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Determinants of Firm Leverage

Evidence from China

Abstract: Using a large survey sample of manufacturing firms between 2003 and 2006, the majority of them not listed on either stock exchange, we studied financing behavior in China and tested a series of hypotheses about the determinants of firm leverage as derived from the pecking-order theory. Overall our results show that the theory well explains private firm financing where the amount of leverage is negatively related to profits, liquidity, and age, and positively related to firm size and average leverage ratio. However, different ownership types and firms located in different market environments do not have the same determinants of leverage, and their financing behavior is not well explained by the pecking-order theory. This suggests that China's economic and financial reforms have not yet been completed.

China's economic reforms have substantially changed the industrial organization and management of firms. Under central planning, state-owned enterprises (SOEs) dominated economic activity, with urban and rural collectives on the fringe. Today, the evolution of ownership forms

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and of relationships of firms to the market and government has created a range of firm types. This process of privatization and modernization of firms is specific to China. It was not until the mid-1990s that the need to privatize was accepted and only in the 2000s that the government officially recognized private property by including the right of private ownership in the constitution.

In the mid-1990s, China's central leaders also initiated bank reforms in conjunction with public finance reform.¹ Financial sector development lagged other aspects of market reform, with price distortions of capital and other constraints (Allen, Qian, and Qian 2005; Aziz 2008). Reforms of SOEs also hit a critical juncture at this time, as reflected in the 1994 Company Law. By 2001, over 80 percent of SOEs had been through some form of reform, and over 50 million state employees lost their jobs (Li and Putterman 2008, 356).

Government control over investment decisions is a key characteristic of a planned economy. Decentralizing investment via freedom to invest retained profits, take out loans, utilize equity markets, and seek venture capital funding is a critical step in a market transition. Changes in the rules for corporate governance along with market competition continued to force companies to transform. The changes at some companies were faster than their reclassification, so that some state companies were probably acting like private firms before they were recognized as such (Dollar and Wei 2007, 3). A study by Bai, Lu, and Tao (2009) found that just issuing some shares to private investors gave sufficient incentive to increase profits and exhibit other market-driven outcomes. Matthews, Jiang, and Guo (2009) found that joint-stock banks performed better than state-owned banks. Kato and Long (2006) found that privately controlled listed firms exhibited a closer match between CEO turnover and firm performance than did state-controlled listed firms, and that independent boards were positively related to CEO turnover and performance.

Most companies, however, were reforming despite not being listed on either of the two exchanges. Studies reviewed by Li and Putterman (2008) found improved performance as measured by profitability and productivity, although there was evidence of continued state influence on company operations, mostly in a way that enhanced profitability. Examining investment efficiency across firm types, however, Dollar and Wei (2007) found that state firms continued to have lower returns on capital than private firms. Even within the banking reforms passed

in 1994, there was no procedure outlined for private firms to apply for funding without government sponsorship of some type. Only in 1997 did the regulations change to allow banks to lend to private firms (Firth et al. 2009, 1146). In cross-country comparisons, China's ranking in terms of access to financing is quite low (Salvatore 2010).

This article explores the determinants of Chinese domestic firm leverage positions using a sample survey of manufacturing firms overwhelmingly unlisted from the mid-2000s—a decade after loan options opened up. Studies of leverage determinants in China to date have focused on the small number of listed firms or the behavior of foreign firms in China (Chen 2004; Huang and Song 2006; Li, Yue, and Zhao 2009; Liu, Tian, and Wang 2011; Ni and Yu 2008; Tong and Green 2005). To our knowledge, the only study of leverage that focused on nonlisted domestic firms investigated borrowing by former SOEs using a much older data set for the period 1980–89 (Keister 2004). Our sample is made up of largely unlisted Chinese domestic firms and also provides new evidence with more recent data. In addition, our study adds insight into the leverage determinants of firms under different ownership types, adding to the results of earlier studies of a small number of listed firms.

Foreshadowing our results, we find that the pecking-order theory explains leverage fairly well in the case of China's private firms' financing, but leverage is also heavily influenced by ownership forms and the market environments in which firms operate. The divergence between private firms and others suggests that market and financial reforms are incomplete in China. Leverage determinants of private firms, especially small and medium-sized private firms (SMEs), are explained best by the theory. In contrast, SOEs leverage is not well explained at all, and the results for mixed-ownership firms are similar to state firms.

Research on Firm Capital Structure

A number of major theories of capital structure are debated within the literature, including pecking-order theory, trade-off theory, market-timing theory, and signaling theory. For privately held firms, only the first two are relevant, since the market-timing and signaling theories deal with incentives to issue shares. The pecking-order theory postulates that firms prefer to use retained profits rather than bank loans for funding because

of asymmetric information or transaction costs, or both (Myers 1984; Sogorb-Mira and López-Gracia 2003, 7–8; Titman and Wessels 1988, 6). The third option, issuing equity to outside sources, is the last choice, perhaps because of preferences to maintain control or constraints on firms in the ability to issue shares. The trade-off theory focuses on a firm's choice between gaining tax benefits from interest payments on debt and the costs of possible financial distress if the firm is indebted to a bank.

These fundamental capital structure theories have been widely tested with empirical data from the United States and other developed countries. For example, Rajan and Zingales (1995) extended empirical evidence largely based on firms in the United States to the Group of Seven (G7) countries, where they used four key variables to investigate capital structure determinants: the tangibility of assets, market-to-book ratio, the logarithm of sales as a size proxy, and a profitability measure. They found that key factors related to firm leverage in the United States seemed similarly related in other countries as well.

Following the Rajan and Zingales cross-country studies, Booth et al. (2001) examined factors affecting capital structures in developing countries. They found that the most successful predictor of firm leverage is profitability. They concluded that a firm's capital structure choices in the ten developing countries they studied are affected by the same variables as in developed countries.

These types of studies lay out the empirical foundation to investigate firms' financing choices, but they focus on publicly listed firms. Recently, using data on U.S. private firms, Cole (2008) tested the pecking-order and trade-off theories, and found more support for the pecking-order theory. The pecking-order theory also appears to be the more appropriate framework for analyzing Chinese firms.

One reason for this proposition is that a very small percentage of firms in China are publicly listed. Only 1,500 or so firms are traded on China's two exchanges, and by some estimates fewer than 15 percent of those are privately controlled (Kato and Long 2006). Even within the group of listed Chinese firms, two studies argue that the trade-off theory is not relevant, while one argues that it is (Chen 2004; Huang and Song 2006; Ni and Yu 2008). Based on data for listed firms only, Ni and Yu (2008) find limited evidence for the pecking-order theory (only in large listed firms), while Tong and Green (2005) find stronger evidence for it based on a database of forty-four traded companies. Although Ni and Yu (2008, 110) find that the pecking-order theory fits with large firms only,

they indicate that this result seems unusual; they maintain that the theory is more suitable for small companies, because small companies function in a context with more seriously asymmetric information. Since we are focusing on possible differentiating characteristics between private and state firms, plus the fact that thousands of private firms are not listed, we feel the pecking-order theory is the better starting point.

A second reason is that foreign firms benefit more than domestic firms from tax breaks. An article by Li, Yue, and Zhao (2009), using survey data for Chinese firms similar to the ones in our study, focused on comparing the capital structures of state-owned companies and foreign-owned firms.² They found that state firms were relatively highly leveraged, but that firms with foreign ownership had relatively low leverage. They argued that the results with respect to foreign firms are consistent with the trade-off theory, because during the period under investigation, foreign firms paid lower tax rates than domestic firms. Foreign firms also have funding options from outside the country in which they are located. In this study we focus on the development of domestic, private firms in China as compared with state-controlled companies and their financing choices within China, and therefore we do not include firms with foreign ownership. This makes the trade-off theory less relevant.

For these reasons, given the nature of China's economic transition, we believe that the pecking-order theory is the most appropriate framework in which to explore how leverage is determined across ownership types and regions. The pecking-order theory, together with the existing studies on capital structure, provides several key determinants of leverage, as summarized in Table 1 (Cole 2008, 10–13). The more profitable firms are, and the more financial slack (such as cash reserves) firms have, the less leverage we expect them to use, since they have access to more internal financing. Expectations about good growth prospects would also lead to less leverage if that growth was expected to generate retainable profits. In contrast, the larger a firm, the more tangible assets it has, and if they are in industries with higher average leverage ratios, the more leverage we would expect them to use. Larger firms, and firms with more tangible assets, are able to borrow more easily and at lower costs than smaller firms because they pose lower risks to banks both in terms of providing more information to evaluate risk (fewer informational asymmetries between insiders and outsiders) and have more collateral to repay creditors should bankruptcy occur. The average leverage ratio varies by industry and represents a target leverage level

Table 1

Standard Variables in Pecking-Order Theory with Expected Signs

Dependent variable: leverage = total loans/total assets

Variable	Expected sign
Profit	–
Financial slack/liquid assets	–
Growth prospects	–
Firm size	+
Firm assets	+
Industry leverage average	+
Firm age	+/-

Source: Cole (2008).

for firms. Finally, firm age could lead to either a positive or a negative relationship. The older the firm, the more leverage it would be expected to use, because it has better access to loans and has had time to establish a track record. On the other hand, younger firms typically do not have much liquidity and so need to rely more on bank loans.

While we recognize that there are different forms of capitalist firms, there are certain basic expectations of firm behavior in a market economy, such as the need to make a profit in order to stay in business (Chan and Unger 2009). We expect that private firms are the most likely to meet these criteria in China. However, because the Chinese approach to reform has been to push state firms to function with hard budget constraints in a market economy, one outcome was that by the 2000s, different ownership forms behaved in similar ways, as reflected in their determinants of leverage. Since making these changes may have been difficult for old-style state firms, we might expect that newly established state firms would behave differently from well-established ones. Likewise, firms that operate in an institutional environment that is more market-oriented are more likely to have leverage determinants similar to private firms in a market economy like the United States. In China, the coastal areas are the most advanced institutionally, followed by the northeast and then the inland areas.

These expectations are stated in the following hypotheses:

H1: If reforms have successfully induced market behavior,

leverage firms of all ownership forms should exhibit the leverage determinants the pecking-order theory predicts.

H2: If H1 is rejected, and if small and large private firms have different leverage determinants, then large private firms and state firms have more similar leverage determinants.

H3: Because new firms would be less likely to have a managerial history with the former planned system, young state firms have more similar leverage determinants to private firms than older state firms.

H4: If reforms have successfully established systemwide market-oriented institutions, leverage determinants for firms should be similar to those in different geographical regions.

H5: If H4 is rejected, then the coastal areas, where reforms received priority and therefore tend to be more marketized, would more clearly exhibit the leverage determinants the pecking-order theory predicts.

Data and Estimation

To test these hypotheses we utilize industrial-firm-level data from the Chinese National Bureau of Statistics (NBS) covering the period from 2003 to 2006.³ This data set is one of the most comprehensive on China's manufacturing industries. Unlike many available data sets that cover the approximately 1,500 publicly listed firms in China, this database covers all SOEs and registered non-SOEs with annual sales above RMB500,000. It provides detailed information about each firm's year-end financial statements and the firm's characteristics, including NBS manufacturing industry code, organizational form, firm age, number of employees, and location. Appendix Tables A1–A4 provide the descriptive statistics for our variables.⁴

The organizational forms reported are: state-owned, collectively owned, stock cooperative enterprises, jointly operated enterprises, limited liability companies, companies limited by shares, private firms of different organizational forms, and enterprises established by foreign investors. For our purposes we divide the firms into three ownership categories: SOEs, mixed state-owned, and private. The SOE category is wholly state-owned, with approximately 13,000 firms (category 110 in Tables A3–A4). The mixed category includes all the hybrid SOEs

that have issued shares or have other types of alliances and therefore are not considered wholly state-owned for registration purposes, with approximately 45,000 firms (categories 120–160). The private category includes approximately 45,000 firms (categories 171–174).⁵ We exclude all foreign-invested firms.⁶

Several other characteristics from the Appendix tables need to be highlighted. First, short-term loans are much higher than long-term loans.⁷ Measured in share of assets, for all firms in the survey for all four years, the ratio of average long-term loans to assets was only 5 percent, while for short-term liabilities as a share of assets it was 51 percent. The long-term loan-to-asset ratios for private firms and mixed-ownership firms are only 6 and 4 percent, respectively, while the short-term loan-to-asset ratio for both types was 58 percent. Compare this to small public firms in the United States, where the long-term loan-to-asset ratio varied from 11 percent in 2003 to 20 percent in 1987, while total loan-to-asset ratios varied between 44 and 57 percent (Cole 2008, 20). So while total loans to assets are comparable, in China there is apparently a strong bias toward short-term borrowing.⁸ Given the character of the loan structure in the Chinese case, we use the ratio of short-term liabilities to assets as our main variable of inquiry.⁹

Second, the mean profit (measured as return on assets) for wholly owned state firms is 1 percent, while mixed-ownership and private firms have a mean positive profit at 8 and 11 percent respectively. State-owned enterprises in the northeastern region usually lose money, and in inland areas profit is just barely above zero. In this data set, half of the wholly owned state firms reported zero or negative profits, while only 10 percent of the private and mixed-ownership state firms reported zero or negative profits. So although progress has supposedly been made in terms of commercializing state companies, there apparently are many that continue to survive without being profitable. The successful, so-called champion national firms are more likely to fall into the mixed-ownership category because most of them have issued shares on one of the exchanges and have some foreign investment or other ownership characteristic indicating they are no longer wholly state-owned.

Finally, tangible assets as a percentage of total assets are higher for SOE firms than for other ownership forms. For SOEs this is almost at 50 percent, compared to 36 percent for private firms. With regional comparison, we can see that SOEs in the northeastern and inland areas have the highest ratios of tangible assets to total assets.

Based on our theoretical framework and the particular characteristics of this data set, we estimated Equation (1).

$$LV_{it} = \beta_1 + \beta_2 \text{Profit}_{i,t-1} + \beta_3 \text{Sales}_{i,t-1} + \beta_4 \text{Assets}_{i,t-1} + \beta_5 \text{Size}_{i,t} + \beta_6 \text{Age}_{i,t-1} + \beta_7 \text{AvgLV}_{i,t-1} + \mu \quad (1)$$

The dependent variable to capture leverage (LV_{it}) is total short-term loans as a percentage of total assets for firm i in year t . Profit is measured as the return on assets. The Sales variable represents financial slack or access to liquid assets and is measured as sales revenue. Size represents the number of employees and measures firm size. Assets are tangible assets as a percentage of total assets, which is our measure of firm collateral. Age is measured as the log of each firm's age, and AvgLV is the industry median leverage ratio. These independent variables (except for size) are lagged one year, under the assumption that a loan decision would be made on last year's performance rather than current performance, and is dependent on whether the bank or the firm's management was making the decision.¹⁰

Equation (1) was estimated for each ownership group and region, and by size and age, to test our stated hypotheses. We define large private firms as those having assets of at least RMB20,714 representing the top 25 percent of the private firms in this data set. We define young firms as those established in 1996 or later, after major company reforms aimed at creating incentives for market behavior were put in place. The survey defines the firms by three regions: (1) northeast: Heilongjiang, Jilin, and Liaoning; (2) coast: Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangzhou, and Hainan; and (3) inland: Shanxi, Neimenggu, Anhui, Jiangxi, Henan, Hubei, Hunan, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang.

The estimation procedure is based on pooled time-series and cross-sectional data with fixed effects by firm, using truncated data that dropped the outliers below 5 percent and above 95 percent as well as any observations that were obviously wrong.¹¹

Results

The first set of results is for private firms. Column (3) in Table 2 presents the results for the full set of private firms in the survey, with large private

Table 2

Estimation Results, Private Firms Dependent Variable: Ratio of Short-Term Loans to Total Assets, 2003–6

(1) Regressor (symbol)	(2) Variable	(3) Private firms, all	(4) Private firms, large	(5) Private firms, SME
$Profit_{it}$	Return on assets (lagged)	-0.046*** (0.0048)	-0.025*** (0.008)	-0.039*** (0.0070)
$Sales_{it}$	Sales revenue (lagged)	-2.95e-08** (1.25e-08)	-2.08e-08* (1.16e-08)	-5.32e-07*** (1.02e-07)
$Size_{it}$	Number of employees	88 0.00001 (6.20e-06)	1.71e-06 (6.49e-06)	0.00003*** (0.00001)
$Assets_{it}$	Ratio of tangible assets to total assets (lagged)	-0.0455*** (0.007)	-0.052*** (0.0128)	-0.0323*** (0.009)
$AveLV_{it}$	Median loans to total assets (lagged)	0.1*** (0.02)	0.084** (0.036)	0.06** (0.0269)
Age_{it}	Log of firm's age (lagged)	-0.008*** (0.0017)	-0.0036 (0.0029)	-0.007*** (0.002)

(continues)

Table 2 (continued)

(1) Regressor (symbol)	(2) Variable	(3) Private firms, all	(4) Private firms, large	(5) Private firms, SME
Constant		0.507*** (0.013)	0.52*** (0.023)	0.53*** (0.0170)
No. of observations		128,782	38,030	90,752
No. of firms		102,035	30,445	75,194
Adj. R^2		0.123	0.1	0.087
F-stat.		34.82***	6.48***	25.6***

Source: NBS 2003–6.

Notes: Standard errors are reported in parentheses. *denotes 10% significance level, **denotes 5% significance level, ***denotes 1% significance level. Large private firms are defined as those with assets valued at RMB20,714 or more. SME = small and medium-sized firms.

firms presented in column (4) and small and medium-sized (SME) private firms presented in column (5). Profit is significant and negative, as expected, in all three cases. Sales revenue, our measure for financial slack, is also significant and negative, as expected. Firm size is significant and positive for the subset of SME private firms, but is insignificant for large private firms and all private firms. The average leverage of each group of firms is positive and significant, as expected. The age variable is negative and significant for the full sample and for SMEs, suggesting that smaller private firms need more leverage, perhaps because they are younger. All these results are fairly consistent with the pecking-order theory.

The one result that is inconsistent with the theory is the tangible asset variable, which was expected to be positive but here resulted in significant negative coefficients in all three cases. Pecking-order theory suggests that tangible assets signal collateral that would increase the chances, and/or lower the costs, of acquiring a loan. In the case of this data set in China, something else seems to be going on. Here we see that the higher the ratio of tangible assets to total assets, the less likely a firm is to take out a loan. Our expectations concerning tangible assets assume that banks in China would try to recover some losses if a loan is not repaid. This, in fact, may not happen very often. In addition, with the state sector, policy directives ensure bank support to the targeted companies to prevent bankruptcies. Banks may then shy away even more than usual from lending to the risky private sector, and/or the small and medium-sized sector, to keep their balance sheets reasonable. Li, Yue, and Zhao (2009) reported the same result with their similar survey data but did not address any reason or implications. Interestingly, Liu, Tian, and Wang (2011) found negative coefficients for their assets variable with total leverage and short-term leverage, and positive coefficients with long-term leverage and bank loans as their dependent variables. Chen (2004) also found the asset variable to be insignificant with her pooled estimation of eighty-eight listed firms between 1995 and 2000 using total leverage as the dependent variable, but to be significant and positive with long-term leverage as the dependent variable. Using data from 1,200 Chinese listed firms, Huang and Song (2006) found a positive relationship between tangible assets and market-valued total liabilities in only one of their models, and the relationship was insignificant in their other specifications. A key difference between their studies and ours is that their data included only listed firms, which are overwhelmingly state firms. Hence the size of tangible assets in the private sector may

indicate a better-managed firm, or one with more resources, rather than one that can repay a loan with assets if necessary.¹² Alternatively, there could be something about the nature of short-term debt in China that is behind these unexpected results.¹³ Overall, then, the results in Table 2 suggest that private firms with more profit, higher sales revenue, a higher percentage of tangible assets, and those that are smaller and older, use less leverage. Size and age do not explain leverage for large private firms. Except for the expectations relating to tangible assets, the capital structure of this set of firms is explained well by the pecking-order theory, especially for SME private firms.

The results for the wholly owned SOE firms are shown in Table 3. In column (3), we can see that wholly owned state firms overall do not fit the expectations of the pecking-order theory. The profit variable is negative and significant, and the tangible asset variable is significant and negative, as was the case with private firms. The other variables are all insignificant. With the profit variable, however, we need to take care in interpreting the results in this case. For example, it could be that firms that made less profit received more loans, resulting in a significant negative coefficient on our profit variable. That is quite different from firms that make enough profit to self-finance and therefore have less liability. The negative coefficient on profits for all these categories of firms is quite large, ranging from 0.10 to 0.25, as compared with private firms whose profit coefficients were in the 0.03 to 0.05 range. Based on what we know about the low average profits in this sector, the negative coefficient may mean that even nonprofitable state companies received loans. In fact, the less profitable firms may be more likely to receive loans if government policy uses state companies to ensure employment or other outcomes, and is willing to pay for this through guaranteed loans from the state banking system. The tangible asset variable is also significant and negative for all SOEs except for the young firms, as was the case with private firms. Although again—and maybe especially in this case—it does not seem likely that tangible assets are signaling available backup collateral in case of firm failure. Finally, the results for young wholly owned firms (column 4) show that profits and size were significant, but nothing else. In other words, in contrast to our expectations, young, wholly owned state firms do not seem to have similar factors determining their capital structure as private firms.

The results for the mixed-ownership firms (columns 5 and 6) are not much different from those for the wholly owned state firms. Profits,

Table 3

Estimation Results, State-Owned Enterprises (SOEs) by Region Dependent Variable: Ratio of Short-Term Loans to Total Assets, 2003–6

(1) Regressor (symbol)	(2) Variable	(3) SOEs wholly-owned	(4) SOEs wholly-owned, young	(5) SOEs mixed	(6) SOEs mixed, young
Profit _{<i>it</i>}	Return on assets (lagged)	-0.159** (0.0184)	-0.252** (0.07)	-0.101** (0.0078)	-0.132** (0.012)
Sales _{<i>it</i>}	Sales revenue (lagged)	3.27e-09 (2.53e-09)	-8.95e-09 (1.52-08)	2.72e-10 (1.34e-09)	1.77e-09 (2.99e-09)
Size _{<i>it</i>}	Number of employees	1.78e-06 (1.63e-06)	0.00003** (0.00001)	-5.70e-07 (1.16e-06)	1.09e-06 (2.15e-06)
Assets _{<i>it</i>}	Ratio of tangible assets to total assets (lagged)	-0.047** (0.013)	-0.003 (0.077)	-0.032** (0.0079)	-0.043** (0.012)
AveLV _{<i>it</i>}	Median loans to total assets (lagged)	0.013 (0.022)	-0.033 (0.077)	0.09** (0.022)	0.08* (0.033)
Age _{<i>it</i>}	Log of firm's age (lagged)	-0.003 (0.0043)	-0.01 (0.0082)	-0.0007 (0.0017)	0.0017 (0.002)

(continues)

Table 3 (continued)

(1) Regressor (symbol)	(2) Variable	(3) SOEs wholly-owned	(4) SOEs wholly- owned, young	(5) SOEs mixed	(6) SOEs mixed, young
Constant		0.48** (0.021)	0.497** (0.056)	0.48** (0.0141)	0.48** (0.02)
No. of observations		21,788	2,863	84,054	45,116
No. of firms		14,568	2,227	61,491	35,424
Adj. R^2		0.08	0.001	0.068	0.06
F-stat.		14.45**	3.25**	35.59**	23.62**

Source: NBS 2003–6.

Notes: Standard errors are reported in parentheses. *denotes 5% significance level, **1% significance levels.

tangible assets, and industrial mean average are significant for all mixed-ownership firms and for the young mixed-ownership firms, whereas age, size, and sales revenue did not matter. Bai, Lu, and Tao (2009) reported that firms with some partial privatization seemed to have incentives to behave more like private companies with hard budget constraints. Our results do not strongly support this. Huang and Song (2006) also concluded, from their study of listed firms in the 2000s, that listed state firms do seem to be profit-maximizers, but again, most of our state firms are not listed and do not seem to be profitable overall.

Using these results, we do not find support for hypotheses H1–H3. Firms of different ownership forms have different leverage determinants, and there is little evidence that state firms behave similarly to private ones in terms of capital structure. Even the results for young state firms were more similar to the wholly owned state firms than to the private firms, as were the mixed-ownership firms.

Tables 4–6 present our results for the regional analysis, reflecting institutional development. Table 4, column (3) presents the results for private firms in the coastal area, the most marketized area of China. All the variables except for firm size are significant and consistent with our expectations overall. Except for the sign of the tangible assets coefficient, as was the case in the first set of results, this set of results fits the pecking-order theory very well. When comparing the coastal region with the northeast sample, the size of firms is significant and the age of the firms is insignificant (column 4). For firms in the inland areas, profits, tangible assets, and industrial mean average are significant, with size, sales, and age insignificant (column 5). These results provide some evidence that the less developed the region, the less the pecking-order theory can explain the loan structure of private firms.

Results for wholly owned state firms are reported in Table 5. Profit is the only significant variable across all three regions. In the inland area, it is the only significant variable and most likely represents policy lending, as these firms are mostly unprofitable. The coefficients are very large, and again most likely reflect government's desire to keep these companies operating. For state firms in inland areas, the only significant variable is the return on assets. For the northeast, firm age and assets also matter.

Finally, Table 6 presents the results for the mixed-ownership firms. The results for the coastal and inland areas are similar, with profits, assets, and industry median being significant. Again, the capital structure

Table 4

Estimation Results, Private Firms by Region Dependent Variable: Ratio of Short-Term Loans to Total Assets, 2003–6

(1) Regressor (symbol)	(2) Variable	(3) Private firms, coast	(4) Private firms, northeast	(5) Private firms, inland
$Profit_{it}$	Return on assets (lagged)	-0.0417*** (0.0051)	-0.199*** (0.048)	-0.058*** (0.0128)
$Sales_{it}$	Sales revenue (lagged)	-2.43e-08* (1.29e-08)	-2.71e-07*** (1.01e-07)	-2.54e-08 (4.60e-08)
$Size_{it}$	Number of employees	0.0000 (7.07e-06)	0.0001** (0.00004)	2.25e-06 (0.0000)
$Assets_{it}$	Ratio of tangible assets to total assets (lagged)	-0.0312*** (0.008)	-0.0879** (0.035)	-0.08*** (0.0163)
$AveLV_{it}$	Median loans to total assets (lagged)	0.08*** (0.0231)	0.18* (0.1096)	0.147*** (0.051)

Age _{<i>t</i>}	Log of firm's age (lagged)	-0.0087*** (0.0019)	-0.001 (0.0082)	-0.004 (0.0037)
Constant		0.5379*** (0.0149)	0.44*** (0.067)	0.42*** (0.0308)
No. of observations		94,964	6,509	27,283
No. of firms		74,360	5,333	22,327
Adj. R ²		0.102	0.07	0.124
F-stat.		22.66***	7.45***	10.22***

Source: NBS 2003–6.

Notes: Standard errors are reported in parentheses. *denotes 10% significance level, **denotes 5% significance level, ***denotes 1% significance levels.

Table 5

Estimation Results, State-Owned Enterprises (SOEs) by Region Dependent Variable: Ratio of Short-Term Loans to Total Assets, 2003–6

(1) Regressor (symbol)	(2) Variable	(3) SOEs wholly- owned, coast	(4) SOEs wholly- owned, northeast	(5) SOEs wholly- owned, inland
$Profit_{it}$	Return on assets (lagged)	-0.237** (0.0278)	-0.16* (0.07)	-0.103** (0.0260)
$Sales_{it}$	Sales revenue (lagged)	6.19e-09 (3.96e-09)	-1.39e-09 (4.66e-09)	3.38e-09 (4.44e-09)
$Size_{it}$	Number of employees	-9.48e-08 (4.52e-06)	1.84e-06 (2.04e-06)	1.77e-06 (3.17e-06)
$Assets_{it}$	Ratio of tangible assets to total assets (lagged)	-0.06** (0.020)	-0.13** (0.0447)	-0.027 (0.0180)

AveLV _{<i>it</i>}	Median loans to total assets (lagged)	-0.0145 (0.029)	0.067 (0.08)	0.04 (0.035)
Age _{<i>it</i>}	Log of firm's age (lagged)	0.007 (0.007)	-0.03* (0.014)	-0.0044 (0.0058)
Constant		0.48** (0.03)	0.59** (0.07)	0.45** (0.0309)
No. of observations		8,536	2,086	11,158
No. of firms		5,648	1,476	7,447
Adj. R ²		0.042	0.1467	0.09
F-stat.		14.09**	3.15**	3.42**

Source: NBS 2003–6.

Notes: Standard errors are reported in parentheses. *denotes 5% significance level, **denotes 1% significance levels.

Table 6

Estimation Results, Mixed Ownership State-Owned Enterprises (SOEs) by Region Dependent Variable: Ratio of Short-Term Loans to Total Assets, 2003–6

(1)	(2)	(3)	(4)	(5)
Regressor (symbol)	Variable	SOEs mixed, coast	SOEs mixed, northeast	SOEs mixed, inland
$Profit_{it}$	Return on assets (lagged)	-0.086*** (0.0089)	-0.108** (0.0437)	-0.14*** (0.0162)
$Sales_{it}$	Sales revenue (lagged)	1.33e-09 (1.68e-09)	-8.99e-10 (2.87e-09)	-3.54e-09 (4.00e-09)
$Size_{it}$	Number of employees	5.02e-07 (1.47e-06)	-2.77e-06 (4.29e-06)	-2.5e-06 (2.19e-06)
$Assets_{it}$	Ratio of tangible assets to total assets (lagged)	-0.02* (0.0105)	-0.0200 (0.0315)	-0.051*** (0.0133)
$AveLV_{it}$	Median loans to total assets (lagged)	0.07*** (0.027)	0.13 (0.095)	0.099** (0.0395)

Age _{<i>t</i>}	Log of firm's age (lagged)	-0.0020 (0.0022)	-0.0008 (0.0063)	0.0005 (0.0026)
Constant		0.49*** (0.0178)	0.45*** (0.06)	0.45*** (0.025)
No. of observations		50,265	5,797	27,949
No. of firms		36,409	4,317	20,751
Adj. R ²		0.05	0.06	0.07
F-stat.		18.32***	1.47	18.13***

Source: NBS 2003–6.

Notes: Standard errors are reported in parentheses. *denotes 10% significance level, **denotes 5% significance level, ***denotes 1% significance levels.

of mixed-ownership firms is explained partially by the theory, but not as well as the private sector. In the case of the northeast, however, the *F*-statistic is not significant, indicating there is a very poor fit indeed.

The main finding from the regional estimations is that leverage ratios are determined differently across regions for all ownership types, which leads us to reject hypothesis H4. The northeastern region (Heilongjiang, Liaoning, and Jilin) fits the theoretical expectation least well, while the coastal results are the best. The coastal results for private firms fit the theory very well, as suggested by hypothesis H5. Li, Yue, and Zhao (2009) also found that firms in coastal areas had less leverage. However, this result was contrary to their expectations, because they did not apply the pecking-order theory.

Conclusion

Overall our results show that different ownership types and firms located in different regions do not have the same determinants of leverage. The pecking-order theory explains the leverage determinants of private firms the best, especially for SMEs as compared with other ownership forms, and regionally the fit is best on the more marketized coast. Our results reject hypotheses H1–H4, since there were clear differences in the determinants of leverage among ownership types, age of firms, and across regions, and large private firms did not behave in the same ways as SOEs.

Other studies on China's banking sector suggest that lending has increasingly been tied to expectations about good performance, as banks may be subject to increasing costs associated with nonperforming loans and bankrupt firms. For example, Firth et al. (2009), using 2002 firm survey data, found that more profitable firms have higher loan ratios. Yeung (2009) found through interviews that bank management is increasingly sensitive to risk and therefore wary of making loans without good information. Our results suggest that something different is going on, at least for the manufacturing sector. In all of our estimates, the profit variable was negative and significant, suggesting that the more profitable a firm is, the lower its loan-to-asset ratio. So while state firms may be more likely to have loans than other ownership forms, as reported by Li, Yue, and Zhao (2009), our results suggest that the more profitable firms of all ownership types have lower loan ratios. Firms try to avoid taking a loan from a bank; they seem to prefer self-

finance or use other forms of financing. Based on her study of listed firms, Chen (2004) interprets this situation as firms having a different pecking order, if allowed. That is, they would prefer to self-finance first, but then, if necessary, would prefer equity financing to bank loans. Her reasoning is based on the fact that both the companies she studied and the banks lending to them are state-owned; hence equity financing is low cost and relatively unconstrained, since the only shareholder that matters is the government. Ni and Yu (2008, 111) also point out that equity financing is preferable for listed firms because the high cost of entering the corporate bond market and the inefficiency of the banking system may be deterrents to borrowing. In our study, most of the firms, regardless of ownership, did not have the equity option, and if they did, the preference might vary depending on ownership form. In any case, the fact that there are more firms that would like to list than the number allowed raises the value of listing, as does the high value given to the nontradable shares of listed companies (Huang and Song 2006, 25, 27).

Our results raise a puzzle related to tangible assets. In general, it is thought that firms with a higher ratio of tangible assets to total assets are more likely to receive bank loans because they have more tangible assets to put up as collateral. However, we find a fairly consistent, significantly negative relationship between the tangible asset ratio and the loan ratio. So again, firms that might be expected to qualify more easily for bank loans do not use them. This was so in the case of manufacturing firms in China in the 2000s.

The story behind these results is no doubt quite complex, and the analysis is complicated by missing variables. For example, it may be that banks prefer to lend to better-governed firms, as suggested by Firth et al. (2009), but these firms may also be the more profitable ones. With the data we have, we are not able to sort out these possible effects. Nonetheless, the overall results of our study suggest that private firms in China are making the leverage decisions that would be expected of firms in a market business environment as described by the pecking-order theory. SOEs, and even firms of mixed ownership, reveal a different story. These results are consistent with results on listed firms, as reported in Liu, Tian, and Wang (2011), which are largely state-controlled. The determinants of leverage for the state firms may be better understood with policy and political variables rather than what we expect from market-oriented, profit-maximizing firms with hard budget constraints.

Further limitations with respect to this study include the time frame covered and the available variables. This survey data set ends in 2006, just as a new round of financial sector reforms was launched that included building bond markets in China (Walter and Howie 2011). However, the response to the financial crisis in 2009 apparently reversed much of the progress that was initiated. In any case, the short time span, 2003–6, of the survey available to us cannot capture the rapidly changing financial environment in China. Limitations on the variables also make it difficult to explore key questions, such as the reasons for the significant importance of short-term relative to long-term debt in the Chinese context, The role of tangible assets in firms' decision-making and how the lack of development of a bond market affects firms' behavior are both areas for future research.

Notes

1. For a full description of these reforms and economic transition in China generally, see Naughton (2007).

2. They use data from 2000 to 2004, while ours are from 2003 to 2006.

3. This dataset is known as the Industrial Microdata in English.

4. This industrial classification is similar to the standard industrial classification (SIC) used internationally.

5. Note that the number of observations varies by year and variable.

6. Firms included in the survey are not stable over time. Hence, in one year the set of firm identifications will not fully match those in another year if a firm went out of business. For this reason, estimations that include lagged values and variables that measure change over time will drop some of the observations.

7. Long-term loans are for one year or more.

8. Anecdotally, it has been reported that short-term funds are often mismatched with long-term projects. *Communication with Standard Chartered Bank* (May 18, 2010), Shanghai.

9. The correlation coefficient between long-term and short-term debt in our data is 0.9. In addition, we ran the same set of regressions using the total loan-to-asset ratio as the dependent variable. We find the results very similar to those presented here.

10. With the data set available, we do not have an independent measure for growth prospects. Berkman, Cole, and Fu (2009) and Ni and Yu (2008) used asset growth to capture growth potential in the case of China, and Cole (2008) used change in employment. However, because we are using lagged variables, we are wary of adding a growth variable to capture potential growth for firms. In addition, our sales revenue variable may be a proxy for growth as well as for available liquid assets.

11. For example, if a firm reported zero assets.

12. The ratio of tangible assets variable is positively correlated with the profit variable with a coefficient of 0.7.

13. Note that Tong and Green (2005) and Ni and Yu (2008) do not include tangible assets in their discussion or estimations.

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Appendix Table A1

Descriptive Statistics: Variable Means, 2003-6

Variable	Wholly-owned SOEs	Mixed SOEs	Private Only	All Firms	Regional comparison								
					Wholly-owned SOEs only			Mixed SOEs			Private		
					1 NE	2 Coast	3 Inland	1 NE	2 Coast	3 Inland	1 NE	2 Coast	3 Inland
Long-term loans to total assets	.15	.06	0.04	.05	.14	.12	.17	.06	.05	.09	.04	.03	.06
Short-term loans to total assets	.46	.51	.53	.51	.48	.47	.45	.52	.53	.48	.50	.55	.45
Total loans to total assets	.62	.58	.58	.56	.63	.6	.64	.58	.58	.58	.55	.59	.53
Sales (RMB1,000)	174.8	133.79	38.71	97.66	195	197	155	213	131	124	34.42	392.29	38.05
Employees (number)	598.06	424.88	169.8	327.14	932.17	460.7	639.71	568.03	355.79	519.73	150	164.54	191.67

(continues)

Appendix Table A1 (continued)

Variable	Wholly-owned SOEs	Mixed SOEs	Private Only	All Firms	Regional comparison								
					Wholly-owned SOEs only			Mixed SOEs			Private		
					1 NE	2 Coast	3 Inland	1 NE	2 Coast	3 Inland	1 NE	2 Coast	3 Inland
Firm age (years)	27.34	11.47	6.4	9.32	27	27.81	27.06	11.05	11.41	11.69	6.53	6.44	6.41
Firm age (log)	3.04	2.03	1.56	1.83	2.99	3.0	3.03	1.95	2.08	1.97	1.51	1.57	1.51
Profitability (ROA)	.01	.08	.11	.08	-.003	0.01	.006	.02	.09	.08	.08	0.11	0.11
Tangible assets (% of total assets)	.48	.35	0.36	0.36	0.49	0.43	.52	.37	.32	.40	0.41	0.34	0.41
Industry median leverage	.04	.005	.00	.004	.03	.03	.04	.004	.003	.008	.00	.00	.001

Notes: NE = Northeast; ROA = return on assets; SOEs = state-owned enterprises.

Appendix Table A2

Descriptive Statistics: Variable Medians, 2003–6

Variable	Wholly-owned SOEs	Mixed SOEs	Private	All firms	Regional comparison									
					Wholly-owned SOEs only			Mixed SOEs			Private			
					1 NE	2 Coast	3 Inland	1 NE	2 Coast	3 Inland	1 NE	2 Coast	3 Inland	
Long-term loans to total assets	0.03	0	0	0	0	0.008	0.07	0.0	0.0	0	0.0	0	0	0
Short-term loans to total assets	0.45	0.51	0.55	0.51	0.48	0.46	0.44	0.52	0.54	0.47	0.50	0.58	0.44	0.44
Total loans to total assets	0.63	0.6	0.6	0.59	0.64	0.6	0.64	0.6	0.6	0.59	0.56	0.62	0.53	0.53
Sales (RMB1,000)	11.09	22.07	16.4	20.1	10.9	12.1	12.4	18.6	22.15	22.76	14	16.47	16.8	16.8
Employees (number)	167	140	97	142	173	145	181	137	170	126	82	94	110	110
Firm's age (years)	26	8	6.43	6	23.5	25	27	7	8	7	4	5	4	4

(continues)

Appendix Table A2 (continued)

Variable	Wholly-owned SOEs	Mixed SOEs	Private	All firms	Regional comparison								
					Wholly-owned SOEs only			Mixed SOEs			Private		
					1 NE	2 Coast	3 Inland	1 NE	2 Coast	3 Inland	1 NE	2 Coast	3 Inland
Firm's age (log)	3.26	2.08	1.61	1.79	3.18	3.22	3.3	1.95	2.07	1.95	1.61	1.61	1.61
Profitability (ROA)	0.001	0.03	0.04	0.03	0	0.00	0.00	0.05	0.04	0.02	0.03	0.05	0.05
Tangible assets (% of total assets)	0.48	0.32	0.33	0.33	0.5	0.41	0.53	0.34	0.29	0.38	0.39	0.31	0.40
Industry median leverage	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0

Notes: NE = Northeast; ROA = return on assets; SOEs = state-owned enterprises.

Appendix Table A3

Descriptive Statistics: Mean Ratios of Total Loans to Total Assets by Ownership

Register- type code	Organizational form	2003		2004		2005		2006	
		Obs	Mean	Obs	Mean	Obs	Mean	Obs	Mean
110	Wholly-owned state owned	13,979	0.63	14,701	0.63	13,144	0.62	10,922	0.61
120	Collectively owned	12,867	0.58	14,128	0.58	13,576	0.55	10,615	0.55
130	Stock cooperative enterprises	6,724	0.60	6,863	0.60	6,767	0.58	5,209	0.57
140	Jointly operated enterprises	1,120	0.56	1,138	0.56	1,039	0.55	838	0.56
150	Limited liability companies	19,725	0.60	34,372	0.60	37,610	0.58	35,638	0.58
160	Companies limited by shares	4,611	0.57	5,996	0.56	6,383	0.56	5,572	0.55
171	Private firm (sole proprietorship)	11,926	0.56	20,116	0.56	23,936	0.53	22,061	0.53
172	Private cooperative enterprises	2,565	0.53	4,583	0.53	5,248	0.50	4,734	0.51
173/ 174	Private limited liability companies/ private companies limited by shares	30,730	0.59	71,269	0.60	80,808	0.58	78,481	0.58
190	Other domestic enterprises	253	0.54	262	0.58	862	0.54	582	0.56
All firms		135,362	0.57	221,818	0.58	240,569	0.56	223,104	0.56

Appendix Table A4

Descriptive Statistics: Median Ratios of Total Loans to Total Assets by Ownership

Register- type code	Organizational form	2003		2004		2005		2006	
		Obs	Median	Obs	Median	Obs	Median	Obs	Median
110	Wholly-owned stated owned	13,979	0.63	14,701	0.63	13,144	0.62	10,922	0.61
120	Collectively owned	12,867	0.59	14,128	0.59	13,576	0.56	10,615	0.56
130	Stock cooperative enterprises	6,724	0.62	6,863	0.62	6,767	0.59	5,209	0.58
140	Jointly operated enterprises	1,120	0.58	1,138	0.58	1,039	0.56	838	0.58
150	Limited liability companies	19,725	0.62	34,372	0.62	37,610	0.60	35,638	0.60
160	Companies limited by shares	4,611	0.59	5,996	0.58	6,383	0.57	5,572	0.56
171	Private firm—a sole proprietorship	11,926	0.58	20,116	0.58	23,936	0.53	22,061	0.53
172	Private cooperative enterprises	2,565	0.54	4,583	0.54	5,248	0.49	4,734	0.51
173/ 174	Private limited liability companies/ private companies limited by shares	30,730	0.62	71,269	0.63	80,808	0.61	78,481	0.61
190	Other domestic enterprises	253	0.57	262	0.62	862	0.54	582	0.56
All firms		135,362	0.59	221,818	0.59	240,569	0.57	223,104	0.57

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