The Determinants of Capital Structure: Evidence from China

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Abstract

This paper employs a new database, which contains the market and accounting data from more than 1000 Chinese listed companies up to the year 2000, to document the characteristics of these firms in terms of capital structure. As in other countries, leverage in Chinese firms increases with firm size, non-debt tax shields and fixed assets, and decreases with profitability and correlates with industries. We also find that ownership structure affects leverage. Different from those in other countries, leverage in Chinese firms increases with volatility and firms tend to have much lower long-term debt. The static tradeoff model rather than pecking order hypothesis seems better in explaining the features of capital structure for Chinese listed companies.

JEL Classification: G32

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The Determinants of Capital Structure: Evidence from China

This paper documents the determinants of capital structure in Chinese listed companies and investigates whether firms in the largest developing and transition economy of the world entertain any unique features. Specifically we would like to answer the following two questions:

1. Are corporate financial leverage decisions made in Chinese listed firms different from those made in firms in economies where private property right is much more popular and market mechanism have been the rule for years?
2. Do the factors that affect cross-sectional variability of capital structure in other countries have similar effects on Chinese firms' capital structure? The factors have been identified by theoretical studies and by previous empirical studies on data from other countries including both developed and developing countries.

The institutional environment for Chinese firms has two salient features: (1) China is in transition from a command economy to a market economy, and (2) Most Chinese listed companies were state-owned enterprises (SOEs) before and the state still maintains its controlling right after the firms go public. It is not difficult to understand that China has different institutional structures from developed as well as many developing countries. For example, in the world of Modigliani and Miller, tax should have no effect on firms' capital structure in a command economy. This is because in China the government or state is the owner of firms and banks, as well as the beneficiary of tax. Similarly, it is widely acknowledged that non-listed SOEs are not profit-maximisers; their size (proxy for bankruptcy cost), tangible assets (collateral) and even profitability may have no effect on their capital structure. Also, because the state is the controlling shareholder for most listed companies, if it does not change its behavior towards the firms, the firms are less likely to run into financial crisis compared with their counterparts whose controlling shareholders are individuals or private institutes, which are wealth-maximization oriented. The proxies for financial crisis cost (size and volatility) in Chinese firms are expected to have less or no effects on capital structure. As a result, the answers to the two questions will also tell us, to a great extent, whether these companies, which claim to be profit-oriented, are really so?

Since Modigliani and Miller published their seminal paper in 1958, the issue of capital structure has generated great interests among financial researchers (see an excellent survey by Harris and Raviv, 1991). With respect to the theoretical studies, there are two widely acknowledged competitive models of capital structure: the static tradeoff model and the pecking order hypothesis.

According to static tradeoff models, the optimal capital structure does exist. A firm is regarded as setting a target debt level and gradually moving towards it. The firm's optimal capital structure will involve the tradeoff among the effects of corporate and personal taxes, bankruptcy costs and agency costs, etc. Both tax-based and agency-cost-based models belong to the static tradeoff models, such as Modigliani and Miller (1958, 1963), Miller (1977), Kraus and Litzenberger (1973), Kim (1978), Bradley, Jarrel and Kim (1984), Jensen and Meckling (1976), Jensen (1986), Grossman and Hart (1982), Harris and Raviv (1990), Stulz (1990), Diamond (1989), and Chang (1999). On the other hand, the pecking order hypothesis, first suggested by Myers and Majluf (1984), states that there is no well-defined target debt ratio. Firms are said to prefer retained earnings (available liquid assets) as their main source of funds from investment. Next in order of preference is less risky debt, and last comes risky external equity financing. It is so because the existence of the asymmetric information problem between insider and outsider investors. Debt ratios change when there is an imbalance of internal cash flow, net of dividends, and real investment opportunities while the factors considered in the tradeoff model are regarded as the second-order. Many papers have extended the basic Myers-Majluf idea, such as Krasker (1986), Brennan and Kraus (1987), Narayanan (1988), Noe (1988), Constantinides and Grundy (1989), and Heinkel and Zechner (1990).

It is important to test which hypothesis, tradeoff or pecking order, is more powerful in explaining firms' financing behavior. Unfortunately, there is no conclusive test. Shyam-Sunder and Myers (1999) claim that tradeoff model can be rejected and pecking order model has much greater time-series explanatory power than tradeoff model by testing the statistical power of alternative hypotheses. However, Chirinko and Singha (2000) show that the test conducted by Shyam-Sunder and Myers (1999) generates misleading inferences and that their empirical evidence can evaluate neither the pecking order nor static tradeoff models. Fama and French (2002) find pecking order and trade-off models each explains some of companies' financing behavior; and none of them can be rejected.

Booth et al. (2001) point out that empirically distinguishing between these two different models has proven difficult because variables that describe one model can also be classified as other model variables. Partly because of this, many recent empirical studies have employed cross-sectional tests and a variety of variables that can be justified using any of these two models.

The majority of empirical studies of capital structure, such as Bradley, Jarrell, and Kim (1984), Titman and Wessels (1988), Rajan and Zingales (1995), and Wald (1999), employ data from developed countries, mainly from the US to document the determinants of capital structure. Studies on emerging markets, such as Booth et al. (2001) and Wiwattanakantang (2001), only appeared in recent years.

This paper uses a new database, which has market and accounting data for more than 1000 Chinese listed companies' up to the year 2000. The new database is China Stock Market and Accounting Research Database (CSMAR), developed and maintained jointly by China Accounting and Finance Research Center at the Hong Kong Polytechnic University and Shenzhen GTA Information Technology Co. Some data such as ownership structure and management shareholding are from Taiwan TEJ Mainland China Database. In this study, several features of Chinese listed firms' capital structure are documented.

First, the correlation between characteristics and leverage in Chinese state-controlled listed companies is similar to what has been found in other countries. This finding suggests that these firms have become profit-maximisers and basic economic forces are also at work in Chinese listed companies. It implies that it is desirable to list SOEs even though the state does not give up its controlling right, which is consistent with the findings of Huang and Song (2002).

Second, compared with companies in other economies, Chinese listed companies have much lower leverage. One possible reason is that the bond market in China is very small and quite undeveloped. Also, remarkably high Tobin's Q makes the bond issuance and even bank loans unattractive for Chinese listed companies. So accelerating the development of the bond market to expand the financing channels of listed firms may be desirable.

The rest of the paper is organized as follows. Section 1 briefly discusses the proxies for the determinants of capital structure. Section 2 presents the descriptive statistics of

leverage and determinant proxies. Section 3 discusses the empirical results, followed by robustness checks in Section 4. Section 5 concludes the paper.

1. Proxies for the Determinants of Capital Structure

Theoretical and empirical studies have shown that profitability, tangibility, tax, size, non-debt tax shields, growth opportunities, volatility, and so on affect capital structure. On the relationship between these factors and companies' capital structure, Harris and Raviv (1990), summarizing a good number of empirical studies from US firms, suggest that "leverage increases with fixed assets, non-debt tax shields, investment opportunities and firm size and decreases with volatility, advertising expenditure, the probability of bankruptcy, profitability and uniqueness of the product." However, recent studies have updated our understanding about the determinants of capital structure. For example, Wald (1999) shows that leverage decreases rather than increases with non-debt tax shields. Here, we first summarize the results of previous theoretical and empirical studies on these factors and then discuss how we will measure these determinants in this study.

1.1 Profitability

Although much theoretical work has been done since Modigliani and Miller (1958), no consistent predictions have been reached of the relationship between profitability and leverage. Tax-based models suggest that profitable firms should borrow more, *ceteris paribus*, as they have greater needs to shield income from corporate tax. However, pecking order theory suggests firms will use retained earnings first as investment funds and then move to bonds and new equity only if necessary. In this case, profitable firms tend to have less debt. Agency-based models also give us conflicting predictions. On the one hand, Jensen (1986) and Williamson (1988) define debt as a discipline device to ensure that managers pay out profits rather than build empires. For firms with free cash flow, or high profitability, high debt can restrain management discretion. On the other hand, Chang (1999) shows that the optimal contract between the corporate insider and outside investors can be interpreted as a combination of debt and equity, and profitable firms tend to use less debt.

In contrast to theoretical studies, most empirical studies show that leverage is negatively related to profitability. Friend and Lang (1988), and Titman and Wessels (1988) obtain such findings from US firms. Kester (1986) finds that leverage is negatively

related to profitability in both the US and Japan. More recent studies using international data also confirm this finding (Rajan and Zingales (1995), and Wald (1999) for developed countries, Wiwattanakantang (1999) and Booth et al. (2001) for developing countries). Long and Maltiz (1985) find leverage to be positively related to profitability, but the relationship is not statistically significant. Wald (1999) even claims that "profitability has the largest single effect on debt/asset ratios." In this study, profitability will be defined as earnings before interest and tax (EBIT) scaled by total assets.

1.2 Tangibility

On the relationship between tangibility and capital structure, theories generally state that tangibility is positively related to leverage. In their pioneering paper on agency cost, ownership and capital structure, Jensen and Meckling (1976) point out that the agency cost of debt exists as the firm may shift to riskier investment after the issuance of debt, and transfer wealth from creditors to shareholders to exploit to the option nature of equity. If a firm's tangible assets are high, then these assets can be used as collateral, diminishing the lender's risk of suffering such agency costs of debt. Hence, a high fraction of tangible assets is expected to be associated with high leverage. Also, the value of tangible assets should be higher than intangible assets in case of bankruptcy. Williamson (1988) and Harris and Raviv (1990) suggest leverage should increase with liquidation value and both papers suggest that leverage is positively correlated with tangibility.

Empirical studies that confirm the above theoretical prediction include Marsh (1982), Long and Malitz (1985), Friend and Lang (1988), Rajan and Zingales (1995), and Wald (1999). In this study, tangibility is measured as fixed assets scaled by total assets. As the non-debt portion of liabilities does not need collateral, tangibility is expected to affect the long-term debt or total debt ratio rather than total liabilities ratio.

1.3 Tax

The impact of tax on capital structure is the main theme of pioneering study by Modigliani and Miller (1958). Almost all researchers now believe that taxes must be important to companies' capital structure. Firms with a higher effective marginal tax rate should use more debt to obtain a tax-shield gain. However, MacKie-Mason (1990) comments that the reason why many studies fail to find plausible or significant tax effects on financing behaviors, which is implied by Modigliani and Miller theorem, is because the debt/equity ratios are the cumulative result of years' of separate decisions and most tax

shields have a negligible effect on the marginal tax rate for most firms. MacKie-Mason, contrary to other researchers, studies the incremental financing decisions using discrete choice analysis. He focuses especially on the effect of taxes (tax loss carry-forwards and investment tax credit) upon the debt-equity choice conditional on going public, and finds that the desirability of debt financing at the margin varies positively with the effective marginal tax rate, which is consistent with MM theorem.

Unfortunately we don't have relevant data to analyze the tax effect in a similar way as MacKie-Mason. Instead, the average tax rate is used to measure tax effect on leverage in this study. Also, a certain portion of total liabilities does not have to pay any interest. Hence there is no tax-shield effect for that portion of total liabilities.

1.4 Size

Many studies suggest there is a positive relation between leverage and size. Marsh (1982) finds that large firms more often choose long-term debt while small firms choose short-term debt. Large firms may be able to take advantage of economies of scale in issuing long-term debt, and may even have bargaining power over creditors. So the cost of issuing debt and equity is negatively related to firm size. However, size may also be a proxy for the information that outside investors have. Fama and Jensen (1983) argue that larger firms tend to provide more information to lenders than smaller ones. Rajan and Zingales (1995) argue that larger firms tend to disclose more information to outside investors than smaller ones. Overall, larger firms with less asymmetric information problems should tend to have more equity than debt and thus have lower leverage. However, larger firms are often more diversified and have more stable cash flow; the probability of bankruptcy for large firms is smaller compared with smaller ones, *ceteris paribus*. Both arguments suggest size should be positively related with leverage. Also, many theoretical studies including Harris and Raviv (1990), Stulz (1990), Noe (1988), Narayanan (1988), and Poitevin (1989), suggest that leverage increases with the value of company.

Empirical studies, such as Marsh (1982), Rajan and Zingales (1995), Wald (1999), and Booth et al. (2001), generally find that leverage is positively correlated with company size. While both Rajan and Zingales (1995) and Wald (1999) find that larger firms in Germany tend to have less debt, Wald (1999) finds that, in Germany, a small number of professional managers control a sizable percentage of big industrial firms' stocks (such as

Siemens and Daimler-Benz) and can force management to act in the stockholders' interests. Based on this fact, he argues that such centralized company control is responsible for the negative coefficient on size.

Following the above-mentioned studies, a natural logarithm of sales is used to measure firm size in this study. In doing so, we imply the size effect on leverage is nonlinear. The natural logarithm of sales and total assets are highly correlated (the correlation coefficient is 0.79), so each of them should be a sound proxy for company size. Here sales rather than total assets is used to prevent the probability of spurious correlation.

1.5 Non-debt tax shields

The tax deduction for depreciation and investment tax credits is called non-debt tax shields (NTDS). DeAngelo and Masulis (1980) argue that non-debt tax shields are substitutes for the tax benefits of debt financing and a firm with larger non-debt tax shields, *ceteris paribus*, is expected to use less debt. Empirical studies generally confirm their prediction. Bradley et al. (1984) employ the sum of annual depreciation charges and investment tax credits divided by the sum of annual earnings before depreciation, interest, and taxes to measure NTDS. They find leverage is positively related with NTDS. However, NTDS is highly correlated with tangibility and they do not include proxy of tangibility in their studies, which is also expected to affect firms' leverage. Wald (1999) uses the ratio of depreciation to total assets and Chaplinsky and Niehaus (1993) employ the ratio of depreciation expense plus investment tax credits to total assets to measure NDTS. Both studies find that leverage is negatively correlated with NDTS. In this study, we use depreciation scaled by total assets to measure non-debt tax shields.

1.6 Growth Opportunities

Theoretical studies generally suggest growth opportunities are negatively related with leverage. On the one hand, as Jung, Kim and Stulz (1996) show, if management pursues growth objectives, management and shareholder interests tend to coincide for firms with strong investment opportunities. But for firms lacking investment opportunities, debt serves to limit the agency costs of managerial discretion as suggested by Jensen (1986) and Stulz (1990). The findings of Berger, Ofek, and Yermack (1997) also confirm the disciplinary role of debt. On the other hand, debt also has its own agency cost. Myers (1977) argues that high-growth firms may hold more real options for future investment than low-growth firms. If high-growth firms need extra equity financing to exercise such

options in the future, a firm with outstanding debt may forgo this opportunity because such an investment effectively transfers wealth from stockholders to debtholders. So firms with high growth opportunity may not issue debt in the first place and leverage is expected to be negatively related with growth opportunities. Jensen and Meckling (1976) also suggest that leverage increases with lack of growth opportunities.

Empirical studies predominately support theoretical prediction, Kester (1986) is only one exception. The findings of Kim and Sorensen (1986), Smith and Watts (1992), Wald (1999), Rajan and Zingales (1955), and Booth et al. (2001) are consistent with the above theoretical prediction. There are different proxies for growth opportunities with different implications. Wald (1999) uses a five-year average of sales growth. Titman and Wessels (1988) use capital investment scaled by total assets as well as research and development scaled by sales to proxy growth opportunities. Rajan and Zingales (1995) use Tobin's Q and Booth et al. (2001) use market-to-book ratio of equity to measure growth opportunities. We argue that sales growth rate is the past growth experience, while Tobin's Q better proxy future growth opportunities although sales growth rate as well as Tobin's Q (market-to-book ratio of total assets) are employed to measure growth opportunities in this study.

1.7 Volatility

Volatility or business risk is a proxy for the probability of financial distress and it is generally expected to be negatively related with leverage. However, Hsia (1981), based on the contingent claim nature of equity, combines the option pricing model (OPM), the capital asset pricing model (CAMP), and the Modigliani-Miller theorems to show that as the variance of the value of the firm's assets increases, the systematic risk of equity decreases. So the business risk is expected to be positively related with leverage. Several measures of volatility are used in different studies, such as the standard deviation of the return on sales (Booth et al., 2001), standard deviation of the first difference in operating cash flow scaled by total assets (e.g., Bradley et. al., 1984; Chaplinsky and Niehaus, 1993; and Wald, 1999), or standard deviation of the percentage change in operating income (e.g., Titman and Wessels, 1988). All these studies find that business risk is negatively correlated with leverage. In this study, we follow Booth et al. (2001) in using standard deviation of earnings before interest and tax to measure volatility.

1.8 Ownership Structure and Managerial Shareholdings

Agency theory (Jensen and Meckling (1976), Jensen (1986) etc.) suggests that the optimal structure of leverage and ownership may be used to minimize total agency costs. They propose two types of conflicts of interest: conflicts between shareholders and managers, and conflicts between shareholders and debtholders. So it is expected that there are some correlation between ownership (including managerial ownership) structure and leverage. Theoretically, Leland and Pyle(1977) argue that leverage is positively correlated with the extent of managerial equity ownership. However empirical studies produce mixed results: for example, Berger, Ofek and Yermack(1997) confirm such positive correlation, while Friend and Lang(1988) give opposite results. Although ownership structure is believed to have impact on capital structure, there seems no clear predication about the relationship between ownership structure and leverage.

In this study, institutional shareholdings proxy the ownership structure of Chinese firms and managerial shareholdings are proxied by the total shares held by top managers, directors and supervisors.

Now we summarize the determinants of capital structure, definitions, predicted signs and the results of previous empirical studies in Table 1.

Insert Table 1 here

2. Descriptive Statistics of the Determinants and Leverage

This study employs the six measures of leverage shown in Table 2, with definitions in the notes section. Total liabilities ratio (TL) is used as the main measure of leverage and all the others are employed for robustness checks. Why do we regard total liabilities ratio a more appropriate measure for capital structure? We argue that, firstly, when a firm wants to obtain more debt, the creditor will consider not only how much the firm's long-term debt is, but also how much the firm's current debt and total liabilities are. So the portion of other liabilities will affect the debt capacity of a firm. Second, current debt is a quite steady part of total assets (Gibson, 2001, p248 for US firms). It also seems to be the case for Chinese companies. Third, many companies in China use trade credit as a means of financing, so accounts payable should also be included in measures of leverage. The market measures of leverage are remarkably low because of the high Tobin's Q. Also,

many field studies such as Toy et al. (1974) show that financial executives think about capital structure targets in book value rather than in market value terms.

Based on the reasons stated above, we use book total liabilities ratio (TL) as our major measure of leverage in the analysis of the determinants of capital structure and employ quasi-market ratios and other measures of leverage for robustness checks. Table 2 reports the descriptive statistics of six measures of leverage and the explanatory variables and Table 3 reports their correlation matrix. All firms, both consolidated and unconsolidated, are included.

Insert table 2 and table 3 here

The measures of leverage are calculated from the year 2000 data while the explanatory variables are averaged where possible to reduce the noise. Specifically, ROA, size, non-debt shields, Tobin's Q, sales growth rate, tax, and tangibility are averaged values from 1994 to 2000 while ownership structure and management shareholding are proxied by institutional shareholdings and total shares held by all directors and top managers at the end of the year 1999. Volatility is the standard deviation of ROA.

Chinese listed companies have several characteristics worthy to be mentioned. First, the state is the controlling shareholder of most listed companies, while management shareholdings are quite low. Mainland China incorporated and listed companies have non-public A-shares, public A-shares, B-shares and H-shares. Public A-shares are listed on the Shanghai or Shenzhen Exchange, denominated in RMB and restricted to domestic investors. B-shares are also listed in mainland China, but denominated in US dollars (Shanghai-listed companies) or Hong Kong dollars (Shenzhen-listed companies), and were restricted to foreign investors until early 2001. H-shares are listed in Hong Kong, New York, London, or Singapore and restricted to foreign investors. Non-public A-shares are held by the state, founder institutions, domestic institutions, foreign institutions, and employees. Sometimes, a company gives a right offer and the non-public shareholders give up the right offer and public shareholders could buy these shares. However, these shares are still non-public shares, which could not be traded on the Exchanges until the China Securities Regulation Committee (CSRC) gives special approvals, which could take up to several years. It is also the case for non-public A-shares held by employees. The shares of directors and managers are tradable, but the directors and top managers cannot

trade the shares of the very companies during the time when they are working for them. Some of these firms also have B-shares or H-shares, so public investors also include B-shareholders and H-shareholders.

For simplicity, we divide these shareholders into four groups: the state, institutions (including domestic, founder and foreign institutions, so called legal person shares), the public (including A-public shareholders, B and H shareholders) and others. There are around 100 companies that have public A-shares together with B- or H- shares. Our calculation shows that only around 38% of shares of Chinese listed companies can be traded on stock exchanges. The state and institutes hold around 60%, with the median value of state-held shares being 44%. The overall shareholding (median) of directors and managers is 0.017% or RMB 0.66 million. The ownership structure is expected to affect capital structure as suggested by Jensen and Meckling (1976). However, the minor managerial shareholdings in China cannot be expected to have much effect.

Second, although tax is widely believed to affect capital structure, the effective tax rate cannot be expected to have impact. In China, the regular corporate tax rate is 33%. However, many listed firms can apply for a preferable tax rate at 15% or even lower (Actually, the mean and standard deviation of the effective tax rate are 15.6% and 6.4% respectively). The marginal income tax seems quite similar across all the companies. So we do not expect to find positive relationship between tax rate and leverage suggested by theories.

Third, Chinese listed companies have quite low leverage and book ratio is much higher than market ratio of the same leverage measure. In order to compare Chinese companies with those in other countries, we follow Rajan and Zingales (1995) to calculate different leverage measures as shown in Table 4. Also, in order to compare with other developing countries, we put the relevant measures of leverage for 10 other developing countries (Booth et al., 2001) in our table.

Insert table 4 here

Table 4 shows that, compared with those in the G-7 countries, Chinese companies tend to have much less debt/liabilities. For example, total liabilities ratio of Chinese listed companies is 46% while the same ratios in the G-7 countries are between 54-73%. Also Chinese listed companies have lower leverage than Chinese unlisted companies, which is

59%[1]. On the other hand, the market ratios are much lower than book ratios of the same leverage measure. For example, with respect to total liabilities ratio, the book value is 46% while the market value is 14%, only 30% of the book value. The difference between market and book ratio is not so large in other countries. The book value of total liabilities ratio in Italy is approximately equal to the market value. Such relation is even reversed in India, Jordan and Zimbabwe.

Such big difference is driven by remarkably high Tobin's Q, whose mean value is 3.2. Two reasons may explain such a high Tobin's Q. One is that the government had adopted a quota system for listing before the year 2001 and the application for listing was fiercely competitive for companies wanting to go public. Although the quota system is now replaced by sanction system, getting approval is still quite difficult and competitive. As a result, the listing status has great value for the listed firms. Another reason is that, as we mentioned before, around 60% of shares of these listed companies are held by state or institutions and they are non-tradable on stock exchanges. These non-publicly-tradable shares are transferred at price much closer to the book value of equity among SOEs and institutions than the tradable shares[2].

Lastly, different measures of leverage are highly correlated with each other. Although the market ratio is much lower than the book ratio, they are highly correlated (Table 2). The correlation is 0.83 between book and market long-term debt ratios (LD and MLD), 0.77 between book and market total debt ratios (TD and MTD), and 0.72 between book and market total liabilities ratios (TL and MTL). It is also no surprise that these different measures are highly correlated with each other. For example, the correlation coefficient between TD and TL is as high as 0.88. All the correlation coefficients are significantly different from zero at the 1% level. Among the explanatory variables, non-debt tax shields (depreciation/total assets) are highly correlated with tangibility (fixed assets/total assets). Their correlation coefficient is 0.50. And to a lesser extent, size is correlated with Tobin's Q (-0.41). Multicollinearity may arise if both NDTS and tangibility or both size and Tobin's Q are included as the explanatory variables at the same

[1] This figure is calculated from the date in China Statistical Yearbook (2001).
[2] We casually collect five institutional shares' transactions data from the website www.cs.com.cn that happened between April and May 2002. The average ratio of institutional shares' transaction price to book value of equity is 1.15, while the average ratio of public shares price to book value of equity for these five companies is around 5.51. Chan and Xiong (2002) systematically documents such discount phenomena.

time. However, multicollinearity test shows that it is not a serious problem.

3. Empirical Analysis

In this section, we present the results of empirical analysis on the determinants of capital structure. As the results of OLS analysis and Tobit model are much similar with each other, we just present and discuss OLS results for simplicity.

Table 5 reports the results of the determinants of total liabilities ratios (TL).

Insert table 5 here

Generally our results are consistent with the predictions of theoretical studies and the results of previous empirical studies. Profitability is strongly negatively related with TL. A one percent increase in ROA could bring more than 1.5-2.0 percent drop in TL. Non-debt tax shields are also highly negatively related with TL. Volatility, size and ownership of institutes are positively related with TL. As expected, tax and management shareholding have no significant effect on TL.

On the relationship between size and leverage, if size is interpreted as a reversed proxy for bankruptcy cost, it should have less or no effect on Chinese firms' leverage because the state keeps around 40% of the stocks of these firms and, because of soft budget constraint, state-controlled firms should have much less chance to go bankrupt. However, as Table 5 shows, this is not true. An alternative interpretation is needed. We argue that although the state is still a controlling shareholder for most listed firms, these firms are limited corporations; it is unlikely that the state will bail them out, even in case of trouble, because the central government is only a legal representative of state shareholder. The beneficiaries of state shares in these listed firms may be local governments, who can behave just like big private shareholders. We believe the economic force works quite well even in an environment where the state is the controlling shareholder.

In contrast to theoretical predictions, tangibility is negatively related with TL. The reason for that may be the non-debt part of total liability does not need collaterals. Long-

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They find that the price of institutional shares is about only one fifth of the floating A-share price of the same company.

term debt ratio is positively correlated with tangibility as shown in Table 7. Also, when we regress the first difference of TL against the first difference of the explanatory variables, the change of total liabilities ratio is significantly positively correlated with the change of tangibility as shown in Table 6.

As we use sales growth rate to measure the past growth experience and Tobin's Q to measure a firm's growth opportunity in the future, the signs and significance of their coefficients give us an interesting story. Firms that experienced a high growth rate in the past tend to have higher leverage, while firms that have a good growth opportunity in the future (a higher Tobin's Q) tend to have lower leverage. It makes sense. Firms with brighter growth opportunity in the future prefer to keep leverage low so they won't give up profitable investment because of the wealth transfer from shareholders to creditors. Also, the fast growth enjoyed by firms means that these firms had good investment opportunities in the past and had used more debt to finance their investment.

The positive relation between total liabilities ratio and volatility is consistent with Hsia's (1981) view that firms with higher leverage level tend to make riskier investment. This means that asset substitution effect dominates the consideration of business risk. To check for this hypothesis, we calculate the correlation coefficients between total liabilities ratio (TL), long-term debt ratio (LD), total debt ratio (TD) in the year 1994 and volatility of profitability in 1995-2000 (number of observation is 282). It turns out that although the coefficient between LD and volatility is not significantly positive, the coefficient between TD and volatility is 0.12, significantly different from zero at the 5% level and the coefficient between TL and volatility is 0.11, significant at the 10% level. The companies with high leverage in China tend to make riskier investments.

Also, it may be explained by the following reasons. In China, the credit market is still regulated and the term structures of interest rates are decided by the central bank rather than by the market force such as the borrower's credibility. Banks only have the right to decide whether borrower's application is approved or not and the listed companies generally are regarded as best companies in China. As a result, the companies with high business risk still can get bank loans at regulated interest rate, which is lower than market rate if interest rate was deregulated. So the companies with high volatility seem to take advantage of the regulated credit market.

Among others, one interesting finding from Table 5 is that ownership structure does affect companies' leverage. The institutional shareholding is positively correlated with total liabilities ratios at the 1% level in all models employed in Table 5.

Companies in different industries tend to have different leverage. China has huge development gaps in different provinces, autonomous regions and municipalities, and companies headquartered in different regions may have different leverage. The models No. 6,7, 8 and 9 confirm such hypothesis. From the models No. 6, 7, 8 and 9 in Table 5, we conclude that: (1) Introducing industry and region dummy does not bring noticeable changes in signs or significance for any other variables. (2) The pattern where firms in different industries or regions have different leverage is persistent when we consider other factors that affect firms' capital structure. When we add industry dummy variables and region dummy variables, the models' goodness of fit increases and the adjusted R^2 increases from 0.314 to 0.324 (with industry dummy), 0.354 (with region dummy), and 0.359 (with both industry and region dummy), respectively. Also, F-tests show that the coefficients of province dummy variables are not equal to zero at the 1% level in models No. 8 and 9, and the coefficients of industry dummy variables are not equal to zero at the 5% level in model No.7.

4. Robustness Analyses

In this part, we run several robustness analyses over the determinants of leverage. First, we employ five ways to check the stability of the relation between total liabilities ratio and the explanatory variables. Second, we report the results of OLS analysis over other different measures of leverage.

Table 6 reports the results of robustness analysis on the determinants of total liabilities ratio.

Insert Table 6 here

As summarized in Table 6, we employ five ways to check the stability of the relation between total liabilities ratio and the explanatory variables. (1) Averaged: Not only the explanatory variables but also total liabilities ratio are averaged across the year 1994 to 2000. When firms deviated from their target capital structure ratio due to discrete seasoned public offerings, long-term loans, etc., it takes time for them to move toward the target

level. We employ the average of total liabilities ratio to reduce the effect of the adjusting process. (2) Balanced. When we employ only firms that went public before 1994, we can get balanced data, in which related data across 1994 and 2000 are all available to the explanatory variables. (3) Without 2000. In this model, we lag the explanatory variables one period to reduce the problem of endogeneity. The data from 1994 to 1999 are used to calculate the values of ROA, size, non-debt tax shields, Tobin's Q, volatility while the ownership of institutes in the end of 1999 is still used to proxy the characteristics of ownership structure. But, total liabilities ratios from the year 2000. (4) First Difference: We regress the first difference of total liabilities ratios against the first difference of the explanatory variables. It is no surprise that the correlation coefficient between the first difference of the natural logarithm of sales (size) and sales growth is highly correlated (0.54). We drop sales growth to reduce multicollinearity. The correlation coefficient between the first difference of tangibility and non-debt tax shields (0.17) is much smaller than that between tangibility and non-debt tax shields (0.50), we add the explanatory variable of tangibility change in the regression. It turns out that first difference of tangibility is positively correlated with the first difference of total liabilities ratio at the 1% level. The mean value of TL first difference is 2.05, which is significantly different from zero at the 1% level. Also, the intercept (1.61) is significantly positive at the 1% level. It seems to imply that the leverage of Chinese listed companies increases with time. (5) Consolidated. Only firms reporting consolidated financial statements are used. Firms with unconsolidated annual reports tend to report lower leverage than they really have because they generally incorporate equity investment in subsidiaries to their annual reports while not reporting debt and liabilities in subsidiaries. Such restriction deletes around 140 firms. Overall, the signs and significance of the explanatory variables are quite stable.

Table 7 reports the results of OLS analysis over different measures of leverage. Book ratios versus quasi-market ratio (where book value of equity is replaced by the market value of equity) as well as long-term debt ratio versus total debt are employed to check the stability of the relationship between the determinants and the capital structure.

Insert Table 7 here

As stated above, Table 7 shows that tangibility is significantly positively related with long-term debt ratio. Market ratios seem to have better goodness of fit. For example, the adjusted R^2 of the model of market total liabilities ratio (MTL) is as high as 0.461.

Generally speaking, the findings in Table 5 also sustain in Table 7. Specifically, long-term debt ratio is positively correlated with tangibility at the 1% level.

5. Discussions and Conclusions

5.1 Discussions

From the above two sections, we know that in Chinese listed companies, leverage increases with company size, volatility of profitability, tangibility, institutional shareholdings, and it decreases with profitability, and non-debt tax shields. In this session, we will try to discuss the implications of these empirical results based on the two competing capital structure models discussed in the introduction.

Although this paper is to document the features of Chinese listed companies in terms of capital structure rather than to test the static tradeoff model and the pecking order hypothesis. Our study does imply that the former model seems to better explain the capital structure of Chinese listed companies.

Firstly, different from the American companies, Chinese companies tend to heavily rely on external financing, especially equity financing at the aggregate level. Our calculation from the database CSMR shows that more than 50% financing comes from external debt or equity issues, and net equity issues make up more than 50% of external financing in China. By contrast, net equity issuance is negative in the United States during 1991-1993 (Rajan and Zingales, 1995). Also, Myers (1984) points out that, 62% of capital expenditures came from internally generated cashflow for non-financial American companies during 1973-1982 and net equity issues were never more than 6% of external financing. Myers used such fact to justify the pecking order hypothesis. However, Chinese data seem to be contrary to the prediction of the model.

Chinese listed companies could have heavily relied on debt rather than equity financing although bond market of China is still in its very early development stage. All large Chinese companies, including both listed and unlisted, seem to rely heavily on debt rather than new stock issues. Up to the year 2000, the accumulated capital raised from stock markets is RMB655.97 billion yuan (US$79.03 billion), while bond outstanding is RMB86.2 billion yuan (US$10.39 billion) and bank loans outstanding is RMB9937.11 billion yuan (US$1197.24 billion)[3]. The capital raised from stock issuance is only 6.5% of

[3] The data are from China Statistical Yearbook 2001.

capital from both bank loans and bond issuance. Furthermore, as listed companies have much lower leverage than all the large companies (46% and 59%[4], respectively in terms of total liabilities ratio), they seem to have access to bank loans or bond.

The controlling shareholders of Chinese listed companies are often state or institutions (legal persons in Chinese terminology) and they seem to prefer equity rather than debt financing. Most shares held by controlling shareholders cannot be listed and traded in the stock markets. Because these shareholders still can keep the controlling position after seasoned equity offerings and the offering price is much higher than book value (Tobin's Q is around 3.0), the controlling shareholders benefit from increased book value of their shares from seasoned equity offerings. It is also the case for right offerings while the controlling shareholders give up the right. It turns out that, contrary to Myers' argument, the asymmetric information seems to become a second-order effect, while the agency cost between the insider shareholders and outside shareholders seems to become the first-order effect for Chinese listed companies. We argue that asymmetric information as well as tax shields, non-debt tax shields, cost of financial distress, and agency cost all affect companies' capital structure. The static tradeoff model incorporating asymmetric information problem is expected to better explain companies' capital structure than the pecking order hypothesis.

Secondly, ownership structure does have an impact on firms' capital structure in China. This study documents the positive relationship between the institutional shareholding and leverage. Also we find the companies with B- or H-shares tend to have higher level of leverage than those without B- or H-shares[5]. The pecking order theory has nothing to say about it. The static tradeoff model does predict that ownership structure affects companies' capital structure.

Thirdly, this paper generally confirms the determinants and their signs suggested by the static tradeoff model. The static tradeoff models have produced many interesting predictions on the determinants of capital structure. This study confirms that leverage increases with size, tangibility, and decreases with growth opportunities and non-debt tax shields.

[4] The leverage of all large companies is calculated from the data in China Statistical Yearbook (2001).
[5] Relevant results are available upon request.

Fourthly, the static tradeoff model could explain strongly negative correlation between profitability and financial leverage. Consistent with previous empirical researches, this study confirms that profitability has large negative effect on capital structure. A 1% increase of ROA brings along more than 1.5% drop in total liabilities ratio. Fama and French (2002) and Myers (1984) use this fact to reject the static tradeoff model. However, Chang (1999) builds a new model within the agency-principal framework and its comparative static analysis shows that firm's leverage decreases with profitability.

5.2 Conclusions

The forces working on firms' capital structure in other countries also work in a quite similar way in China. Although China is still transforming its economy from a command economy to a market-based economy and the state is still the controlling shareholder for most listed companies, the factors which affect firms' leverage in other countries also affect Chinese companies' leverage in a similar way. Specifically, leverage, as measured by long-term debt ratio, total debt ratio and total liabilities ratio, decreases with profitability and increases with company size. Tangibility has a positive effect on long-term debt ratio. Firms that have experienced quick sales growth rate tend to have higher leverage while firms that have bright growth opportunities tend to have less leverage.

Why is the relationship between the explanatory variables and leverage in China similar to that in other countries? One explanation is that Chinese listed firms are the best part of the country's economy in terms of corporate governance and they have followed the basic rules of market economy. State ownership of these firms does not prevent these firms from following rules of the market. So it is desirable to list SOEs even if the state does not give up its controlling right.

The ownership structure also affects capital structure. Firms with higher state shareholding and lower institutional shareholding tend to have lower total liabilities ratio and lower total debt ratio. Although it is not very economically significant, we do find the companies with B- or H-shares have economically significantly higher level of leverage than those without B- or H-shares. We fail to find a significant correlation between the shareholding of management and firms' leverage. This is probably because that management shareholding is too low; the shareholding of all management (directors, supervisors and top managers) is only 0.017% (median value for 1035 firms).

While the findings in developed countries are mostly portable to China, the capital structure of Chinese companies has some different features. First, although the practice of the General Accepted Accounting Principles (GAAP) varies across the world and a rigorous comparison in capital structure across countries is impossible, we have clear evidence that Chinese companies have less long-term debt, less total liabilities and higher shareholders' equity compared to their counterparts in both developed countries (e.g., US, Japan, Germany, France, Italy, UK, Canada) and some developing countries (e.g., India, Pakistan, Turkey). Second, Chinese companies tend to rely on higher levels of external financing, especially higher levels of equity financing than those in other developed countries. Third, the difference between book value and quasi-market value of leverage is much bigger in China than that in other countries. Generally the market value of leverage is much lower than the book value of the same leverage measure in China.

Why do Chinese firms have such a low long-term debt ratio? One possible reason is that Chinese firms prefer and have access to equity financing once they go public as most firms enjoy a favorable high stock price. This is the case at least compared to the book value of equity. As mentioned, the remarkably high Tobin's Q make Chinese firms prefer equity financing over debt financing at least from the perspective of state or institutional shareholders. Also, the management prefers equity financing rather than debt financing because the former is not binding. Another possible explanation is the fact that the Chinese bond market is still in an infant stage of development. Banks are the major or even the only source of firms' external debt. As a result, firms have to rely on equity financing and trade credit, where firms owe each other in the form of accounts payable. In order to provide more financing opportunities for Chinese firms, it is desirable for China to accelerate the development of its bond market.

References

Berger, G. Philip, Eli Ofek and David L. Yermack, 1997, Managerial entrenchment and capital structure decisions, *Journal of Finance* 52, 1411-1438.

Booth, Laurence, Varouj Aivazian, Asli Demirguc-Kunt, and Vojislav Maksimovic, 2001, Capital structures in developing countries, *Journal of Finance56,* 87-130.

Bradley, Michael, George A. Jarrell, and E. Han Kim, 1984, On the existence of an optimal capital structure: theory and evidence, Journal of Finance, 39,857-880.

Chang, Chun, 1999, Capital structure as optimal contracts, *North American Journal of Economics and Finance 10(2)*, 363-85.

Chaplinsky, Susan and Greg Niehaus, 1993, Do inside ownership and leverage share common determinants? *Quarterly Journal of Business and Economics*, 32(4), 51-65.

Chan, Zhiwu and Peng Xiong, 2001, Discounts on illiquid stocks: evidence from China, Yale IFC Working Paper No.00-56 (Available at http://papers.ssrn.com/abstract=286169).

DeAngelo, H. and R. Masulis, 1980, Optimal capital structure under corporate and personal taxation, *Journal of Financial Economics* 8, 3-29.

Demirguc-Kunt, Asli, and Vojislav Maksimovic, 1999, Institutions, financial markets and firm debt maturity, *Journal of Financial Economics* 54, 295-336.

Fama, E.F. and Jensen, Michael, 1983, Agency problem and residual claims, *Journal of Law and Economics* 26, 327-349.

Friend, Irwin, and Larry H.P. Lang, 1988, An empirical test of the impact of managerial self-interest on corporate capital structure, *Journal of Finance* 43, 271-281.

Gibson H. Charles, 2001, Financial Reporting and Analysis: Using financial accounting information, South-Western College Publishing

Harris, Milton, and Artur Raviv, 1988, Corporate control contests and capital structure, *Journal of Financial Economics* 20, 55-86.

Harris, Milton, and Artur Raviv, 1990, Capital structure and the information role of debt, *Journal of Finance* 45, 321-349.

Harris Milton, and Artur Raviv, 1991, The theory of capital structure, *Journal of Finance* 46, 297-355.

Hsia, C. C., 1981, Coherence of the modern theories of finance, *Financial Review*, Winter 1981, 27-42.

Huang, Samuel and Frank Song, 2002, The Financial and Operating Performance of China's Newly Listed H-firms, working paper which is available at http://www.hiebs.hku.hk/working_papers.asp

Jensen, Michael C. and William H. Meckling, 1976, Theory of the firms: Managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 3, 305-360.

Jensen, Michael C., 1986, Agency costs of free cash flow, corporate finance, and takeovers, *American Economic Review* 76, 323-339.

Kester, Carl W., 1986, Capital and ownership structure: a comparison of United States and Japanese corporations, Financial Management??, 5-16.

Kim, Wi Saeng and Eric H. Sorensen, 1986, Evidence on the impact of the agency costs of debt in corporate debt policy, *Journal of Financial and Quantitative Analysis* 21, 131-144.

Leland, Hayne and David Pyle, 1977, Information asymmetrics, financial structure, and financial intermediation, *Journal of Finance* 32, 371-388.

Long, Michael and Ileen Maltiz, 1985, The investment-financing nexus: Some empirical evidence, Midland Corporate Finance Journal 3, 53-59.

MacKie-Mason, Jeffrey K., 1990, Do taxes affect corporate financing decisions? *Journal of Finance* 45, 1471-1493.

Maksimovic, Vojislav and Sheridan Titman, 1991, Financial policy and reputation for product quality, *Review of Financial Studies* 4(1), 175-200.

Marsh, Paul, 1982, The choice between equity and debt: An empirical study, *Journal of Finance* 37, 121-144.

Masulis, Ronald W. 1988, *The Debt/Equity Choice*, Ballinger Publishing Company.

Megginson, William L., 1997, *Corporate Finance Theory*, Addison-Wesley Educational Publishers Inc.

Miller, Merton, and Franco Modigliani, 1961, Dividend policy, growth and the valuation of shares, *Journal of Business* 34, 411-433.

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

Modigliani, Franco, and Merton Miller, 1958, The cost of capital, corporation finance and the theory of investment, American Economic Review 48, 261-275.

Myers, Stewart C. and Nicholas S. Majluf, 1984, Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics 13,* 187-221.

Narayanan, M. P., 1988, Debt versus equity under asymmetric information, Journal of Financial and Quantitative Analysis 23, 39-51.

Noe, Thomas, 1988, Capital Structure and signaling game equilibria, *Review of Financial Studies* 1, 331-356.

Poitevin, Michael, 1989, Financial signaling and the 'deep-pocket' argument, *Rand Journal of Economics* 20, 26-40.

Rajan G. Raghuram, and Luigi Zingales, 1995, What do we know about capital structure? Some evidence from international data, *Journal of Finance* 50, 1421-1460.

Ross, Stephen, 1977, The determinants of financial structure: The incentive signaling approach, *Bell Journal of Economics* 8, 23-40.

Shyam-Sunder, Lakshmi and Stewart C. Myers, 1999, Testing static tradeoff against pecking order models of capital structure, *Journal of Financial Economics* 51,219-244.

Smith, Clifford, and Ross Watts, 1992, The investment opportunity set and corporate financing, dividend and compensation policies, *Journal of Financial Economics* 32, 263-292.

Stulz, Rene, 1988, Managerial control of voting rights: Financing policies and the market for corporate control, *Journal of Financial Economics* 20, 25-54.

Stulz, Rene, 1990, Managerial discretion and optimal financing policies, *Journal of Financial Economics* 26, 3-27.

Titman, Sheridan, 1984, The effect of capital structure on a firm's liquidation decision, *Journal of Financial Economics 13,* 137-151.

Titman, Sheridan, and Roberto Wessels, 1988, The determinants of capital structure choice, *Journal of Finance*, 43, 1-19.

Toy, Norman, Arthur Stonehill, Lee Remmers, Richard Wright, and Theo Beekhuisen, 1974, A comparative international study of growth profitability, and risk as determinants of corporate debt ratios in the manufacturing sector, Journal of Financial and Quantitative Analysis 9, 875-886.

Wald John K. 1999, How firm characteristics affect capital structure: an international comparison, *Journal of Financial Research* 22(2), 161-187.

Williamson, Oliver, 1988, Corporate finance and corporate governance, *Journal of Finance* 43, 567-591.

Wiwattanakantang, Yupana, 1999, An empirical study on the determinants of the capital structure of Thai firms, *Pacific-Basin Finance Journal* 7, 371-403.

Table 1 Summaries of Determinants of Capital Structure, Theoretical Predicted Signs and the Results of Previous Empirical Studies

Proxy (Abbreviation)	Definitions	Theoretical Predicted Signs	Major Empirical Studies' Results
Profitability (ROA)	Earning before Interest and tax divided by total assets.	+/-	-
Size (SIZE)	Natural Logarithm of Sales	+/-	+
Tangibility (TANG)	Fixed Assets divided by total assets	+	+
Tax (TAX)	Effective tax rate	+	+
Non-Debt Tax Shields (NDTS)	Depreciation divided by total assets	-	-
Growth Opportunities (GROWTH or Tobin's Q)	Sales growth rate or Tobin's Q	-	-
Volatility (VOLTY)	Standard deviation of earnings before interest and tax	+/-	-
Managerial Equity Ownership (MANAG)	Total percentage of directors and top managers	+	+/-
Ownership Structure (INSTITUTE)	Institutional shareholding	?	?

Note: "+ " means that leverage increases with the factor. "-" means that leverage decreases with the factor. "+/-" means that both positive and negative relations between leverage and the factor are possible theoretically if in "Theoretical Predicted Signs" column or have found empirically if in 'Major Empirical Studies' Results' column. "?" means that no clear prediction or empirical study result.

Table 2 Descriptive Statistics of Leverage and Independent Variables for Chinese Listed Firms

Variables	Nobs	Mean	Median	StdDev	Minimum	Maximum
LD	799	9.17	4.10	12.43	0	98.75
MLD	799	2.12	0.61	3.55	0	27.72
TD	799	31.00	29.64	19.22	0	99.86
MTD	799	7.87	6.36	6.44	0	37.21
TL	799	46.24	46.03	17.59	2.47	99.94
MTL	799	14.09	12.33	8.64	0.20	48.25
ROA	799	0.076	0.076	0.042	-0.141	0.281
SIZE	799	19.7	19.6	1.0	16.1	23.2
TANG	799	0.344	0.328	0.162	0.006	0.832
TAX	799	0.156	0.151	0.064	0.000	0.391
NDTS	799	0.019	0.016	0.016	0.000	0.296
Tobin's Q	799	3.19	2.93	1.24	1.35	11.21
GROWHT	799	0.265	0.161	0.553	-0.608	7.789
INSTITUT	799	22.70	14.10	24.19	0.00	86.37
MANAG	799	0.420	0.211	0.887	0.000	15.310
VOLTY	799	0.038	0.028	0.037	0.000	0.530

Note1: Book long-term debt ratio, LD, is defined as long-term debt divided by long-term debt plus book value of equity. Book total debt ratio, TD, is defined as total debt (short-term plus long-term) divided by total debt plus book value of equity. Book total liabilities ratio, TL, is defined as total liabilities divided by total liabilities plus book value of equity. When book value of equity is replaced by market value of equity, LD, TD and TL become market long-term debt ratio(MLD),market total debt ratio(MTD) and market total liabilities ratio(MTL) respectively. As the prices of H or B shares are quite different from public A shares for the same companies, it is difficult to measure the market value of these firms. Hence we delete firms with H or B shares when calculating market ratios. One salient feature among these measures of leverage is that the market ratio is much lower than the book ratio.

Note2: All variables except volatility are averaged from 1994 to 2000. Not all related data across the seven years are available. Volatility is the standard deviation of ROA. ROA is earnings before interest and tax divided by total assets. Size is the natural logarithm of net sales. Tangibility is fixed assets divided by total assets. Tax is effective tax rate, which is income tax divided by income before tax. Non-Debt Shields is depreciation divided by total assets. Tobin's Q is market to book ratio of total assets. Market value of total assets is book value of total liabilities plus market value of equity. Sales growth is growth rate of net sales. Ownership is proxied by institutes' ownership. Director is ownership of management. Its unit is one thousandth.

Table 3 The Correlation Matrix of Leverage and Independent Variables for Chinese Listed Firms

Variables	LD	MLD	TD	MTD	TL	MTL	ROA	SIZE	TANG	TAX	NDTS	TOBIN'S Q	GROWTH	INSTITUT	MANAG
LD	1														
MLD	0.83	1													
TD	0.51	0.36	1												
MTD	0.54	0.63	0.77	1											
TL	0.42	0.28	0.88	0.65	1										
MTL	0.41	0.51	0.61	0.86	0.72	1									
ROA	-0.14	(-0.06)*	-0.43	-0.26	-0.43	-0.24	1								
SIZE	(0.06)*	0.19	-0.07	0.24	(0.05)*	0.41	0.27	1							
TANG	0.19	0.29	-0.09	(0.06)*	-0.19	(-0.02)*	(0.05)*	(0.05)*	1						
TAX	(0.01)*	(0.05)*	(-0.03)*	(0.07)*	(0.00)*	0.12	0.08	0.21	(0.05)*	1					
NDTS	(0.02)*	0.09	-0.19	-0.07	-0.22	-0.08	0.18	0.18	0.5	0.07	1				
Tobin's Q	-0.2	-0.29	-0.28	-0.51	-0.31	-0.61	0.32	-0.41	-0.15	-0.14	(-0.04)*	1			
GROWTH	(0.03)*	(0.04)*	0.07	0.07	0.12	0.09	0.11	(-0.07)*	-0.08	-0.09	(-0.04)*	0.09	1		
INSTITUT	(-0.06)*	-0.16	0.11	-0.09	0.11	-0.13	-0.09	-0.3	-0.13	-0.17	-0.12	0.21	(0.06)*	1	
MANAG	(-0.05)*	(-0.03)*	(-0.02)*	(0.03)*	(0.00)*	(0.05)*	0.14	(0.04)*	-0.08	(-0.03)*	(-0.06)*	0.07	(0.05)*	(0.05)*	1
VOLTY	(0.03)*	-0.08	0.17	(-0.04)*	0.17	(-0.05)*	-0.34	-0.21	(-0.02)*	(-0.03)*	(0.00)*	0.1	(0.01)*	0.2	-0.08

Note: Number of observations is 799. One salient feature among different measures of leverage is that the market ratio is much lower than the book ratio (table 2), however, they are highly correlated. It is no surprise that these different measures are highly correlated each other, all the correlation coefficients are significantly different from zero at the 1% level.

*: means not significantly different from zero at the 5% level.

Table 4 The Extent of Leverage in China and Some Other Countries

Country	Number of Firms	Time Period	Total Liabilities to Total Assets (Medians(Means) Aggregate)		Debt to Total Assets (Medians(Means) Aggregate)		Debt to Net Assets (Medians(Means) Aggregate)		Debt to Capital (Medians(Means) Aggregate)		Interest Coverage (Medians/Aggregate)	
			Book	Market	Book	Market	Book	Market	Book	Market	EBIT/ Interest	EBITDA/ Interest
China	**954**	**2000**	**0.45(0.46)**	**0.12(0.14)**	**0.22(0.23)**	**0.06(0.07)**	**0.27(0.29)**	**0.06(0.08)**	**0.28(0.31)**	**0.06(0.08)**	**6.51**	**8.63**
			0.49	**0.153**	**0.24**	**0.077**	**0.30**	**0.082**	**0.32**	**0.082**	**5.64**	**8.26**
US	2580	1991	0.58	0.44	0.27	0.20	0.34	0.24	0.37	0.28	2.41	4.05
Japan	514	1991	0.69	0.45	0.35	0.22	0.48	0.27	0.53	0.29	2.46	4.66
Germany	191	1991	0.73	0.60	0.16	0.12	0.21	0.15	0.38	0.23	3.20	6.81
France	225	1991	0.71	0.64	0.25	0.21	0.39	0.32	0.48	0.41	2.64	4.35
Italy	118	1991	0.70	0.70	0.27	0.29	0.38	0.38	0.47	0.46	1.81	3.24
UK	608	1991	0.54	0.40	0.18	0.14	0.26	0.18	0.28	0.19	4.79	6.44
Canada	318	1991	0.56	0.49	0.32	0.28	0.37	0.32	0.39	0.35	1.55	3.05
Brazil	49	85-91	0.3						0.1	na		
Mexico	99	84-90	0.35						0.14	na		
India	99	80-90	0.67						0.34	0.35		
South Korea	93	80-90	0.73						0.49	0.64		
Jordan	38	83-90	0.47						0.12	0.19		
Malaysia	96	83-90	0.42						0.13	0.07		
Pakistan	96	80-87	0.66						0.26	0.19		
Thailand	64	83-90	0.49						na	na		
Turkey	45	83-90	0.59						0.24	0.11		
Zimbabwe	48	80-88	0.42						0.13	0.26		

Notes:

The relevant values for China are calculated from the CSMAR database.

Total Liabilities to Total Assets=Total Liabilities/Total Assets;

Debt to Total Assets=(Short-term Debt + Long-term Debt)/Total Assets;

Debt to Net Assets=(Short-term Debt + Long-term Debt)/Net Assets, where net assets=Total Assets- Accounts payables -Other current liabilities;

Debt to Capital=Total Debt/(Total Debt+Equity);

EBIT is earning before interest and tax;

EBITDA is earnings before interest, tax, depreciation and amortization.

The relevant values for the USA, Japan, Germany, France, Italy, the UK and Canada are from Rajan and Zingales (1995) and those for other countries are from Booth et al. (2000). Debt to capital ratios from Booth et al. (2000) means long-term debt, which is defined as total liabilities minus current liabilities.

I present medians, means and aggregate ratios (obtained by summing relevant items across all the companies and dividing relevant summed items) for Chinese companies while only medians are presented for other countries.

Table 5 OLS Analysis Results on Total Liabilities Ratios for Chinese Listed Companies

PARAMETER	NO.1	NO.2	NO.3	NO.4	NO.5	NO.6	NO.7	NO.8	NO.9
ROA	-188.03	-149.16	-198.91	-160.58	-163.14	-159.31	-155.48	-158.92	-153.94
	(-13.25)***	(-9.05)***	(-14.15)***	(-9.85)***	(-9.93)***	(-9.74)***	(-9.22)***	(-9.7)***	(-9.07)***
SIZE	4.19	2.739	4.424	2.996	2.917	2.617	2.391	2.618	2.448
	(7.36)***	(4.22)***	(7.89)***	(4.69)***	(4.54)***	(4.06)***	(3.51)***	(4.00)***	(3.51)***
NDTS	-193.1	-200.91	-184.87	-192.64	-189.9	-128.19	-108.29	-116.45	-102.34
	(-5.63)***	(-5.92)***	(-5.49)***	(-5.78)***	(-5.68)***	(-3.37)***	(-2.73)***	(-3.09)***	(-2.6)***
INSTITUT	0.081	0.091	0.076	0.086	0.086	0.081	0.08	0.078	0.084
	(3.43)***	(3.9)***	(3.3)***	(3.76)***	(3.74)***	(3.53)***	(3.39)***	(3.31)***	(3.47)***
VOLTY	22.91	36.17	19.72	32.793	32.92	32.91	31.43	26.26	27.93
	(1.46)	(2.29)**	(1.28)	(2.11)**	(2.11)**	(2.13)***	(2.02)**	(1.66)*	(1.75)*
TOBIN'S Q		-2.475		-2.433	-2.422	-2.736	-2.835	-2.394	-2.563
		(-4.48)***		(-4.49)***	(-4.45)***	(-4.98)***	(-4.97)***	(-4.25)***	(-4.38)***
GROWTH			5.392	5.333	5.348	5.129	4.889	4.543	4.576
			(5.6)***	(5.61)***	(5.6)***	(5.4)***	(5.09)***	(4.81)***	(4.78)***
TANG						-12.593	-8.872	-12.203	-10.676
						(-3.34)***	(-2.12)**	(-3.24)***	(-2.55)***
TAX					6.27	6.156	7.871	9.77	10.466
					(0.74)	(0.73)	(0.93)	(1.13)	(1.2)
MANAG					0.689	0.613	0.594	0.481	0.531
					(1.16)	(1.04)	(0.99)	(0.81)	(0.87)
INDUSTRY		NO	NO	NO	NO	NO	YES	NO	YES
REGION		NO	NO	NO	NO	NO	NO	YES	YES
ADJRSQ	0.261	0.278	0.288	0.305	0.305	0.314	0.324	0.354	0.359

Note: Number of observations is 799. F-tests shows the coefficients of province dummy variables are not equal to zero at the 1% level in the models of No. 8 and 9, and the coefficients of industry dummy variables are not equal to zero at the 5% level in the model of No.7 and not significantly different from zero at the 10% level in the model of No.9.

Table 6 Report of Robustness Analysis on the Determinants of Capital Structure

VARIABLES	Benchmark	Averaged	Balanced	Without 2000	First Difference	Consolidated
ROA	-160.6	-152.9	-166.4	-157.3	-37.59	-131.6
	(-9.85)***	(-11.12)***	(-4.51)***	(-8.39)***	(-9.82)***	(-7.27)***
SIZE	3	3.78	2.78	2.99	4.31	2.73
	(4.69)***	(7.03)***	(1.95)**	(4.17)***	(9.2)***	(3.86)***
NDTS	-192.6	-113.95	-358.8	-143.8	-40.97	-327.21
	(-5.78)***	(-4.06)***	(-3.19)***	(-4.76)***	(-1.92)*	(-6.54)***
TOBIN'S Q	-2.43	-2.49	-2.26	-1.13	-0.648	-2.44
	(-4.49)***	(-5.45)***	(-1.14)	(-1.52)	(-3.61)***	(-4.42)***
GROWTH	5.33	3.37	7.14	4.75		3.64
	(5.61)***	(4.21)***	(3.52)***	(5.24)***		(4.81)***
INSTITUT	0.086	0.084	0.04	0.096		0.096
	(3.76)***	(4.33)***	(0.79)	(3.77)***		(3.74)***
VOLTY	32.79	-0.97	-34.9	26.13		40.95
	(2.11)**	(-0.07)	(-0.91)	(1.35)		(2.46)**
TANG					16.5	
					(6.3)***	
NOBS	799	799	203	705	1581	660
ADJRSQ	0.305	0.335	0.211	0.262	0.125	0.275

Notes:

Note1: Benchmark is the duplication of No. 4 in table 3.

Note2: Balanced: Only firms going public before 1994 are included.

Note3: Without 2000: We lag the explanatory variables one period to reduce the problem of endogeneity. That is we use the data from 1994 to 1999 to calculate the values of the explanatory variables.

Note4: First Difference: We regress the first difference of total liabilities ratio against the first difference of the explanatory variables. It is no surprise that the correlation coefficient between the first difference of size and sale growth is highly correlated(0.54).We drop sales growth to reduced multicollinearity. While the correlation coefficient between the first difference of tangibility and non-debt tax shields(0.17) is much smaller than that between tangibility and non-debt tax shields(0.50).We add the explanatory variable of tangibility change in the regression. The intercept (1.61) is significantly positive at the 1% level. It seems to say that the leverage of Chinese listed firms increases with time.

Note5: Consolidated: Only firms reporting consolidated financial statement are included.

Note6: Averaged: Not only the explanatory variables but also total liabilities ratio are averaged across 1994 to 2000 once possible.

Table 7 Results of OLS Analysis over Different Measures of Leverage

VARIABLES	TL	MTL	LD	LD	MLD	TD	TD	MTD
ROA	-160.6	-39.23	-28.8	-33.64	-3.72	-148.5	-147.3	-28.05
	(-9.85)***	(-5.56)***	(-2.13)**	(-2.53)***	(-0.99)	(-7.96)***	(-7.88)**	(-4.68)***
SIZE	3.00	2.72	0.12	0.53	0.24	0.1	0.00	0.92
	(4.69)***	(9.86)***	(0.23)	(1.00)	(1.64)*	(0.14)	(0.00)	(3.92)***
NDTS	-192.6	-59.13	22.57	-60.03	14.73	-147.5	-127.5	-29.3
	(-5.78)***	(-4.1)***	(0.82)	(-1.93)*	(1.93)*	(-3.87)***	(-2.92)***	(-2.39)**
TOBIN'S Q	-2.43	-3.04	-1.62	-1.2	-0.66	-3.25	-3.35	-2.11
	(-4.49)***	(-12.95)***	(-3.61)***	(-2.68)***	(-5.27)***	(-5.24)***	(-5.33)***	(-10.55)***
GROW	5.33	2.6	1.21	1.51	0.47	3.75	3.68	1.51
	(5.61)***	(6.32)***	(1.54)	(1.94)*	(2.16)**	(3.45)***	(3.38)***	(4.31)***
INSTITU	0.086	0.01	-0.016	-0.01	-0.013	0.075	0.073	0.002
	(3.76)***	(0.844)	(-0.83)	(-0.46)	(-2.39)**	(2.87)***	(2.8)***	(0.29)
VOLTY	32.79	-2.48	7.31	7.23	-4.42	31.39	31.41	-5.28
	(2.11)**	(-0.37)	(0.57)	(0.57)	(-1.24)	(1.77)*	(1.77)*	(-0.93)
TANG				16.77			-4.06	
				(5.44)***			(-0.94)	
OBS	799	799	799	799	799	799	799	799
ADJRSQ	0.305	0.461	0.042	0.076	0.101	0.239	0.239	0.299

Notes:

Book long-term debt ratio, LD, is defined as long-term debt divided by long-term debt plus book value of equity. Book total debt ratio, TD, is defined as total debt (short-term plus long-term) divided by total debt plus book value of equity. Book total liabilities ratio, TL, is defined as total liabilities divided by total liabilities plus book value of equity. When book value of equity is replaced by market value of equity, LD, TD and TL become market long-term debt ratio(MLD),market total debt ratio(MTD) and market total liabilities ratio(MTL) respectively. As the price of H or B shares are quite different from public A shares for the same companies, it is difficult to measure the market value of these firms. Hence we drop firms with H or B shares when calculating market ratios.