>	-0.003*** <i>0.000</i>	-0.002** <i>0.024</i>	-0.001 <i>0.499</i>	0.001 <i>0.921</i>
ASSET	-0.066*** <i>0.000</i>	-0.059*** <i>0.000</i>	-0.263*** <i>0.000</i>	-0.200*** <i>0.000</i>	0.195*** <i>0.000</i>	0.139*** <i>0.000</i>	0.144*** <i>0.000</i>	0.209*** <i>0.000</i>
TAX	0.139*** <i>0.000</i>	-1.077*** <i>0.000</i>	0.060*** <i>0.001</i>	-0.685*** <i>0.004</i>	0.078*** <i>0.000</i>	-0.392** <i>0.011</i>	0.062*** <i>0.000</i>	-1.326*** <i>0.000</i>
SIZE	0.137*** <i>0.000</i>	0.125*** <i>0.000</i>	0.068** <i>0.000</i>	0.037** <i>0.000</i>	0.069*** <i>0.000</i>	0.088*** <i>0.000</i>	0.053*** <i>0.000</i>	0.069*** <i>0.000</i>
ROA	-1.029*** <i>0.000</i>	-0.493*** <i>0.000</i>	-0.895*** <i>0.000</i>	-0.414*** <i>0.000</i>	-0.132*** <i>0.000</i>	-0.078*** <i>0.001</i>	-0.780*** <i>0.000</i>	-0.301*** <i>0.000</i>
R ²	0.242	0.192	0.266	0.133	0.292	0.227	0.193	0.207
F-stat	82.083	65.212	93.303	41.870	106.012	80.318	61.520	71.473

Panel C The regression results of Non-SOEs before and after the share split reform

Variable	LEV		STDR		LTDR		BR	
	Before	After	Before	After	Before	After	Before	After
C	-0.924 <i>0.000</i>	-1.005 <i>0.000</i>	-0.594 <i>0.000</i>	-0.479 <i>0.000</i>	-0.330 <i>0.000</i>	-0.528 <i>0.000</i>	-0.389 <i>0.000</i>	-0.509 <i>0.000</i>
LARGEST	-0.104 <i>0.476</i>	0.091 <i>0.445</i>	0.027 <i>0.840</i>	0.313*** <i>0.008</i>	-0.129 <i>0.144</i>	-0.222*** <i>0.000</i>	-0.173* <i>0.055</i>	-0.071 <i>0.438</i>
LARGEST ²	0.008 <i>0.963</i>	-0.099 <i>0.536</i>	-0.125 <i>0.455</i>	-0.415*** <i>0.009</i>	0.130 <i>0.100</i>	0.315*** <i>0.000</i>	0.062 <i>0.676</i>	0.004 <i>0.974</i>
TOP	-0.047 <i>0.282</i>	-0.039 <i>0.323</i>	-0.079** <i>0.049</i>	-0.097** <i>0.012</i>	0.032* <i>0.087</i>	0.058*** <i>0.001</i>	-0.089** <i>0.014</i>	-0.116*** <i>0.000</i>
INDEX	-0.001 <i>0.659</i>	-0.000 <i>0.931</i>	0.001 <i>0.823</i>	0.001 <i>0.445</i>	-0.002 <i>0.147</i>	-0.001 <i>0.065*</i>	-0.001 <i>0.541</i>	0.000 <i>0.861</i>
ASSET	-0.081*** <i>0.002</i>	-0.044* <i>0.064</i>	-0.178*** <i>0.000</i>	-0.099*** <i>0.000</i>	0.096*** <i>0.000</i>	0.055*** <i>0.000</i>	0.116*** <i>0.000</i>	0.151*** <i>0.000</i>
TAX	-0.057 <i>0.909</i>	-0.699** <i>0.040</i>	0.286 <i>0.545</i>	-0.471 <i>0.162</i>	-0.340 <i>0.127</i>	-0.227 <i>0.149</i>	-1.430*** <i>0.001</i>	-1.673*** <i>0.000</i>
SIZE	0.156*** <i>0.000</i>	0.157*** <i>0.000</i>	0.114*** <i>0.000</i>	0.091*** <i>0.000</i>	0.041*** <i>0.000</i>	0.065*** <i>0.000</i>	0.070*** <i>0.000</i>	0.077*** <i>0.000</i>
ROA	-0.657*** <i>0.000</i>	-0.383*** <i>0.000</i>	-0.730*** <i>0.000</i>	-0.296*** <i>0.000</i>	0.072 <i>0.119</i>	-0.086*** <i>0.000</i>	-0.351*** <i>0.001</i>	-0.140*** <i>0.000</i>
STATEMI	0.066*** <i>0.000</i>	0.053*** <i>0.000</i>	0.054*** <i>0.000</i>	0.034*** <i>0.000</i>	0.012*** <i>0.004</i>	0.019*** <i>0.000</i>	0.034*** <i>0.000</i>	0.018** <i>0.011</i>
R ²	0.217	0.232	0.212	0.126	0.131	0.196	0.165	0.199
F-stat	25.017	35.577	24.364	17.072	13.570	28.608	17.823	29.258

Notes: LEV, STDR, LTDR, BR, LARGEST, LARGEST2, TOP, ASSET, TAX, SIZE, ROA and STATEMI have the same meaning as described in the notes to Table 3 and Table 4.

The year dummies and industry dummies are included in each regression, but not reported.

Before and after columns present the regression results before and after the share split reform respectively, using LEV, STDR, LTDR and BR as dependent variables.

Standard errors are displayed in parentheses below coefficients; p-values are displayed in italics.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.

Conclusions

This paper investigates the effect of ownership structure on the leverage decision of both SOEs and non-SOEs in China. Our results indicate that state control and ownership structure have different influences on the leverage decision of Chinese SOEs and non-SOEs. We first show that state ownership is positively associated with firm leverage, and then show that SOEs in regions with a poor institutional environment have higher leverage ratios, especially a higher long-term debt ratio, than SOEs in regions with a better institutional environment. We found that political connections are important for non-SOEs to secure bank loans. The largest shareholding has a negative relationship with the leverage ratios of SOEs, while a non-linear relationship exists with the short-term and long-term debt ratio non-SOEs. The results also show that the improvement of institutional environment and the share split reform can either weaken the negative relationship or strengthen the positive relationship between largest shareholding and leverage of both SOEs and Non-SOEs to some extent.

Overall, our results suggest that the financing behaviour of Chinese Non-SOEs is more market oriented. Chinese SOEs have a quite different financing behaviour from the firms in Western countries, due to the influence and prevalence of government intervention. However, the share split reform and a better institutional environment is helpful to reduce the agency conflict between largest shareholder and minority shareholders, and improve the corporate governance quality of Chinese firms. Therefore, policies that aim to reduce the government intervention and the ownership concentration, and encourage the development of the institutional environment are necessary to diversify the financial sources of Chinese listed firms, and will also benefit to China's market-oriented reform.

Notes

1. Prior to the split-share structure reform, domestic A shares were divided into non-tradable and tradable shares. Non-tradable shareholders represent the government, hold roughly a two-thirds majority, and manage the firms, while tradable shareholders have little power to affect the decisions made by non-tradable shareholders. The reform requires all the non-tradable shareholders have to pay compensation to tradable shareholders to convert those non-tradable shares to tradable share. Therefore, the reform can reduce state ownership, ownership concentration, and also align the interest between large and minority shareholders better.
2. Prior research tends to use survey data of non-listed firms (Li *et al.* 2009; Firth *et al.* 2009). However, no literature mainly focuses on the comparison between SOEs and Non-SOEs.
3. Recent literature suggests that a firm's financing behaviours are shaped by the legal systems and financial environments across countries (la Porta *et al.*, 1998; Demirguc-Kunt and Maksimovic, 1998; Rajan and Zingales, 2003). According to this body of research, an efficiently operating legal and financial system can reduce problems of opportunism and asymmetric information, and have a significant effect on the relative magnitude of the costs and benefits associated with debt. Evidence also increasingly indicates that firms' capital structures also vary across different regions within a single country (Degryse and Ongena, 2005; Guiso, 2004).

4. This is because financial firms tend to have their own capital structure, due to their specific financial character.
5. We used robust standard errors adjusted for clustering at the provincial level. Robust standard errors are much larger than conventional estimates, which assume independence across firm-year observations and standard errors only assuming autocorrelation within the same firm. Therefore, so our significance tests are not inflated by the large number of firm-year observations in our sample. Year dummies are included in all specifications to capture temporal effects.
6. Our regression results include the coefficients for various variables, but we focus only on the results related to our hypotheses.
7. The eastern region covers: Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan. The central and west regions include: Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan, Inner Mongolia, Guangxi, Sichuan, Chongqing, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang and Tibet.

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References

- Allen F., Qian J., Qian M., 2005. Law, finance, and economic growth in China. *Journal of Financial Economics* 77, 57 – 116.
- Akhtar, S., and Oliver B., 2009, Determinants of Capital Structure for Japanese Multinational and Domestic Corporations, *International Review of Finance*, 9:1–2, 1-26.
- Baker M., and Wurlger J., 2002, Market timing and capital structure, *Journal of Finance*, 57, 1-32.
- Berger, P.G., Ofek, E. and Yermack, D.L. (1997), “Managerial entrenchment and capital structure decision”, *Journal of Finance*, Vol. 52, pp. 1411-38.
- Berle, A. and Means, G.C., 1932, *The Modern Corporation and Private Property*, New York, The Macmillan company, USA.
- Booth, L., Aivazian, V., Demirg-Kunt, A., Maksimovic, V., 2001. Capital structure in developing countries. *Journal of Finance* 56, 87–130.
- Brandt L., Li H., 2003. Bank discrimination in transition economies: ideology, information, and incentives? *Journal of Comparative Economics* 31, 387 – 413.
- Claessens S., Djankov S., and Lang H.P., 2000, “The Separation of Ownership and Control in East Asian Corporation”, *Journal of Financial Economics* 58, pp.81-112.
- Cull R., Xu L.C., Zhu T., 2009. Formal finance and trade credit during China’s transition. *Journal of Financial Intermediation* 18, 173 – 192.
- Degryse, H., Ongena, S., 2005, Distance, lending relationships and competition, *Journal of Finance*, 60(1), 231-266.
- Delcours N., 2007, The determinants of capital structure in transitional economies, *International Review of Economics and Finance* 16, 400-415.
- Demirg-Kunt A., Maksimovic V., 1998. Law, finance, and firm growth. *Journal of Finance* 53, 2107 – 2187.
- Demirg-Kunt A., Maksimovic V., 1999. Institutions, financial markets, and firm debt maturity. *Journal of Financial Economics* 54, 295 – 336.
- Dewenter, Kathryn L., Malatesta, Paul H., 2001. State-owned and privately owned firms:

an empirical analysis of profitability, leverage, and labor intensity. *American Economic Review* 91, 320–334.

Dyck, I.J. Alexander and Zingales L., 2002, “Private Benefits of Control: An International Comparison”, *CEPR Discussion Paper No. 3177*.

Faccio M., and Lang H.P., 2002, The Ultimate Ownership of Western European Corporations, *Journal of Financial Economics* 65, pp.365-395.

Fan, G., Wang, X.L. and Zhu, H.P., 2009, The Marketization Index of China: The Process of Regional Marketization Report 2007, Press of Economic Science, Beijing [In Chinese].

Fan, P.H., Titman, S. and Twite, J. (2003), An international comparison of capital structure and debt maturity choices, SSRN working paper.

Firth, M., Fung, P., and Rui, O., 2006, Corporate performance and CEO compensation in China, *Journal of Corporate Finance*, 12, 693–714.

Firth, M., Fung, P.M.Y., Rui, O.M., 2007. How ownership and corporate governance influence chief executive pay in China's listed firms. *Journal of Business Research* 60(7), 776–785.

Firth M. *et al.*, 2009. Inside the black box: bank credit allocation in China's private sector. *Journal of Banking and Finance* 33, 1144–1155.

Friend, I. and Lang, L.H.P. (1988), “An empirical test of the impact of managerial self-interest on corporate capital structure”, *Journal of Finance*, Vol. 43, pp. 271-81.

García-Herrero A., Gavilá S., Santabárbara D., 2005. China's Banking Reform: An Assessment of Its Evolution and Possible Impact. Bank of Spain Working Paper.

Gordon R.H., Li W., 2003. Government as a discriminating monopolist in the financial market: the case of China. *Journal of Public Economics* 87, 283 - 312.

Guiso, L., Sapienza, P., Zingales, L., 2004. Does Local Financial Development Matter?. *Quarterly Journal of Economics*, 119, 929-969.

Huang, Samuel G.H., Song, Frank M., 2002. The Determinants of Capital Structure: Evidence from China. University of Hong Kong Working Paper.

Jensen, M. and Meckling, W., 1976, Theory of the firm: managerial behaviours, agency cost and ownership structure, *Journal of Financial Economics*, 58, 3-28.

Jong A., Kabir R., Nguyen. T. T., 2008, Capital structure around the world: The roles of firm- and country-specific determinants, *Journal of Banking & Finance*, 32, 1954 - 1969.

Kaoto, T. and Long, C. 2005, “CEO turnover, firm performance, and corporate governance in Chinese listed firms”, SSRN working paper.

Kasseeah H., 2008, What determines the leverage decisions of Chinese firms? *Journal of the Asia Pacific Economy*, Vol.13, No.3, 354-374.

La-Porta R. *et al.*, 1997. Legal determinants of external finance. *Journal of Finance* 52, 1131 - 1150.

La-Porta R. *et al.*, 1998, *Law and Finance*. *Journal of Political Economy*, 6, 1113-1155.

La-Porta R., Lopez-de-Silanes F., Shleifer A., 2002. Government ownership of banks. *Journal of Finance* 57, 265 - 301.

Li K., Yue H., Zhao L., 2009. Ownership, institutions, and capital structure: evidence from China, *Journal of Comparative Economics*, 37, 471-490.

Modigliani, F. and Miller M., 1958, The cost of capital, corporate finance, and the theory of investment, *American Economic Review*, 48(3), 261-297.

Modigliani, F. and Miller M., 1963, Corporate income taxes and the cost of capital: a correction, *American Economic Review*, 53, 433-443.

Miller, M., 1977, Debt and taxes, *Journal of Finance* 32, 261-275.

Myers, S., 1984, The capital structure puzzle, *Journal of Finance*, 39, 575-592.

Nenova T., 2000, “The Value of Corporate Votes and Control Benefits: A Cross-country Analysis”, Harvard University working paper.

Park A., Seht K., 2001, Tests of financial intermediation and banking reform in China, *Journal of Comparative Economics*, Vol. 29, Iss. 4; 608-644.

Pagao, M. and Roell, A., 1999, “The choice of stock ownership structure: agency costs, monitoring, and the decision to go public”, *The Quarterly Journal of Economics*, Vol. 113, pp. 188-225.

Petersen, M. A. and Rajan R.G., 1994, The benefits of lending relationship: evidence from small business data, *The journal of Finance*, 49(1), 3-37.

Rajan, R., Zingales, L., 2003, Banks and Markets: the Changing Character of European Finance. *CEPR Discussion Paper*, 3865.

- Ross, S., 1977, The determination of financial structures: an incentive signalling approach, *Bell Journal of Economics*, 8, 23-40.
- Sapienza, P., 2004, The effects of government ownership on bank lending, *Journal of Financial Economics*, 72, 357-384.
- Serrasqueiro, Z.M.S., and Rogao, M.C.R., 2009, Capital structure of listed Portuguese companies, *Review of Accounting and Finance*, 8 (1), 54-75.
- Shi Y., 2009, Corporate Financing Policy under Large Shareholder's Control: Evidence from Chinese Listed Companies, SSRN working paper.
- Shleifer A., Vishny R.W., 1994. Politicians and firms. *Quarterly Journal of Economics*, 109, 995-1025.
- Shleifer A., Vishny R.W., 1997, "A Survey of Corporate Governance", *Journal of Finance* 52 (2), pp.737-783.
- Sun, Q., Tong, W.H.S., 2003. China share issue privatization: the extent of its success. *Journal of Financial Economics* 70 (2), 183 - 222.
- Xiao, Z., 2009, Large shareholders, legal institution and capital structure decision, Empirical evidence from Chinese listed companies, *Nankai Business Review*, Vol, 12(1), 59-86[In Chinese].
- Xu, X.N. and Wang, Y. 1999, Ownership structure and corporate governance of Chinese listed companies, *China Economic Review*, Vol. 10, pp. 75-98 [In Chinese].
- Yeh, Y-H. et al., 2009, Non-tradable Share Refrom and Corporate Governance in the Chinese Stock Market, *Corporate Governance: An International Review*, 17(4), 457-475.
- Zeckhauser, R J., and Pound J., 1990, Are Large Shareholder Monitors? An Investigation of Share Ownership and Corporate Performance, in R. Glenn Hubbard, ed.: *Asymmetric Information, Corporate Finance, and Investment*, pp.149-180, University of Chicago Press.
- Zhang, W.Y., 1998, "China's SOE Reform: A Corporate Governance Perspective", Technical Report Series 1998-5, Asia Pacific Financial Markets Research Centre, City University of Hong Kong.
- Zou H., Xiao J.Z., 2006, The financing behaviour of listed Chinese firms, *The British Accounting Review* 38, 239-258.

Appendix A. Detailed description of the marketization index

The marketization index is compiled by the National Economic Research Institute (Fan et al., 2009), a comprehensive index that captures the regional market development of the following aspects:

- (1) Relationship between government and markets:
 - a. The role of markets in allocating resources using the ratio of government spending to GDP.
 - b. The level of tax burden on rural residents using the ratio of farmer families' tax bills to their annual income.
 - c. The role of government in business using the ratio of total hours firm managers spent dealing with government and government officials to their total working hours.
 - d. The level of enterprise burden in addition to normal taxes using the ratio of non-tax levies to sales.
 - e. The size of government using the ratio of employment by the central and local government, and various social organizations to population.
- (2) Development of nonstate sector in the economy:
 - a. The ratio of industrial output by the private sector to total industrial output.
 - b. The ratio of capital investment by the private sector to total capital investment.
 - c. The ratio of employment by the private sector to total employment.
- (3) Development of product markets:
 - a. The extent to which prices are set by market demand and supply.
 - i. The extent to which prices of retail merchandises are set by market demand and supply.
 - ii. The extent to which prices of production factors are set by market demand and supply.
 - iii. The extent to which prices of farm products are set by market demand and supply.
 - b. The extent of regional trade barriers using the ratio of number of trade barriers to GDP.
- (4) Development of factor markets:

- a. Banking development.
 - i. Competitiveness of the banking sector using the ratio of deposits taken by non-state financial institutions to total deposits.
 - ii. The extent to which banks employ economic criteria in their capital allocation using the ratio of short-term loans to the non-state sector (such as agricultural loans, loans to village/township enterprises, loans to private enterprises, and loans to foreign-owned enterprises) to total short-term loans.
 - b. Foreign direct investment (FDI) using the ratio of FDI to GDP.
 - c. Mobility of labor using the ratio of employment provided by migrant workers to total employment.
 - d. Commercialization of technological innovation using the ratio of volume of technological transfers to employment by the technology sector.
- (5) Development of market intermediaries and legal environment:
- a. Development of marketintermediaries.
 - i. The ratio of number of lawyers to population.
 - ii. The ratio of registered accountants to population.
 - b. Protection of producers' legal rights using the ratio of number of economic crimes to GDP.
 - c. Protection of property rights.
 - i. The average number of patents applied per engineer.
 - ii. The average number of patents approved per engineer.
 - d. Protection of consumer rights using the ratio of number of consumer complaints received by the Consumer Association to GDP.

In summary, the marketization index consists of 23 components. The year of 1999 is used as the base year, and the minimum and maximum values for each component are specified to be 0 and 10, respectively. Values of each component in other years are normalized by the corresponding base year values. The final marketization index is an arithmetic average of these 23 components. It is worth noting that using the principal components analysis to determine the weights on each of the 23 components leads to no major difference in the relative ranking of regions (Li et al., 2009).

Appendix B. Descriptive statistics for marketization index

Province	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Beijing	5.15	4.89	3.95	4.64	6.17	6.92	7.5	8.19	8.48	8.96	9.55
Tianjin	4.53	4.92	4.71	5.36	6.59	6.73	7.03	7.86	8.41	9.18	9.76
Hebei	4.98	5.21	4.66	4.81	4.93	5.29	5.59	6.05	6.61	6.93	7.11
Shanxi	3.34	3.61	3.32	3.39	3.4	3.93	4.63	5.13	5.28	5.84	6.23
Inner Mongolia	2.55	2.93	3.41	3.59	3.53	4	4.39	5.12	5.74	6.28	6.4
Liaoning	4.58	4.64	4.47	4.76	5.47	6.06	6.61	7.36	7.92	8.18	8.66
Jilin	3.51	3.57	3.97	3.96	4	4.29	4.69	5.49	6.06	6.44	6.93
Heilongjiang	2.73	3.31	3.57	3.7	3.73	4.09	4.45	5.05	5.69	5.93	6.27
Shanghai	5	5.04	4.7	5.75	7.62	8.34	9.35	9.81	10.25	10.79	11.71
jiangsu	5.25	5.38	5.73	6.08	6.83	7.4	7.97	8.63	9.35	9.8	10.55
Zhejiang	6.17	6.41	5.87	6.57	7.64	8.37	9.1	9.77	10.22	10.8	11.39
Anhui	4.42	4.39	4.67	4.7	4.75	4.95	5.37	5.99	6.84	7.29	7.73
Fujian	5.43	5.7	5.79	6.53	7.39	7.63	7.97	8.33	8.94	9.17	9.45
Jiangxi	3.93	4.41	3.9	4.04	4	4.63	5.06	5.76	6.45	6.77	7.29
Shandong	4.8	5.19	5.15	5.3	5.66	6.23	6.81	7.52	8.44	8.42	8.81
Henan	4.82	5.09	4.05	4.24	4.14	4.3	4.89	5.64	6.73	7.07	7.42
Hubei	4.24	4.69	4.01	3.99	4.25	4.65	5.47	6.11	6.86	7.12	7.4
Hunan	4.73	5.09	3.98	3.86	3.94	4.41	5.03	6.11	6.75	6.98	7.19
Guangdong	6.29	6.47	5.96	7.23	8.18	8.63	8.99	9.36	10.18	10.55	11.04
Guangxi	4.22	4.29	4.39	4.29	3.93	4.75	5	5.42	6.04	6.12	6.37
Hainan	4.6	4.51	4.7	4.75	5.66	5.09	5.03	5.41	5.63	6.35	6.88
Chongqing	4.28	4.39	4.57	4.59	5.2	5.71	6.47	7.2	7.35	8.09	8.1

Sichuan	4.24	5.37	4.07	4.41	5	5.35	5.85	6.38	7.04	7.26	7.66
Guizhou	2.89	3.2	3.29	3.31	2.95	3.04	3.67	4.17	4.8	5.22	5.57
Yunnan	2.7	2.89	3.47	4.08	3.82	3.8	4.23	4.81	5.27	5.72	6.15
Tibet	NA	NA	NA	0	0.33	0.63	0.79	1.55	2.64	2.89	4.25
Shanxi	3.03	3.45	2.94	3.41	3.37	3.9	4.11	4.46	4.81	5.11	5.36
gansu	3.01	3.36	3.61	3.31	3.04	3.05	3.32	3.95	4.62	4.95	5.31
Qinghai	1.29	1.49	2.15	2.49	2.37	2.45	2.6	3.1	3.86	4.24	4.64
Ningxia	1.69	2.01	2.86	2.82	2.7	3.24	4.24	4.56	5.01	5.24	5.85
Xinjiang	1.77	2	1.72	2.67	3.18	3.41	4.26	4.76	5.23	5.19	5.36