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DETERMINANTS OF CAPITAL STRUCTURE:

EVIDENCE ON CHINESE COMPENIES

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ABSTRACT

For lack of enough empirical studies on capital structure of Chinese firms and to further explore the determinants of capital structure, this thesis employs a newest dataset from year 2004 and 2005, composing of 336 firms from main board of Shanghai Stock Exchange and small and middle enterprises (SMEs) board of Shenzhen Stock Exchange to empirically study the determinants of capital structure for Chinese firms.

Based on review of relevant capital structure theories, mainly pecking order model and trade-off theory and previous empirical studies in this field from different countries, eight potential independent variables are included in the regression models and different leverage ratios of both book values and market values are used as dependent variables.

Results derived from this thesis are in line with the dominant results from previous empirical studies on Chinese firms. Identified negative determinants include profitability and non-debt tax shield. Positive determinants identified are years listed on the stock markets, size, volatility and tangibility. Results for growth opportunities are quite mixed and state-owned shares ratio is not significant. Consistent with previous studies, much lower long-term debt ratio is found for Chinese listed firms which can be explained by the small size of bond market, special role of short-term debt and the preference of equity financing over long-term loans.

For some results from this study are consistent with pecking order theory while others support trade-off models, it is difficult to say which model is more suitable in China but rather they combine together and determine the capital structures for Chinese firms.

1. INTRODUCTION

When we read different companies' balance sheets, it goes unnoticed that some companies use huge amount of bank loans, others issue new stocks frequently while others no debt, no new issuance at all. Capital structures of different companies, or of the same company in different years differ a lot, which is an interesting question arouse much curiosity among researchers.

Since Modigliani and Miller (1958) published their paper focusing on corporate financing theory, much research has been done in this field. But until now, how do firms in different institutional environments choose their capital structure in practice is still a question without a clear answer.

What is exactly capital structure? Capital structure is a firm's mixed financing results, debt-to-equity ratio. Debt-to-equity ratio could mean different ratios by using different definitions of debt and equity. There are many different kinds of debts and at least two kinds of equity, common equity and preferred equity. Newly developed financial products, such as hybrids make the distinction between debt and equity more difficult. Hybrid could belong to equity or debt depending on the detailed contract, which entails more characteristics of debt instrument or equity.

For Chinese companies, determinants of financing choice are a more intriguing and difficult problem to answer for environmental factors, such as the small size of bond market, immatureness of the stock market, and the important role of special "relationship" between banks and firms. All those factors could affect corporate decisions about which financing source they would choose, such as internal funds, bank loans, issuing bonds or issuing stocks or which one they can choose. Another reason that makes Chinese firms interesting samples to study is that they are operating in a developing and transiting economy, which entails them many special characteristics different from firms in developed countries. For empirical studies about leverage in Chinese firms appeared until recently and with very limited quantities, still more research in this field are needed to arrive at a more clear conclusion.

1.1. Purpose of the thesis

This paper examines the theoretical models about corporate financing choices and related empirical studies in capital structure area for different countries. The main objective of this study is to examine which potential factors are determinants of capital structure decisions for Chinese firms in manufacturing sector by building regression models for a sample data composed of both big firms and small and middle-sized enterprises (SME), based on newest data in year 2005 and year 2004 from Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) in China. To find out if different factors play roles on big firms and SMEs, we also make individual regression fro them.

For there exists already a few studies on capital structure of Chinese firms, another purpose of this paper is to compare our results derived from a specific sector, namely manufacturing industry, with previous empirical results based on the cross-sectional samples.

Questions will be answered in this paper:

1. Which factors are determinants of general public listed firms in manufacturing industry?

2. Are the set of determinants of capital structure for big firms and SMEs the same? If not, what could be the potential reasons?

3. Are there any difference between determinants when different measures of leverage are used? If yes, what could explain the difference?

4. Which capital structure model should work better for listed Chinese companies?

1.2. Contributions and limitations

There exist a few papers studying about financing decisions for Chinese enterprises. However, those studies appear until quite recently and still far from enough. And also some quite different results are given by different studies which could make leverage characteristics in China not so clear. In this sense, this paper contributes one more empirical study in this field.

All previous papers are cross-sectional analysis for the main purpose is to find out determinants for general listed companies in China, but for firms listed in the main board are usually larger and state-owned firms. By adopting data of firms from a newly developed SME board in SZSC in 2004, more SME s and non-stated owned firms are included in the sample to balance the whole dataset.

However, for the SMEs board in SZSC came into being since the end of 2004, it is still a very young market and the number of companies listed on this board is rather small, 40 in 2004 and about 70 in 2005. Bias results from this limited number.

Another limitation is that for the sample companies we use are all from listed companies, which are in general better ones in their respective industries. Hence, they might not be good representatives of an average firm.

Besides, for the unavailability of some data, we have to exclude a few potential variables from our study. For example, for the tax system is rather complicated, the tax rates differ a lot for different types of companies, for companies in different locations, and also for the same company in different operating years. And it is very hard to collect all those information. We have to exclude tax-related variables from our study.

1.3. Hypotheses of the study

Based on previous empirical studies and capital structure theories, hypotheses are listed at follows.

H1 Expected relationship between profitability and leverage is negative.

Based on different theories, the effect of profitability on leverage is different. According to trade-off models, it should be positive and from pecking order point of view, negative correlation is predicted.

However, according to available empirical studies on Chinese firms, the dominant results are that negative relationship exists between profitability and leverage.

It can be explained by the immature disclosure systems about firm information. Much asymmetric information exists between firms and investors and also between firms and banks. Hence, cost of external financing is much higher compared with the cost of internal funding. Firms prefer to use their own cash flow if it is available.

H2 Positive relationship between firm size and leverage.

Big firms are considered to be financially and operationally stronger with less possibility to go into bankrupt and in general they have better and longer relationship with commercial banks in China. Hence, it is easier for them to get more debt compared with SMEs. Taking the immatureness of stock market into consideration, more asymmetric information exists between firms and investors. Therefore, the adverse selection problem is more serious in China and equity issuance is expected to be the last resort for big companies. Bigger companies are expected to have more debt. For SMEs, it is quite hard to get bank loans. And in order not to forgo the good investment opportunities and to support their growth, they are willing to issue equity as external financing if they can. Therefore, debt/equity ratio is expected to be very low for SMEs who have the access to the equity market.

H3 Growth rate is expected to be a mixed determinant of leverage ratios.

If growth rate of a firm is quite high, it means the firm has many good investment opportunities and the expected rate of return is quite high. They are not reluctant to give up the highly profitable opportunities. But at this time, more capital is needed for the investments and it is quite possible the operating cash flow is not enough. Therefore, firms turn more to external funding resources.

However, for the immatureness of Chinese stock market, firms with higher growth rate can usually get more capital gains from secondary markets and equity issue might be preferred over bank loans. If firms can get access to equity financing as they want, they would choose equity issuance rather than bank loans. Under this circumstance, lower leverage ratios are expected.

Meanwhile, to get permission from government to issue new equity is not easy. Hence, strict limitation comes from supply side. If firms can not get the funding by new equity issuance, they turn to bank loans and higher leverage ratios are expected.

The correlation between growth rate and leverage is determined by different forces. And the final result depends on which force takes the dominant role.

H4 Tangibility is expected to be a positive factor for the collateral value it could afford to decrease the banks' risk.

As known, tangible assets can be used as collateral for credit institutions to secure their loans and it is safer for banks to lend to firms with a lot of tangible assets. Therefore, higher tangibility should lead to higher debt levels. It is argued that this result is derived based on the assumption that debtors and creditors do no have close relationship (Berger and Udell, 1994), which is not the case in China. Admittedly, relationship plays a most important role. When close relationship exists between banks and firms, there is not so much asymmetric information and consequently, tangible assets might not be essential to secure loans for banks and the firms also would like to preserve the collateral value of the assets to enlarge its debt capacity for future financing. If tangibility doesn't play an important role in leverage ratios, it indicates somehow that relationship lending still plays dominant role in China. But it is expected that even though relationship lending still matters a lot in China, the role is diminishing and the credit institutions are increasingly recognizing the importance of counterparts' financial standing to decrease the risk they take. Therefore, tangible relationship between tangibility and leverage ratios is expected.

H5 Volatility is expected to inversely relate to leverage ratios.

The argument is that the more volatile a firm's earning is, it is more risky for the creditors to lend money to it for the firm has bigger bankruptcy risk and therefore it is difficult for the firm to get debt.

H6 State-owned shares ratio plays positive role on leverage ratios.

State-owned shares include both state shares and legal person shares. Legal person shares are also included for they are held by entity or institution with a legal person status, e.g. a state-owned enterprise or a firm controlled by an SOE.

State-owned enterprises (SOE) can get more bank loans and access bond markets for government helps in building the relationship between banks and SOE.

1.4. Structure of the thesis

This thesis is organized as follows: in the first section, purposes of the study and research problems are presented. Hypothesis about results of the empirical study and contributions & limitations of this paper are also included here. In the following section, we discuss different theories of capital structure, which are categorized into the foundation-MM theory, trade-off models, pecking-order models and others.

Chapter 3 reviews previous empirical study about determinants of leverage in different countries, including Chinese evidence. To understand the quantitative results better, we introduce institutional environment of China in chapter 4, which includes the economy situation, legal environments and financial markets.

In chapter 5, we describe the data source, sample composition and also the methodology we will adopt to analyze the data. And the empirical results are presented in chapter 6, with descriptive statistics, regression results and comparative analysis. Finally, we give a short summary and the conclusion of the paper in Chapter 7.

2. THEORY OF CAPITAL STRUCTURE

2.1. Foundation—The Modigliani-Miller theory

Modigliani and Miller (MM, 1958) lays the foundation for the later study and discussion about capital structure. They showed that financing decisions don't affect firm value in perfect markets. They argued that firm value can not be changed just by splitting its cash flows in different ways, which also means that a firm's value is determined by its real assets rather than the securities it uses. Therefore, the conclusion is that capital structure is irrelevant for firms in perfect markets and the firm's value depends only on its operating income and the degree of business risk. And even though there may exist temporary different values between a levered company and un-levered one, the difference would disappear soon for in perfect market, no arbitrage opportunity exists. It is denoted as *preposition I* in MM (1958):

Proposition I: The market value of any firm is independent of its capital structure and is given by capitalizing its expected return at discount rate ρ appropriate to its class.

$$V_U = V_L$$

Where V_U is the value of an unlevered firm, equaling to the price of buying a firm financed solely by equity; V_L is the value of an unlevered firm, equaling to the price of buying a firm financed by both equity and debt. If V_L doesn't equal V_U, then there would be an arbitrage opportunity.

Next, we will have a look at how *preposition I* is derived based on a simplified example.

Suppose $X = X_U = X_L$ represents future operating income, notice that both firms belong to the same risk class

$$V_U = E_U$$

$$V_L = E_U + D_U$$

r is interest rate on riskless bonds

Consider two different portfolios in Table 1:

Table 1 Cash flow of different portfolios.

	Cash outflow today	Cash inflow in the future
Buy $m\%$ share of U	$m \times E_U = m \times V_U$	$m \times X$
Buy $m\%$ bonds of L	$m \times D_L$	$m \times r \times D_L$
Buy $m\%$ share of L	$m \times E_L$	$m \times (X - r \times D_L)$
Buy $m\%$ of L	$m \times D_L + m \times E_L = m \times V_L$	$m \times r \times D_L + m \times (X - r \times D_L) = m \times X$

For the two portfolios mentioned above have the exact same return, if no arbitrage opportunity exists, the costs to buy the two portfolios should be the same:

$m \times V_U = m \times V_L$, denoting that $V_U = V_L$.

The assumptions MM used to arrive at their conclusion are listed as follows:

1) All investors are price takers who couldn't affect the price.

2) No transaction costs for all market participants can borrow and lend at risk-free rate.

3) No bankruptcy costs.

4) No agency costs, which means that managers always act to maximize stockholders' interest.

5) No asymmetric information exists among all market participants.

6) No taxes at both corporate and personal level.

7) All firms belong to the same risk class.

8) All firms can only issue risk-free debt or risky equity.

Under those strict assumptions, MM draws the famous *preposition 1* (irrelevance proposition) discussed above. Following studies have shown the irrelevance proposition also holds in a more general framework, such as Stiglitz (1969) and Kraus and Litzenberger (1973). In Frydenberg (2003), it is also demonstrated that the relaxing of risk class assumption doesn't affect the results.

By giving those restrictive assumptions, MM model is a pure theoretical one and not realistic for none of the assumptions are met in the real world. However, MM arrive at their final results by identifying and isolating critical variables which could affect firm values. Therefore, it has many practical instructions. All those assumptions could be potential determinants of capital structures and some of the assumptions have been proved to be real determinants by relaxing them in some empirical studies. And many important theories in capital structure after MM, such as trade-off models, pecking order models are all developed based on MM theories by relaxing one or some assumptions used in MM theory. Two most widely discussed and most competing models about financing choices are trade-off models and pecking order models. We will give a brief discussion about these two branches of models in the following sections and other newly developed models thereafter.

2.2. Static Trade-off models

2.2.1 Trade-off models

Theories suggesting that there exists an optimal capital structure that maximizes firm value by balancing the costs and benefits of an additional dollar of debt are categorized as trade-off models. Considering the optimal leverage from different points of view, trade-off models can be sub-categorized in the following three types: models related to bankruptcy costs, agency costs and corporate control respectively.

Before we delve into the details of the trade-off models, tax benefits from debt financing are briefly touched here. In Modigliani and Miller (1963), for interest payment is deducted before taxable income, debt financing could result in tax-shield benefits which decrease firms' tax liabilities. This is the most important benefit from debt. Meanwhile, taking personal tax and also non-debt tax shield, such as shield from depreciation, into consideration, benefits of debt in taxes is offset to some extent.

2.2.1.1. Trade-off models related to bankruptcy costs

In Baxter (1967), the costs incurred by financial distress were identified as non-trivial and could reimburse the tax benefits of debt financing. From Figure 1, we can see the basic idea of this theory. Debt has both advantages and disadvantages for firms: advantages come from the tax-shield of debt clarified in MM(1963) and disadvantages come from the increasing probability of bankruptcy for a company with increasing debt hence the cost of bankruptcy is increased. Prediction of tradeoff theory is that an optimal capital structure does exist and is decided on achieving the balance between the benefits of debt and the costs associated with debt, holding other variables constant. Firms substitute debt with equity or equity with debt until the firm value is maximized. This is the original static trade-off theory which is derived by relaxing the no taxes and no bankruptcy cost assumptions in MM theory.
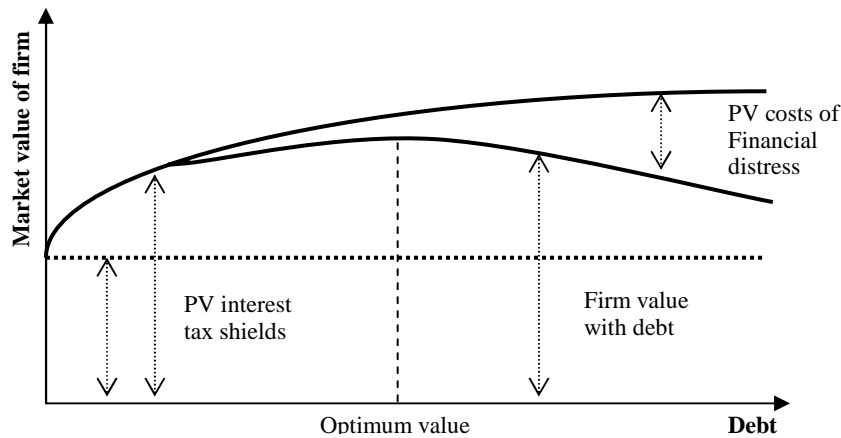
Figure 1 The Static Trade-off Theory of Capital Structure.

2.2.1.2. Trade-off models related to agency costs

In Jensen and Meckling (1976), based on the common knowledge that debt had been widely used prior to the existence of the tax subsidies on interest payments, given the positive bankruptcy costs, they argue that there must be other important determinants of capital structure that haven't been identified.

In this paper, two kinds of conflicts were identified. The first kind of conflicts is resulted from the interest divergence between shareholders and managers who are not wholly-owners of the firms. In corporations, managers don't possess all residual claim but they do bear all the cost. When an owner manager is not a wholly-owned one, which means some outside shareholders exist, his objective is not to maximize the firm's value but to maximize his own shares. The less ownership the manager has, the more severe the divergence between the other stockholders' interest and the mangers'.

Here we can have a look at where the benefit of debt financing related to agency problem comes from. By increasing debt and with the constant shares of mangers, the manager's share of the equity increases and the loss from the conflict decreases. Also, for with more debt, firms have to pay more cash as interests and free cash flow is decreased. Hence, the cash available to managers to engage in some activities which would affect the maximize profit is also decreased (Jensen (1986)). Besides, through

debt financing, control of firms can be limited to a few agents by raising part of the capital through debt financing, such as bank loans or bond sales, reducing agency cost of management.

In Grossman and Hart (1982), another benefit of debt financing is clarified. When a firm goes to bankrupt, the costs could be huge for managers. The incurred costs could include lose of control of the firm, deterioration of reputation. The managers work harder, not risk too much and diverge the operation objective too far from the company's interest in order not to fall into "bad firm" categories. Also in Harris and Raviv (1990), the disciplining role of debt is suggested. For managers don't always behave in the best interest of their investors. In this context, when a firm is near to liquidate, managers may choose not to liquidate for reputation and other considerations. Debt can serve as a disciplining device for default allows the creditors the power to force the firm into liquidation.

The second kind of conflicts is between debt-holders and equity-holders for debt contract makes equity-holders to invest sub-optimally. When an investment gives large profits, stockholders can get most of the gain. But when the investment fails, debt-holders also bear the loss. Consequently, equity-holders may prefer to invest in very risky projects. Risky projects result in decrease in the value of debt. This is the agency costs of debt financing. However, if debt issuers can forecast equity holders' behavior, whether to risk too much or not, they can price adequately to transfer the costs back to the equity holders.

Thus, Jensen and Meckling argue that an optimal capital structure can be attained by finding the point where the total agency cost is minimized. It can be described in Figure 2. They achieved this conclusion by relaxing the MM assumption that no agency costs exist.

An extension of the agency problems was given in Myers (1977). When a firm confronted with bankruptcy, equity holders don't have incentive to contribute new capital to value-increasing investments for the returns from the new investments go mainly to the debt-holders but meanwhile, equity-holders undertake the whole cost. In this situation, more debt financing, the more severe the agency costs of debt.
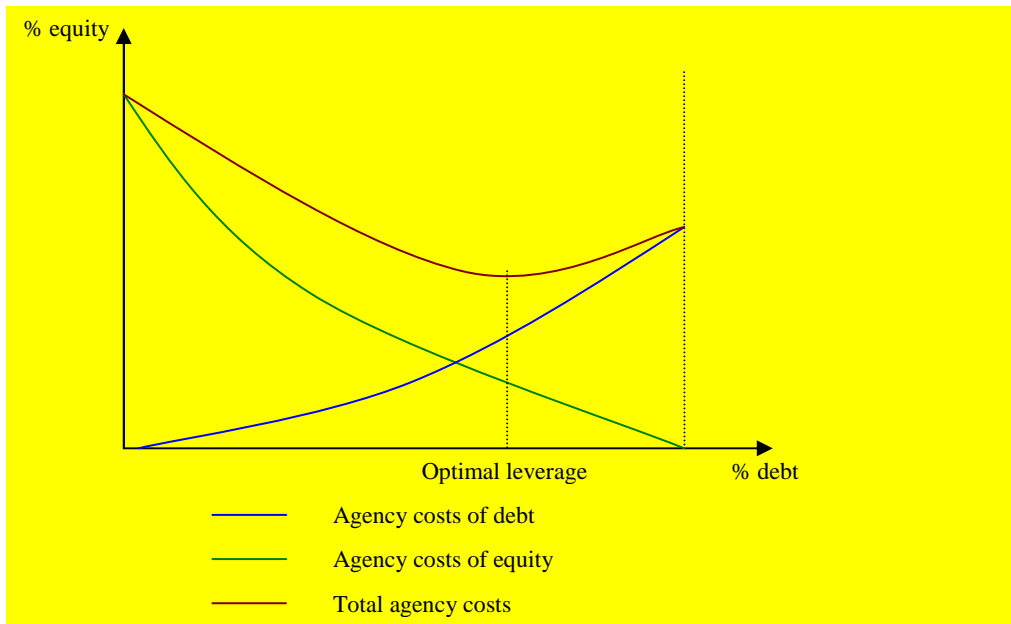
Figure 2 Optimal leverage determined by minimizing agency costs.

2.2.1.3. Trade-off models related to corporate control

Another branch of theory could be categorized into trade off models are derived from corporate control considerations. Models based on corporate control are initiated by the growing takeover activities in the 1980's. The studies are all based on the fact that common stocks carry voting rights while debt does not. Harris and Raviv (1988), Stulz(1988) and Israel(1991) discussed the relationship between capital structure and corporate acquisitions. There is some difference in the process to arrive at their results, e.g. the first two papers study how capital structure affects the outcome of takeover contests through distribution of votes between management and outside investors. By comparison, Israel (1991) argues that the outcome of takeover contests is affected through its effect on the distribution of cash flows between voting and nonvoting securities. However, the results those three papers have identified are quite similar, that is the optimal debt level of a firm can be achieved by the trading off between the probability of acquisition and share of the synergy for the target's shareholders. Here we summarize the study of Israel (1991), focusing on the analysis of relationship between debt level and acquisition and neglecting the price effects of acquisition for it is not of importance for this thesis.

In Israel (1991), two different effects of debt financing were identified. On the one hand, high debt level leads to higher price the potential acquirer has to pay for the target firm and the expected payoff of equity-holders of the target firm increases. This is the value-increasing effect from debt financing. Assumptions used here: debt is issued in competitive markets and yielding zero net present value to debt holders. All premiums from appreciation of debt by acquisition go to equity-holders of the target company.

On the other hand, for the minimal ability of acquirer is required to be higher to make the acquisition profitable under higher debt levels, the possibility that the potential acquirer possess this minimal ability is lower and thereby the likelihood of the acquisition is smaller. This is the value decreasing effect from debt financing.

Thus, Israel argues that optimal capital structure can be obtained by balancing the two sides discussed above.

The discussion above is about how debt financing would affect firms. How about the other way around? If all other things equal, the lower probability the firms being an acquisition target, the lower the debt level. And the higher the acquisition price, other things being equal, the less possibility the target being acquired and hence less debt is issued.

If an acquirer owns higher bargaining power, the managers have to try to transfer more wealth from the acquirer to the debt-holders and then to the shareholders to reimburse the decreased wealth on the equity part. Therefore, target firms with acquirers who have higher bargaining power issue more debt.

The results Israel arrived at are summarized as Lemma 2 in his paper:

The optimal debt level $F^{\#}$ decreases with acquisition costs T and increases with acquirers' bargaining power v.

2.2.2. Determinants derived from trade-off models

- Determinants derived from tax shields

Considering only tax related effects on firms, following factors are potential determinants of debt-to-equity ratios holding other variables constant.

1) Corporate tax rates

Increase in tax rate will increase tax shield of a firm, thus reducing taxable income and thereby reducing tax liabilities. Hence, positive relationship between tax rates and leverage is expected.

2) Non-debt tax shields

It is a negative explanatory variable for tax deductions for depreciation and investment tax credits can be substitutes for the tax benefits of debt financing. DeAngelo and Masulis (1980) predict that leverage is inversely related to non-debt tax shields.

3) Personal tax rates

It is negatively affect debt ratios for in real world, the personal tax rate on interest is higher than the effective personal tax rate on equity distributions. Therefore, personal tax in some way penalty bondholders more and offset the tax benefits of debt at the corporate level.

4) Profitability

It is expected to positively correlate with capital structure for firms with more profitable assets commit a larger part of earnings to interest which is debt payments.

- Determinants derived from agency problems

Based on agency costs trade off models, an optimal capital structure can be attained by minimizing agency costs. Hence, in industries where the potential agency costs of outside equity or debt are quite different, different leverage levels are expected and use of the low agency cost financing arrangement is chosen. For example, when potential agency cost from outside equity is quite huge, such as industries where the firm value is easily decreased by managers, little outside equity and high debt level is best for the firms and vice versa, such as restaurants which are usually run by owner-managers.

Besides, taking the benefits of debt in decreasing agency costs, discipline role and informational role into account, the positive potential determinants include:

1) Liquidation value

In Harris and Raviv (1990a), it is argued that firms with higher liquidation value, e.g, with more tangible assets, have more debt. Increases in liquidation value make liquidation the best strategy, and hence information is more useful. Consequently, a higher debt level is required.

2) Firm value

Following the arguments that liquidation value affects debt levels positively, Harris and Raviv (1990a) indicates that the higher liquidation value, the higher market value of the firm compared with similar firms with lower liquidation value. Consequently, positive relation should exist between firm value and debt level.

3) Default probability

Harris and Raviv (1990a) points out that firms with bigger liquidation value have more debt and thus pay higher yields. They are more likely to default. The higher liquidation value (also the bigger the default probability), the better the liquidation strategy. Therefore, higher debt level is required.

4) Extent of regulation

It is in Jensen and Meckling (1976) the relationship between extent of regulation and leverage is investigated. Industries which permit less asset substitution, one of the most important costs of debt financing, have higher debt levels, such as regulated public utilities, banks and firms in mature industries with few growth opportunities.

5) Free cash flow

Holding growth prospects the same, firms with more free cash flow can benefit more from debt financing for the controlling effects of debt. This is mentioned in Jensen (1986) and Stulz (1990).

Negative determinants:

1) Extent of growth opportunities

Still based on the decreasing free cash flow problem in Jensen (1986), holding the amount of FCF constant, firms with more growth opportunities have less FCF and hence lower debt financing level is required.

Combining cash flow and growth together, firms that generate large cash flows but few or negative growth prospects are confronted with more serious problems that cash flows may be wasted by investing into bad projects. Hence, the control function of debt is more important.

2) Interest coverage

In general, firms with higher leverage level offer higher yields, hence lower interest coverage which is mentioned in Harris and Raviv (1990a).

3) The probability of reorganization following default

Still in Harris and Raviv (1990a), argument for this factor goes like this: increases in liquidation value decrease the probability of reorganization, so negative correlation is expected between debt levels and the probability of reorganization after default.

- Determinants derived from bankruptcy problems

From trade-off models based on bankruptcy costs, the following potential determinants can be identified, assuming the other variables constant:

1) Profitability

On the one hand, the more profitable the firm is, the more tax-shields it can get from debt financing, higher leverage level is beneficial for firms. On the other hand, the less profitable a firm is, the bigger the expected bankruptcy possibility and also the bigger the bankruptcy costs. From the selling side of credit, creditors would reluctant to provide capital to less profitable firms and vice versa. Therefore, positive relationship between leverage and profitability is expected.

2) Size and diversification

Size and diversification are positive factors for in general, small companies with only one or two products are easier to go to bankrupt and vice versa.

3) Volatility

Firms with volatile earnings are more risky. The leverage level is expected to be lower. Therefore, volatility is a negative determinant.

4) Tangibility

The more tangible assets a firm has, its counterparts, the creditors are confronted with less bankruptcy costs for bigger recovery value. Also, it is easier for firms with high tangibility to get more debt. Thus, positive relationship is expected.

5) Uniqueness

Titman (1984) argues that uniqueness of products is negatively related to debt ratios for the liquidation value is smaller and bankruptcy cost might be bigger.

6) Growth rate

According to Baskin(1989), growth rate is argued to be a negative determinant for the higher the growth rate, the greater the bankruptcy risk.

- Determinants derived from corporate control

From corporate control point of view, determinants of leverage include the following factors:

1) Acquisition cost

The higher the acquisition cost, the lower the possibility to be acquired target and thereby lower debt level is expected.

2) Bargaining power of acquirer

The higher the bargaining power of an acquirer, the target firm needs to borrow more to transfer the wealth from debt-holders to equity-holders. Thus, positive relation is expected.

2.2.3. Summary of determinants from trade-off models

Potential determinants and the expected effects on capital structure is summarized in Table 2.

Table 2 Summary of determinants from trade-off theory.

Positive determinants	Negative determinants
Corporate tax rate	Non-debt tax shields
Profitability	Personal tax rate
Liquidation value	Growth opportunities
Firm value	Interest coverage
Default probability	Probability of reorganization after default
Extent of regulation	Volatility
Free cash flow	Uniqueness
Size and diversification	Acquistion cost
Tangibility	
Bargaining power of acquirer	

2.3. Pecking order models

Along with trade-off models, pecking order theory is the other most competing one in capital structure theories. Pecking order models are built on the existence of asymmetric information between firms and investors and hence are based on the relaxing of the assumption that no asymmetric information exists in MM (1958). The main difference between static tradeoff models and pecking order models is that the latter one doesn't suggest the existence of an optimal debt ratio, but argue that there exists an optimal hierarchy of raising funds. And in pecking order theory, current capital structures of firms are accumulated results of their past financing requirements and debt ratios

change in response to imbalances between internally generated cash flows and investment opportunities.

2.3.1. Pecking Order Theory

Myers and Majluf (1984) gave a detailed discussion on corporate financing choices under asymmetric information. Their conclusion is that to maximize the old shareholders' interest, firms always prefer to using internal funds over external funds, debt issuance over equity issuance when external funds are needed to maximize the old shareholders' interest.

Assumptions used to arrive at this conclusion are listed as followings:

1 Capital markets are efficient with public available information, no transaction costs for issue stock.

2 Managers have information that investors do not have and both managers and investors know this.

3 Management acts in the interests of old stockholders and old stockholders are passive, which means they don't rationally rebalance their portfolios when they learn more information from the firms' actions.

First, internal funds are always favorable to external funds. When a company has ample slack, it is not willing to use external financing which will result in possible conflicts of interest between old shareholders and new ones. Besides, when a firm has enough slack and if at this point the stock is overvalued, it may be tempted to issue stock. But for the investors also know this, attempt to issue gives investors negative information.

Second, debt is favorable over equity.

Situation 1: choice of debt or equity is pre-announced

$$V^{old} = a + b + I - E_1 ;$$

$$V^{old} = S + a + b - (E_1 - E) ,$$

Where S denotes financial slack;

a denotes assets-in-place;

b represents investment opportunity;

I denotes required investment;

V^{old} represents the value of old shares;

t=+1 is when the market receives the information that managers received about the value of the firm's asset-in-place and investment opportunity on an earlier time t=0;

E is equity required for new investments;

E1 is the newly issued shares' market value at t = +1;

$(E_1 - E)$ is the capital gain or loss of new shareholders at t=+1.

Only when $S+a \leq S+a+b-(E_1 - E)$, or $b \geq \Delta E$ holes, new shares are issued.

The same argument goes with bond issuance, only when $b \geq \Delta D$ bonds are issued.

For bonds is not as risky as equity and in general $\Delta D \leq \Delta E$, if the firm is willing to issue equity, it is also willing to issue debt. But under some conditions when $\Delta D \leq b \leq \Delta E$ it won't issue equity but only debt.

Situation 2: choice of debt or equity is not pre-announced, chosen at t=0

Market value of old stockholders when No issuance of debt or equity

$V^{old} = S+a$

Additional payoffs to old stockholders when issue external funds and invest.

$b - \Delta E$ equity issuance

$b - \Delta D$ debt issuance

If equity is chosen, it signals that

$\Delta E \leq \Delta D$

capital gains of realized by new stock or bondholders at t=+1 when the firm's true value is revealed.

The condition that firms would choose equity over debt is that $\Delta E \le \Delta D$. This can be found only when $\Delta E < 0$. Therefore, no price can be found where the firm would like to issue equity rather than debt and meanwhile, new investors are willing to buy.

In other words, equity issuance is always not favored by firms for the following reasons: when equity is undervalued, the benefits to the old shareholders from investing in the new investments are less than the dilution costs resulting from issuing new equity; when equity is overvalued, the firm would like to issue new stock to maximize old stockholders' interest but investors also know this, they discount the stock price and they translate the equity issuance into bad news of the firm.

Some papers suggest different results from pecking order theory. Giammarino and Neave (1982) argued that under the condition that managers and investors know the same information except firm risk, equity issues are preferred for the time when managers want to issues debt is when they know the firm is riskier than what investors believe. But meanwhile, investors also realize this and they won't buy the debt. Only equity, or convertible security can be issued by finding an equilibrium price.

Myers and Majluf (1984) also mentioned Giammarino and Neave (1982) in their paper. But they argue for asymmetric information by clarifying that firm value is a stronger determinant of corporate financing compared with asymmetric information about risk, still pecking order holds in general. According to Myers (1984), it is also mentioned that if there is asymmetric information about variance rate, not about firm value, the pecking order could be reversed. In Halov and Heider (2004), it is argued that standard pecking order is only one special case of adverse selection argument. In this special context, adverse selection cost for debt is smaller compared with cost for equity. However, it is also possible in other contexts, the situation is reversed and hence, the pecking order is also different.

2.3.2. Determinants identified by Pecking order model

The most important implication from pecking order is that higher informational asymmetry leads to higher leverage and profitable firms use less debt. Then the hints we

can derive related to determinants of capital structure from pecking order theory are listed as follows:

First, information asymmetry is the key factor to affect the leverage level directly. And all factors bring more asymmetric information could indirectly result in higher leverage. Among the identified factors firm specific determinants include firm size profitability and growth rate, tangibility of assets, intensity of research and development, asset volatility, age and level of institutional ownership. Next, we give a brief discussion the possible effects of those factors on capital structure.

1) Firm size

In Rajan and Zingales (1995), it is argued that bigger firms are more complicated and hence are confronted with higher costs resulting from asymmetric information. Therefore, less external financing is used by firms with larger size. However, in Berger and Udell (1995), it is supported that asymmetric information problems are more severe in small firms than in larger firms. And also in Fama and French (2002), larger firms usually have less volatility and thus higher leverage.

2) Profitability and growth rate

Based on financial slack is a negative determinant of leverage, holding investments fixed, leverage is lower for more profitable firms and holding profitability fixed, leverage is higher for firms with more investment opportunities or higher growth rate.

3) Tangibility of assets

According to Frank and Goyal (2003), the most important of the conventional variables is tangibility. For firms with more tangible assets have less asymmetric information problems. Hence, lower debt levels are expected for lower cost for equity issuing.

4) Asset volatility

According to Halov and Heider (2004), asset volatility can be used as a proxy of firm's investment risk. When asset volatility is huge, they couldn't issue debt to avoid the

adverse selection of debt. In this situation, the firms would choose to issue equity. Consequently, inverse relationship between asset volatility and leverage is expected.

5) Volatility of net cash flows

In Fama and French (2002), it is argued that positive relationship between volatility of net cash flows and leverage for firms behave so to lower the chance of issuing new risky securities or foregoing profitable investments when net cash flows are in the lower part.

6) Age

Age refers to the number of years that current ownership has been in place in Berger and Udell (1995). Positive relationship exists between age and leverage for the older the company, the longer the relationship between banks and the firm, the less the asymmetric information, the lower the rate on the loan and hence the higher the leverage.

7) Capital expenditure, dividends, R&D expenditure

These three factors are all components of cash outflow and increase the financing deficit, they are expected as positive factors of debt in Shyam-Sunder and Myers (1999). However, it is tested in Aboody and Lev (2000) that companies with more R&D activities have more asymmetric information, based on this, R&D intensive companies might use less external financing.

8) Level of institutional ownership

In Best, Hodges and Lin (2004), level of institutional ownership is inversely related to asymmetric information for in general, institutional investors are better informed investors who monitor the firms closely. Therefore, more external financing is used for firms with high level of institutional ownership.

9) Credit ratings

A firm with investment grade rating has less adverse selection problem for more information is disclosed by rating agencies. Hence, firms use less debt and more equity.

Lower leverage level is expected. The arguments appear in Shyam-Sunder and Myers (1999).

Also, from the assumptions Myers and Majluf used, management incentives could be also potential determinants. If they do not act as old stockholders' interest, which is one of the assumptions of pecking order, but as both old and new ones' or only as new stockholders', the financing choice could be totally different. Unfortunately, this factor is difficult to be involved into empirical studies.

Summary of identified determinants based on pecking order theory discussed above is reported in Table 3.

Table 3 Determinants of capital structure from pecking order theory.

Positive determinants	Negative determinants
Size	Size
Growth opportunities	Profitability
Volatility of net cash flow	Asset volatility
Age	Level of institutional ownership
Capital expenditure	Credit ratings
Dividend payout	Tangibility
Research and development expenditure	

2.3.3 Comparison of pecking order model and trade-off theory

For some important determinants of capital structure, the two most popular capital structures give totally different prediction about their role. The different signs and the according arguments are summarized in Table 4.

Table 4 Different Predictions on key determinants.

Potential determinants	Expected relation with leverage ratios	
	trade-off model	pecking order model
Profitability	**Positive**	**Negative**
Arguments	Profitable firms have lower possibility of bankruptcy and benefir mroe from tax shields of debt	For firms prefer to use internal fund always, the more profitable they are, the less they use external funds.
	Profitable firms suffer more from free cash flow problems which can be decreased by using more debt	
Firm size	**Positive**	**Negative**
Arguments	Large firms face less bankruptcy risk and have greater debt capacity	Large firms face lower degree of information asymmetry and lower cost of equity
Tangibility	**Positive**	**Negative**
Arguments	Firms with more tangible assets face less bankruptcy risk and can afford more collaterals to secure debt	Firms with more tangible assets face less information asymmetrcy and lower cost of equity
Growth opportunities *Arguments*	**Negative**	**Positive**
Arguments	Firms with more growth opportunities are more risky and face greater cost of financial distress	Firms with more growth opportunites than assets-in-place have more asymmetric information and also, they are in deficit of cash flow and have to turn to external funding
	To alleviate underinvestment problems incurred by risky debt, firm tend to issue equity	

2.4. Other models

2.4.1. Models based on product/input and output market interactions

Studies in this field are still quite few. It is from Titman (1984), the relationship between a firm's capital structure and the characteristics of its product or input is investigated. And the final result they found is that firms with unique products or high reputation to produce high quality products have less debt, which is consistent with the prediction from trade-off theory.

The relationship between a firm's capital structure and its strategy in the product market is discussed in Brander and Lewis (1986) focusing on limited liability of debt financing and in Brander and Lewis (1985) focusing on bankruptcy effect of financial decisions. Starting from the idea that higher leverage induces equity holders to take riskier strategies given by Jensen and Meckling (1976), Brander and Lewis (1986) investigate a two stage sequential duopoly game. They show that output market equilibrium depends on capital structure and hence owners would choose different debt levels to influence the output market for their good. The equilibrium concept used here is rational Nash equilibrium. One of the conclusions they arrived at is that oligopolists tend to have more debt than monopolists in competitive industries. Another important implication from this paper is that different debt levels across industries could be explained by industry-specific factors, such as modes of competition, including price competition, quantity competition and others. All factors related could be potential determinants of capital structure in industry level.

According to studies in this field, input and output markets have been proven to influence capital structure, another important determinant of capital structure besides taxes, asymmetric information, bankruptcy costs and agency costs. Identified factors include types of products (Makesimovic and Titaman (1991), relative bargaining power between firms and non financial stockholders (Subramaniam (1998), type and degree of output market competition (Showalter (1995), the elasticity of demand (Maksimovic (1988).

2.4.2. Models based on market timing

In practices, equity market timing is a well known phenomenon which refers to issuing stocks at high prices and buying back own shares at low prices. But it is until Baker and Wurgler (2002), the persistent role of market timing on capital structure is identified and supported by U.S empirical study. They argue that current level of capital structure is the cumulative outcome of past attempts of firms to time the market. However until now, mixed evidence is found to support that whether market timing works on financing choices temporarily or persistently, for example, in Tijs and Leo (2004), Welch (2004), HovaKimian (2003), marketing timing is found to be not a significant determinant for

their samples. And in Kayhan and Titonan (2004), only short term effect of market timing rather than long term effect is supported.

2.5. Summary

So far, different capital structure theories have been discussed and based on different theories, a large pool of different sets of determinants are given and also, divergent effects of same determinant are predicted by different theories.

From the determinants identified above, we can see that some of them can be empirically tested whether they are real determinants of capital structure or not, especially those quantitative ones, such as profitability, size, volatility and tangibility. While some qualitative factors are quite difficult to be included into empirical studies for they are very difficult to be defined in numbers, such as bargaining power between firms and non financial stockholders or the probability of reorganization after default.

3. PREVIOUS STUDIES

In previous chapter, we have analyzed different theoretical models of capital structure to establish a theoretical framework. In this chapter, we will have a review of previous studies, focusing on those papers which have contributed to the explanation of capital structure. The objective is to collect the empirical results of previous studies before proceeding into building up the explanatory model of capital structure.

3.1. Evidence on determinants of developed countries

3.1.1. U.S. cases

There are prevailing empirical studies on capital structures of U.S. firms since 1980s. We would discuss briefly two of the studies before 1990s, have a look at the summary of the determinants from empirical study before 1990s from Harris and Raviv (1990) and also review a few papers written after 1990s.

In Bradley et.al.(1984), variability of firm value, level of non-debt tax shields, magnitude of the costs of financial distress are tested whether they influence the firms optimal capital structure or not based on 851 U.S. firms from 25 different industries during 1962 - 1981. By making an ordinary least squares (OLS) regression, it is demonstrated that significant negative significant negative relation exists between leverage and firm volatility and also between leverage and Advertising and R&D expenditures, which are consistent with the hypothesis. But non debt tax is found to be a significant positive determinant which is in contradiction to the prediction. This casts doubt on the argument that non debt tax shields are substitutes for interest tax shields. The positive relation could be explained by the cause of high level of non-debt tax shield. In general, it is resulted from firms investing heavily in tangible assets. And it is argued in Scott (1977), firms with more tangible assets can secure their debt and hence can borrow at lower interest rates. Besides, it is also found mean leverage levels differ a lot for different industries. By performing a standard analysis or variance using industry dummy variables, 54% of the cross sectional variance in firm leverage can be explained by industrial classification.

In Titman and Wessels (1988), uniqueness as a potential determinant of capital structure is discussed and empirically tested. Linear structural modeling, an extension of the factor-analytic is adopted to mitigate the measurement problems of regression. Another characteristic of this paper is that it adopted six measures of leverage: long term, short term, and convertible debt divided by market and by book values of equity. Debt is measured in terms of book value. Sample used in this paper are 469 firms in manufacturing industry from 1974 to 1982. Attributes may affected leverage tested include collateral value of assets; non-debt tax shields; growth; uniqueness; industry classification (firms producing machines and equipment and others. For firms in machine and equipment sector face costly liquidation, they are financed with less debt; size; volatility; profitability.

The following results are arrived at: negative relation between uniqueness and the debt ratios is found for the relation between uniqueness and collateral values the firms can afford. The evidence also indicates that small firms use more short term debt than larger firms. The possible reason could be that smaller firms face higher transaction costs when they issue long term debt or equity.

And also negative relations exist between long term debt/ market value of equity and profitability and also between short term debt / market value of equity, which supports the pecking order theory that firms prefer internal to external financing. However, no significant correlations exist between profitability and book value of equity. It can be explained that borrowing is increased to the extent that the higher income leads to an increase in book value of equity by increasing the retained earnings. Consequently, this ratio is not affected. They can be seen as a support of trading off theory, that firms do have a target debt-to-equity value in book value.

No effect of non-debt tax shields, volatility, collateral value and future growth on debt ratios are found in this study. However, results are not robustness for almost all the variables except uniqueness, which means that it could be problematic to put this empirical result into generalization.

In Harris and Raviv (1990), empirical results about determinant of leverage on firm characteristic levels in U.S before 1990s are summarized as follows.

Table 5 Determinants of Leverage based on U.S. empirical studies.

Characteristic	BJK	CN	FH/L	GLC	LM	Kest	KS	Mar	TW
Volatility	-		-			ns(-)	+		ns(-)
Bankruptcy								-	
Fixed assets			+	+	+			+	ns(+)
Non-debt tax shields	+	+					-		ns(-)
Advertising	-				-				
R&D expenditure	-				-				
Profitability			-	ns(-)	ns(+)	-			-
Growth opportunities		ns(-)				+	-		ns(-)
Size		ns(-)	ns(+)			ns(-)	ns(-)	+	ns(-)
Free cash flow	-								
Uniquess									-

Note:
BLK	*Bradley, et al. (1984)*
CN	*Chaplinsky and Niehaus (1990)*
FH/L	*Friend and Hasbrouck (1988) and Friend and Lang (1988)*
GLC	*Gonedes, et al. (1988)*
LM	*Long and Malitz (1985)*
Kest	*Kester (1986)*
KS	*Kim and Sorensen (1986)*
Mar	*Marsh (1982)*
TW	*Titman and Wessels (1988)*
+	*positive determinants*
-	*negative determinants*
ns(-) or ns(+)	*nonsignificant or at a very weak level with negative sign or positive sign*
blank cells	*not included in the studies*

From the table, a few general determinants of U.S. firms can be found. Positive factors include fixed assets, which are positive in all studies mentioned above and non debt tax shields (with positive sign for two studies and one negative, one insignificant), size (one positive and all the others are non-significant). Negative determinants include volatility (two negative, two non-significant and one positive result), Advertising expense, R&D expense, profitability (three negative, two non-significant), free cash flow, and uniqueness of products. Strictly speaking, most results are quite mixed.

In the following part, we will have a look at some empirical studies on U.S. firms after 1990s which are not included in this table. The first two studies focus on the direct effect from cash flow on capital structure.

In Catherine and Paul (1996), quarterly data of 162 firms from 3 manufacturing industries and 3 non-manufacturing industries from 1979 to 1989 are used to build simultaneous equations model, and 3 stage least squares is used to estimate the models. Its main objective is to consider the contemporaneous and dynamic interaction between a firm's capital structure and its cash flow at the same time.

According to the results derived, investment and dividends both play positive role on leverage. Size of the firm and risk are also positive determinants of leverage. And the

coefficients of other variables used in this study, including tax, tangibility and uniqueness are quite mixed. The most interesting result of this paper is that in the same period, leverage and cash flow tend to be negatively related but across time, leverage is positively related to future cash flow.

Shyam-Sunder and Myers (1999) is also among one of the most important studies in capital structure theory. Funds flow deficit is formulated in this paper as follows:

Funds flow deficit = dividend payments + capital expenditures + net increase in working capital + current portion of long-term debt at start of period – operating cash flows after interest and taxes

Two models are tested in this paper

Model 1: Amount of debt issued (retired) = a + b Funds flow deficit+ e

Hypothesis: *a=0, b=1* if pecking order holds

The result is that regression coefficient of Funds flow deficit, b = 0.85 and the model has high R2 (0,86). This empirical outcome shows that the external funding is mainly composed of debt. For many individual firms, the R2 and coefficient estimates are very close to or even exactly equal 1.

Model 2: Target adjustment model

$$\Delta D_{it} = \alpha + b_{TA}(D^*_{it} - D_{it-1}) + e_{it}$$

Where 0<bTA<1, it represents adjustment towards the target. D^*_{it} is the target debt level for firm i at time t. for target debt level is unobservable, two measures are used here: historical mean of the debt ratio for individual firm and a rolling target for each firms using only historical information and an adjustment process that involves a lag of more than one year.

Significant adjustment (b_{TA} =0.33) is achieved when target debt ratios are calculated as the sample mean debt ratios but insignificant when three or five year rolling average of the book debt ratio up to the preceding year is used.

When two models are included into one, adjustment coefficient drops to one third of the previous one but still significant. And the pecking order coefficient stays the same.

The conclusion derived in this paper is that pecking order is a much better explanation of the debt-equity choice, at least for the mature, public firms in the sample. A well-defined optimal debt ratio as predicted by the tradeoff theory is not found in this paper.

The following empirical studies connect equity market with capital structure, but quite different results are given.

In Baker and Wurgler (2002), marketing timing theory of capital structure is empirically supported. Market timing means that firms are more likely to issue equity when their market values are relatively high compared with book and past market values. And they buy back equity when the firms' market values are relatively low. By testing the relation between current capital structure and historical market values, persistent effects of market timing on capital structure is found. Capital structure is the cumulative outcome of past attempts to time the equity markets.

In Welch (2004), US firm data from 1975 to 2000 are used to study whether variations in debt ratios are caused mainly by external stock returns or by international managerial choices to readjust to their old target ratio. According to the study, past stock returns are the main reason to change debt ratio, the relationship is negative. And taxes induce firms to increase their leverage level. No significant influence from profitability, growth and uniqueness on debt ratios is found. Inverse relation is found between volatility and debt ratios. And for the herding variable, the firms are inclined to adjust their debt ratios towards their industry'. Hence, identified determinants of capital structure are stock returns, capital structure in firms' peer industries, equity volatilities and tax rates.

In Frank and Goyal (2004), US data from 1952-2000 is used. Vector auto-regression is used to analyze debt and equity adjustments separately rather than in form of leverage ratio. It is empirically proved that there is a long run leverage ratio the firm reverts to. Deviations from the ratio help to predict debt adjustments but not equity adjustments, a high market-to-book ratio is associated with subsequent debt reduction, but no effect found in the equity market. Hence, the conclusion they arrive at is that market conditions, measured by market-to-book ratio, affect leverage adjustments. If it is high in an earlier year, then debt reductions will follow in the next year but no significant changes in equity is found.

In Kayhan and Titman(2004), history information and firm characteristics which have been generally agreed as determinants are included into one model. Based on partial adjustment regressions which regress changes in debt ratios on variables that capture the firm's financing, earnings, investment, and stock return history, namely past profitability, financial deficits, past stock returns and leverage deficit. But focusing on the longer term effect of these factors, 5 to 10 years. They conclude that history does influence observed debt ratios and partially persist for at least ten years. But debt ratios tend to move back toward to the target ratios based on traditional tradeoff variables. It is also indicated that a firm's more recent history influences its capital structure more than its more distant history. And history effect reverses for opposite sign appears for the corresponding contemporaneous history variable.

Other studies include MacKay and Gordon (2005) and Manohar et al. (2003). MacKay and Gordon indicate that industry factors help to explain firm financial structure. Departures from the mean industry financial structure are systematically related to technology and risk choices relative to the industry. When firms depart from industry norms for financial structure, they also systematically depart along technology and risk dimensions. Manohar et al. show that leverage is positively related to product diversification but negatively related to geographic diversification based on 1127 sample US firms.

3.1.2. Others

Rajan and Zingales (1995) is one of the earliest studies and one of the most important empirical studies in testing whether capital structure in other countries is related to factors similar to those identified to influence the capital structure of U.S. firms. Countries investigated in this paper are G-7 countries, namely Japan, Germany, France, Italy, the U.S., the U.K. and Canada. For there exists institutional difference in different countries, e.g., different sizes of power of the banking sector, G-7 countries can be categorized into bank oriented ones and market oriented ones. And also, other factors, such as tax code, bankruptcy laws, the state of development of bond markets, and patterns of ownership all may result in different determinants for capital structures.

Variables tested in this paper include tangibility, investment opportunities, firm size and profitability which are among the consensus mentioned in Harris and Raviv (1990). The results show that tangibility consistently plays positive role on leverage in all countries in both book value and market value of leverage; the market-to-book ratio is negatively related with leverage and size is positively correlated with leverage except in Germany where it is negatively correlated. In Wald (1999), why larger firms in Germany tend to have less debt is explained. The reason is that in Germany, a small number of professional managers control a sizable percentage of big industrial firms' stocks and thus they have the power to force management to act in the stockholders' interest. Another result of the paper is that profitability is negatively correlated with leverage in all countries except again Germany and is economically insignificant in France. Two potential reasons for the negative relation between market-to-book value and leverage are given: one is that the higher the market-to-book value, the higher the underinvestment costs, the lower the leverage; an alternative one is that firms time the market by issuing equity when their price is high. But the evaluation of which explanation is more important or the real reason for these countries is not done in this paper but left for the future research. Also, potential reasons for the relation between size and leverage, based on bankruptcy costs and asymmetric information respectively, are also discussed but which one answers the question best is not given.

Finally, the paper concludes that factors identified by previous empirical studies in the US are also determinants of leverage in other countries. However, deep understanding about why there these correlations exist needs to be further explored by delving into institutional environments of different countries.

DeMiguel, A. and Julio Pindado (2001) study the determinants of capital structures in Spain. One of the characteristic of this paper is that it introduces a new variable to proxy financial distress costs, a variable with two components: the first component is a measure of the probability of occurrence, the difference between the standard deviation and the expected value of EBIT; the second is a measure of asset specificity, i.e. the intangible assets whose value would be lost if the firm declared bankruptcy. The argument is that: when expected value is negative, even volatility is quite small, the financial distress costs are perceived as high and vice versa. In addition, level of

intangible assets of the firms should be a determinant for under bankruptcy, these intangibles lose their values and decrease the recover value. The final results indicate inverse relation between non-debt tax shields, financial distress, cash flow and leverage; positive correlation between investment and leverage.

In Chen et al (1998), similar determinants of capital structure for Dutch firms as in other empirical studies are found. One interesting result is that positive correlations exists between book value leverage ratios and market-to-book value which supports the signaling role of debt while negative relation is found between them which supports the pecking order model.

Panel data of over 6000 Swedish companies from 1992 to 2000 are used in Han-Suck Song (2005) to investigate the determinants of leverage based on total debt ratios as well as short-term and long-term ratios. Tangibility, non-debt tax shield, profitability, size, expected growth, uniqueness, income variability, and time dummies are used as exogenous variables.

Some new findings in this paper are listed as follows:

Positive relation is found between tangibility and long term debt ratio but negative for short term debt ratio, which can be explained by that long term debt is used to finance fixed (tangible) assets while short term debt is used for non-fixed assets.

For non-debt tax shield, no significant relation is found when use total debt ratio, but negative for long-term debt ratio and positive for short-term ratio. This indicates that when companies consider non-debt tax shields as substitutes for tax benefits of debt financing, they mainly take long-term debt into consideration.

Size is a positive determinant for total and short term debt ratio, but negative for long term debt ratio, which could be explained by that small firms are more limited to get long-term bank loans.

As in most empirical studies, profitability is a negative determinant. Non-significant factors include expected growth, income variability and uniqueness. Time dummies

does play a role in debt ratios which demonstrates that changes in tax environment affect capital structures in firms.

Following Rajan and Zingales (1995), five different measures of leverage, both book value and market value, are adopted in Wolfgang and Roger (2004) to investigate the determinants of capital structure in Switzerland. And positive factor is tangibility. Negative determinants include growth opportunities, profitability, and volatility. Size, uniqueness, and non-debt tax shields don't play a significant role in this empirical study.

Empirical studies discussed above are summarized in Table 6.

Table 6 Empirical results of some western countries.

Characteristic	RZ(1995)	De(2001)	Ha(2005)	WR(2004)	Ch(1998)
Volatility			ns	-	?
Financial distress		-			
Fixed assets	+		?	+	+
Non-debt tax shields		-	?	ns	
Advertising					
R&D expenditure					
Profitability	-		-	-	-
Growth opportunities	-		ns	-	?
Size	+		?	ns	+
Free cash flow					
Uniquess			ns	ns	
History growth					ns(+)
Investment		+			
ownership					
Operating Cash flow		-			
Political Patron					
Country	G-7	Spain	Sweden	Switzerland	Holand
Numbe of companies			6000	73	150
Time Period		1991-1997	1992-2000	1992-2001	1984-1995

Note:

RZ(1999): Rajan and Zingales (1995)

De(2001): DeMiguel, A. and Julio Pindado (2001)

Ha (2005): Han-Suck Song (2005)

WR(2004): Wolfgang and Roger (2004)

Ch(1998): Chen et al (1998)

Ns means non-significant and ns(+/-) denotes non-significant with positive or negative sign

? means mixed results are found

3.2. Evidence on determinants of firms in developing countries

3.2.1. Chinese cases

Empirical studies on Chinese firms' capital structure appear only recently and the number is still quite limited.

Chen (2004) is one of the earliest studies in investigating determinants of capital structure for Chinese firms. For different institutional environments and financial constraints in the banking sector exist in China, it is suggested that different capital choices of Chinese firms from western firms are expected. Sample set is composed of 77 listed firms from 1995-2000.

One interesting finding is that size is positively related to total debt ratio but negatively related to long-term leverage. It is concluded that large Chinese firms use more short-term finance and less long-term finance. And a new pecking order is introduced in this paper: internal funds, equity and debt. The main reason is that high capital gains in the secondary stock markets, underdeveloped bond markets, lack of protection for individual shareholders, and no obvious debt tax shields combine together to make the firms prefer equity financing rather than debt financing. Profitability and non-debt tax shields are identified as negative determinant and positive ones include tangibility and growth opportunity. Limitation of this paper is the relative small sample set which may make conclusion not applicable for an average listed firm.

The objective of Chen and Xue (2004) is to verify the conclusion derived by Chen (2004) using a much larger data set, 729 listed firms from 1997 to 2001. In this paper, it is argued that for the underdeveloped bond markets and for the more serious agency problems existing in most Chinese firms, bank loans provide mainly short-term financing for working capital and share capital is the main source of finance for capital investment, hence long term debt level is relatively low in China compared with western countries. Besides by adopting a larger dataset, they add two more variables, dividend payout and state-owned shares ratios into the model. And the dependent variable they used is only total debt-to-total capital ratio without long term debt ratio. And book value rather than market value of leverage is chosen here for the high P/E in china, market

value is approximately 40% of the book value. Another reason is that the proportion of non-circulating shares is rather high, average about 65% of total shares. Similar results to Chen (2004) are arrived at and the new pecking order is supported.

In Huang and Song (2005), a relatively large sample dataset, over 1000 Chinese listed companies, is used to analyze the characteristics of capital structure. Ownership structure and managerial shareholdings are introduced as new explanatory variables based on agency theory. And total liabilities ratio (= total liabilities / (total liabilities + book vale of equity) is argued to be the most suitable proxy of leverage for Chinese firms. The first reason is that when the creditor considers a borrower's debt capacity, it considers not only the firm's long term debt, but also its current debt and other liabilities. So the whole portion of liabilities will affect how much debt the firm can get, and hence affect the firm's leverage ratio. The second reason is that current debt is a rather stable part of total assets for Chinese firms. Usually, the firms roll over the short term debt for the next few years. And lastly, trade credit acts also as an important means of financing, so accounts payable should also be included. And book value of equity is used here for financial executives think about capital structure targets in terms of book value rather than in market value.

Consistent with the main body of empirical studies, firm size, non-debt tax shields and fixed assets are identified as positive determinants and profitability as negative determinant. Industries and managerial share-holdings play a role in determining capital structure. Opposite to general arguments that this negative relationship supports pecking order, negative relationship between profitability and leverage found here is used to support trade-off theory based on Chang (1999), positive relation between profitability and leverage is derived based on the optimal contract between employees and investors. Another interesting result derived in this study is a positive relation between volatility and leverage ratio.

In Chen and Roger (2005), 972 listed companies on the Shanghai Stock Exchange and Shenzhen Stock Exchange in China in 2003 are used to test various capital structure theories. They found that profitability is negatively related to capital structure, size and risk of the firms are positively related to the debt ratio in term of market value measures of capital structure but not in book value. Besides, years listed on stock markets are also

identified as one of the positive determinants. Different from Huang and Song (2005), in which institutional shareholdings is identified as a non-significant factor, here it is inversely related to leverage, i.e., the more institutional shareholdings the less they use debt financing.

In Tong (2005), data of 50 largest Chinese listed companies from 2001 to 2002 were used to test different models of corporate capital structure. In this paper, three models were tested to demonstrate the relationship between leverage and its determinants, between leverage and dividends, between corporate investment and its determinants. Significant negative correlation between leverage and profitability, positive between current leverage and past dividend were found to favor pecking order model over trade-off model in China. But for only largest companies are used and the biggest companies are mostly from some specific industries, such as utility, hence again, the results of this study couldn't be used to explain the capital structure decisions of smaller firms. And another limitation is that also only four potential variables, namely size, profitability, asset growth and dividend payout are tested whether they have effect on leverage ratio.

Results of above-mentioned studies, the proxies used in the studies, number of sample firms and the time period are summarized in Table 7.

Table 7 Empirical results from Chinese case studies.

Characteristic	Chen(2004)	HS(2005)	Chen&Xue(2004)	T(2005)	Chen&Roger(2005)
Volatility	ns		ns(-)		+
Tangibility	+	+	+		
Non-debt tax shields	ns	-			
Advertising					
R&D expenditure					
Profitability	-	-	-	-	-
Growth opportunities	+	-	ns(+)	+	
Size	+	+	ns(+)	ns(+)	+
Free cash flow					
Dividend payout			ns(-)	ns(+)	
Managerial shareholdings		ns(-)	ns		
ownership structure		ns(-)	ns(-)		-
Dependent variables					
Overall leverage	BV of total debt/ total assets	Total liabilities/(total Liabilities+BV of equity)	BV of total debt/(BV of total debt+ BV of equity)	1BV of total debt/ BV of total assets 2 BV of total debt/(BV of total liabilities+MV of total equity)	
Long term leverage	BV of LT debt/ total assets				
Independent variables					
Volatility	absolute value of the first difference of percentage change of operating income	standard deviation of EBIT	absolute value of the first difference of percentage change of operating income		
tangibility	tangible assets/total assets	fixed assets/total assets	tangible assets/total assets	fixed assets/total assets	
Non-debt tax shields	depreciation/total assets	depreciation/total assets	depreciation/total assets	depreciation/total assets	
Profitability	EBITD/total assets	EBIT/total assets	EBITD/total assets	EBIT/total assets	
Growth opportunities	sales growh/total assets growth	Marke-to-book ratio of total assetsT	sales growh/total assets growth		
Size	Logarithm of total assets	Natural Logarithm of total assets	Logarithm of total assets	Logarithm of sales	
dividend payout			ordinary dividends to net income		
Managerial shareholdings		total percentage of directors and top managers			
ownership structure		institutional shareholding	state-owned shares to total shares		institutional shareholding
Numbe of companies	77	1200	729		972
Time Period	1995-2000	1994-2003	1997-2001		2003

3.2.2. Others

In Mamoru (2004), determinants of capital structure in East Asian countries, Indonesia, Korea, Malaysia, the Philippines and Thailand in the aftermath of 1997 crisis are investigated. In general, negative relationship between firm profitability and debt-to-equity ratio in all the sample countries is found. And firm size plays a significant

positive role except in Malaysia. But the identified determinant, tangibility, in most industrial countries is found to be insignificant here. The explanation could be that closer relations exist between commercial banks and debtors. Besides, growth opportunity, proxy used here is market-to-book ratio, is also non-significant which demonstrates that high stock price in those countries doesn't motivate firms to issue equity.

In Fraser, et al. (2006), based on the fact that the Malaysian government plays important role of political patron on selected firms by listing restrictions, direct equity ownership of listed firms, control of the banking sector and some government-sponsored institutional investors, relationship between government patron and capital structure is investigated. Using data of 257 firms from 1990 to 1999 and adopting three proxies of patronage, namely the percentage of direct government equity ownership of a firm, percentage of equity owned by institutional investors, and dummy variable the informal ties a firm may have with each of the three most powerful politicians in Malaysia in the 1990s , significant positive effect of political patronage on capital structure is found.

Yupana (1999) studies the determinants of capital structure in Thai firms by using 270 listed firms in the Stock Exchange of Thailand in 1996. One of the most important characteristics of Thai firms is identified and emphasized in this paper, that is the high ownership concentration of individuals or families and corporations. And to identify the role of ownership structure, measure of agency costs are used by using dummy variables: family-owned firms, conglomerate groups, foreign-owned firms, state-owned firms, a firm's reputation, the size of the board of directors, managerial ownership and the degree of ownership concentration. The final finding is that the ownership structure effect financial polity, i.e., single-family owned firms have significantly higher debt level to protect their voting power. And also large shareholders are inversely correlated with debt ratio, which implied that they monitor the management in a much closer and stricter way. Among other financial proxies, non-debt tax shields and profitability have negative effect on debt-equity ratio; and firms' size and tangibility are positively related to leverage ratio; firm risk, measured by variation in sales is non-significant.

Rather small sample dataset is adopted in Devic and Bojan (2001), namely 20 listed companies from Hungary and 18 from Poland. In both countries, consistent with

pecking order theory, negative relation between profitability and leverage is found. And in line with trade-off theory, positive correlation between tangibility and some measures of leverage is also found. Size is identified as the most significant factors in Poland but not significant in Hungary. But for Polish case, it is argued that size is not a proxy for bankruptcy costs for the strong relation exists between size and measures of leverage including both debt and liabilities but not between size and total debt to capital ratio Rather, size is a proxy for the strength of relationships between a company and its suppliers. Negative, but non-significant relation is found between market-to-book value and leverage. An interesting finding is that in Hungary, none of the four determinants has significant effect on leverage when book value is used but in Poland, book value of equity is identified as a better proxy. This suggests that Polish enterprises mainly used book values when make leverage decisions but Hungarian firms use market values.

The results of studies discussed above are summarized in Table 8.

Table 8 Empirical Results of other empirical studies.

Characteristic	Yu(1999)	Fr(2006)	Ma(2004)	DK(2001)	
Volatility	ns				
Financial distress					
Fixed assets	+	ns	ns	+	+
Non-debt tax shields	-				
Advertising					
R&D expenditure					
Profitability	-	-	-	-	-
Growth opportunities			ns	ns	ns
Size	+	+	+	+	ns
Free cash flow					
Uniquess					
History growth					
Investment					
ownership	-				
Operating Cash flow					
Political Patron		+			
Country	Thailand	Malaysia	Indonesia, Korea, Malaysia, the Philippines and Thailand	Poland	Hungarian
Numbe of companies		270	257	119-681	18	20
Time Period		1996	1990-1999	1992-2001		

3.3. Summary

Based on previous studies discussed above, none of the determinants plays the same role in all empirical studies. Dominantly, profitability acts as a negative factor and tangibility is positively related to leverage ratios.

For developing countries, size is identified as a significant positive determinant in most cases but not so obvious in western cases. For all other variables, the empirical results are still quite unclear.

Compared with empirical studies with theoretical studies, only part of the identified determinants in theory have been tested and many of the qualitative factors are still unexplored. And according to empirical results, which model can explain capital structure better is also not so clear. But the best explanation could be that not only one theory works in corporate borrowing decisions, it might be that different forces work together and in different countries, even in different time periods, the dominant model changes.

4. INSTITUTIONAL ENVIRONMENT IN CHINA

Chinese economy, legal and institutional environments including capital markets will be briefly introduced in this section. Understanding those environmental factors would help us explain the quantitative results from the empirical study better. In the last part of this section, we will also give a short discussion about financing problems confronted with Chinese companies currently, how has the situation changed and also what future changes may take place.

4.1. Chinese economy and legal environments

China is a developing country and is developing very fast, average at 9% annually in recent years. It is also in its process of economy transition from a centrally planned economy to a fully market one. A lot of changes are happening in the whole country, including in the institutional environment, capital markets and also the behavior of enterprises. And all those changes could all have a considerable impact on financial policies of companies in this country.

Basically, China is a "banking" country, which means banking system has strong power in the whole market. Financial assets in banking system account for over 80% of all financial assets in China. Most companies still depend on indirect financing rather than direct financing.

Legal framework is still immature and incomplete. For an instance, about the debt-holders' rights, relevant company law is ambiguous. The most serious problem existing is that shareholders and government agencies are given too much power in bankruptcy procedures, no clearly defined private property rights and no effective property rights markets.

Accounting and auditing environments in China are still not transparent enough when compared with developed countries. What makes the situation worse is that there is a lack of effective capital market for external corporate control. Consequently, more asymmetric information exists for firms, even the listed companies. But compared with

a decade ago, the situation is getting better and it is expected that company information will become more and more transparent with more efforts putting into this area.

Based on the strikingly different institutional framework in China compared with western countries, the determinants are expected to reflect the characteristics of institutional structures and financial constraints, which may act as a more important factor than costs of capital.

4.2. Financing channels in China

4.2.1. Banking system

Banking system still plays a central role in financial market in China. Even though recently some progress in financial market development has been achieved, firms are still relying heavily on bank loans for their financing. In contrast, the growth rate of direct financing market is still growing slowly.

In 2003, new issued loans in financial institutions amounted at RMB 3 trillion which was 85% of all financing in that year1.

But Chinese banking system is still highly regulated by central bank which is controlled by government. Commercial banks lend money at interest rates which are determined by central bank. And the same interest rates are used for almost all firms with a little difference under some extreme conditions. Commercial banks don't have much flexibility to alter interest rates for different companies. This is quite different from the situation in Western countries, where the interest rates are determined by market force, i.e. good firms with less risk can borrow money at lower interest rates and bad firms have to pay higher cost to reimburse the higher risk the banks take.

4.2.2. Stock market

On 19th December 1990, SSE came into operation and later on, 3rd July 1991, SZSE followed, which marked the formulation of security market of China. From 1992, China

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[1] *Sources: Quarterly Statistics reports from the People's Bank of China*

began to issue stocks to investors abroad. In the same year, the first B share came into trading in SSE.

Shares in Chinese stock markets are classified as A shares, which are designated for domestic investors and B shares which at first for overseas investors but opened also to local citizens in 2001. A shares are dominantly owned by either the central government or the local governments, legal-person shares which belong to state-owned institutions. State shares and legal-person shares account for almost two third of the total share issues and are not allowed to be traded in the markets.

Before 1998, rights offer to the existing shareholders proportionally was the main method to implement the issues after IPO. And the price of the rights is usually below market prices and usually the existing shareholders accepted all rights offers available to them. To apply for new issuance, annual return on net assets is required to exceed 10% consecutively in the past three years.

Since 2001, it is getting easier to apply for new issuance either by share allotments or by public offering in stock markets. The condition is that the firm's total return on net assets over the past 3 years exceeds 30% with average annual return of net assets not less than 6%.

The development of Chinese stock market is summarized in Table 9.

Table 9 Development of Chinese Stock Market.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
No. Of listed firms	53	183	291	323	530	745	851	949	1088	1154
No. Of listed Stocks	72	218	345	381	599	821	931	1029	1174	1240
A shares	53	177	287	311	514	720	825	922	1060	1130
B shares	18	41	58	70	85	101	106	108	114	110
Total Market Capitalization										
(100 million shares)	1048	3531	3691	3474	9842	17529	19506	26471	48090	43522
A shares	978	3319	3516	3311	9449	17154	19299	26168	47456	42246
B shares	70	212	175	164	394	375	206	304	635	1277

Source: National Bureau Statistics of China

Chinese stock markets have some specific characteristics compared with western countries. Firstly, the majority of listed companies in the main board of SSE and SZSE are state-owned companies. The foundation of the stock market was to serve for the reform of state-owned companies. Before the existence of security markets, indirect

financing from banks was the dominant channel for state-owned companies. Leverage level was quite high and the bad loans level was exceptionally high compared with international standard. The direct result was that the four state owned banks were at great financial risk. To alleviate this problem, SSE and SZSE were founded to widen financing resource of state-owned firms and to decrease the risks of banking system.

Secondly, the stock market in China is still young and immature. Firms, especially firms with high growth rate, can get huge capital gains from secondary markets.

Thirdly, quota control system for equity issues is practiced by Chinese government. And relative to demand, the quota is quite limited. Therefore, to get a quota for an initial public offering (IPO), firms have to pass strict screening process (measured by financial performance and proposed investment projects).

4.2.3. Corporate bond market

It was in 1981 that the first government bond was issued. Until now, government bonds have a dominant proportion compared with corporate bonds and institutional bonds. According to Chinese statistics report, RMB 1251.5 billion yuan were issued in year 2003. Among this, treasury bonds accounted for 50.2%, financial bonds issued by policy banks accounted for 36.1%, RMB 452 billion yuan, Stocks issued made up of 10.8% and last, financing by issuing corporate bonds was only RMB 35.8 billion yuan, accounting for merely 2.9%[2]. We can have another rough look at the structures of bond markets from 1997-2002 in Table 10.

Table 10 Structure and development of Chinese bond market.

Year	Government bond	GB percentage	Policy bond	PB percentage	Corporate bond	CB percentage
1997	554,8	57,4 %	349,1	36,1 %	63,3	6,5 %
1998	776,6	57,3 %	512,1	37,8 %	67,7	5,0 %
1999	1052,4	59,3 %	644,7	36,3 %	77,9	4,4 %
2000	1367,4	62,4 %	738,3	33,7 %	86,2	3,9 %
2001	1561,8	62,1 %	853,4	33,9 %	100,9	4,0 %
2002	1933,6	62,9 %	1005,4	32,7 %	133,4	4,3 %

Sources:Quarterly Statistics reports from the Prople's Bank of China

And nowadays, to issue corporate bond, the firms have to get the permission from the administrative approval system. The State Development and Reform Commission limits the issues of corporate bonds to only project investment bonds, excluding those issues to support companies' business operation. As a result, only a very small number of companies, largest state-owned enterprises which can also get financing from banks or equity markets could have access to the bond market. While all the other SME, non-state owned enterprises could not satisfy their financing needs by issuing bonds.

4.3. Special financing problem for Chinese companies

One of the most acute problems existing in financing is that for small and middle sized enterprises, it is especially difficult to get enough funding to support its development.

SMEs are usually private-owned, quite young, more risky and don't have close relationship with banks. And it was almost impossible for them to pass the criteria to be listed on stock markets for the criteria are set for much bigger firms. To alleviate this special problem, SME board came into trading from 25th June of 2004 which adopts different screening criteria to be listed. The foundation of SME board improve financing situation of SMEs to some extent. But o be listed ones on SME board, the profitability and growth rate must be on the top level among all SMEs.

5. DATA SAMPLE AND METHODOLOGY

5.1. Sample selection

The dataset we use is from SME board recently developed in Shenzhen stock exchange and from main board of Shanghai stock exchange. Sample selection is based on the following criteria:

1) Companies in manufacturing sector in these two stock exchanges.

2) Companies with only A share. Taking into consideration that for different types of stocks, e.g. A share and B share, pricing system is quite different, which results in that the prices of B shares are quite different from public A-shares for the same companies. The same argument goes for H shares. Hence, market value of different types of shares could be quite different for the same company. For comparability, we only choose those companies with only A-shares which are the dominants shares in capital markets of China.

3) Companies with complete records of accounting data in year 2004 and 2005, and also with available stock price and outstanding shares in the end of year 2005.

After selection, the dataset is composed of 336 companies, 297 from SSE and 39 from SZSE. About the accounting data we used are collected from company financial statement (balance sheet, income statement and cash flow statement) and market related data are from *www.cn.finance.yahoo.com*.

The limited size of the sample would result in some bias and it might affect the general application of the empirical result we arrive at later. But for our focus is to identify the key determinants for listed companies and compare with relevant studies, this selection bias should not be a major concern. However, when a larger database is available, it is should be reinvestigated in more details about Chinese firms' capital financing decisions.

5.2. Variable Design

5.2.1. Dependent Variable

For there exist many different measures for leverage ratios, which can be categorized into long term debt ratio and total debt ratio, or book leverage ratios and market leverage ratios, discussion about which specified leverage ratios should be adopted is included in most empirical studies in this field. But for each measure has its own advantages and disadvantages, no consensus is derived so far.

Among existing empirical studies on Chinese companies, the main leverage ratios used are calculated based on book value of debt and equity. According to Chen and Xue (2004), average leverage level based on market value is only 40% of book value leverage. The potential reason for this result is the immatureness of Chinese stock market, i.e. the pricing system is not so complete and the P/E ratio in china is much higher than in western countries. Hence, market price of stock is higher than it should be. Consequently, higher market value of equity for Chinese firms is found.

Between long-term debt ratio and total debt ratio, it is generally agreed that total debt ratio is a better proxy for leverage. It is suggested to use total debt to total assets book value in Chen and Xue (2004). The reason is that by comparing with developed countries and other developing countries, leverage measures in this way is in a similar level, 48.17% china, 66% G-7, 58% in US, (Rajan and Zingles, 1995), 51% in developing countries (Booth, 2001). However, with long term debt to total assets, it is very different, 6.31% for Chinese firms and 41% in G-7 countries (Rajan and Zingles, 1995), 22% in developing countries (Booth, 2001).

Even though there might be some preference in choosing leverage ratios, we will adopt different ratios to study the effects of potential variables on them. Moreover, based on the leverage ratios which have been used in previous studies, to compare with previous western papers and also empirical studies on Chinese firms and to find out if different sets of determinants exist for different leverage ratios, we decide to adopt eight different measures, which are described as follows:

Short term debt / book value of total capital = book value of STD/(book value of (LTD+STD)+book value of equity)

Long term debt / book value of total capital = book value of LTD/(book value of (LTD+STD)+book value of equity)

Total debt / book value of total capital = book value of (LTD+STD)/ /(book value of (LTD+STD)+book value of equity)

Total liabilities / book value of total assets = total liabilities / (total liabilities +book value of equity)

Short term debt / market value of total capital = book value of STD/(book value of (LTD+STD)+market value of equity)

Long term debt / market value of total capital = book value of LTD/(book value of (LTD+STD)+market value of equity)

Total debt / market value of total capital = book value of (LTD+STD)/(book value of (LTD+STD)+market value of equity)

Total liabilities / market value of total assets = total liabilities / (total liabilities +market value of equity)

The abbreviations we will use later on are listed in the Table 11:

Table 11 Descriptions of dependent variables.

Dependent variables	
BSL	short-term debt to book vlaue of total capital
BLL	long-term debt to book vlaue of total capital
BTL	total debt to book value of total capital
BLIA	total liabilities to (total liabilities+ book value of equity)
MSL	short-term debt to(book vlaue of debt+market value of equity)
MLL	long-term debt to(book vlaue of debt+market value of equity)
MTL	total debt to(book vlaue of debt+market value of equity)
MLIA	total liabilities to (total liabilities+market value of equity)

5.2.2. Independent Variable

The following independent variables will be used in our models:

- Tangibility

- Business risk

- Size

- Growth opportunities

- State-owned share ratios

- Years listed on stock exchange

- Profitability

- Non-debt tax shields

We focus on these factors for three reasons:

- According to previous literature, these variables are the most important potential determinants.

- Availability of some data limits our ability to develop other proxies for other factors.

- To compare with previous studies, we adopt the most used measures by Chinese empirical studies.

The measures and the according abbreviations we will use in the models and the expected effects on leverages are listed in Table 12:

Table 12 Descriptions of independent variables

Independent variables	Measure	Expected sign on leverage
Tangibility(TAN)	fixed assets / total assets	Positive or non-significant
Volatility(VOL)	first difference of EBIT	Negative
Size(SIZE)	Natural Logarithm of total assets	Positive
Profitability(PRO)	EBIT/total assets	Negative
Growth opportunities(GO)	Market-to-book value	Positive
Ownership structure(SO)	state owned shares to total shares	Positive
Age(AGE)	years listed on stock exchange	Positive

There exist some potential limitations for proxies chosen in studies of determinants of capital structure. Firstly some attributes derived from different capital structure theories

can not be well represented by available proxies or there exist a few proxies that can be used for one attribute, but it is difficult to decide which one is the most suitable.

Secondly, the attributes that determine capital structures could correlate with each other, so the chosen proxies may measure the effects of several different attributes at the same time.

Last but not least, measurement errors in the proxy variables may be correlated with measurement errors in the dependent variables thus creates spurious correlations.

5.3. Methodology-Multi-linear regression models

The method we adopted in this study to test the effect of the potential determinants on capital structure is based on a multiple-linear regression model. The dependent variable are different leverage ratios, and the independent variables include size, profitability, tangibility, growth opportunities, state-owned-share ratio, years listed on the stock exchange, non-debt tax shield and earnings volatility.

The model used can be described as follows:

$$(1) \quad Y_i = \alpha + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 X_{i3} + \beta_4 X_{i4} + \beta_5 X_{i5} + \beta_6 X_{i6} + \beta_7 X_{i7} + \beta_8 X_{i8} + \varepsilon$$

where Y_i represents different leverage ratios

X_{ij} (j=1,2..8) represent independent variables

β_j (j=1,2..8) represent corresponding regression coefficients of independent variables

ε is the error term

All explanatory variables are expressed as two-year average to minimize the effect of year to year fluctuations. Leverage ratios are calculated based on data from the later year for they are accumulated results of previous operations and can not be changed immediately after the values of independent variables change.

6. EMPIRICAL RESULTS

6.1. Descriptive characteristics of samples

In the following part we will give a brief discussion of the descriptive characteristics of the sample firms. Moreover, we also compare the average leverage ratios with previous Chinese empirical studies.

 6.1.1. Statistical characteristics

The descriptive statistics of all variables, including mean, median, maximum, minimum, and standard deviation are shown in Table 13,14,15,16,17 respectively for different sample groups.

The average long-term debt to total debt ratio for both boards are rather low, around 18%. This result is in line with all previous studies on Chinese leverage levels (Chen and Xue (2004). It indicates that short-term debt is still the main part of debt for Chinese firms. And listed firms in China are still dominantly financed by their own share capital rather than debts. From supply side, lenders, one potential reason for this low long term debt ratio is the undeveloped bond markets in China. And another one is to get long term loans from banks is not a very easy task. From the buying side, companies, they prefer to issuing equity rather than getting long term loans for high price premium existing for the stocks which makes bank loans not so attractive. And also short term debt is preferred over long term debt for it is a general rule that short term loans play a similar role as long term debt, for companies can roll over the one-year loan into the next year but with relative low costs compared with long-term loans.

Different from what is found in Chen and Xue (2004), less difference exists between average market value of leverage ratios and book values, i.e. market values are around 80% of the according book value ratios for main board companies. But for firms in SMEs board, it also holds as in Chen and Xue (2004) that market value ratios are only 40% of the book ratios.

In general, all leverage ratios are higher for companies from main board of SSE compared with firms from SMEs board of SZSE, which indicates that firms listed in SMEs board have more financial flexibility and less financial risk. And from the mean

value of different independent variables, some difference between main board in SSE and SMEs board in SZSE are identified. Firms from SMEs board are listed until quite recently (mean of AGE is less than 1) and from main board are listed already for some years(Mean of AGE is 6.29). Dominantly, firms in SMEs board are smaller in size, more profitable and have less volatile earnings. Another obvious difference is different ownership structure, for firms in main board, average of state-owned-share ratios is 0,36 but by comparison, it is only 0,088 for SMEs board firms.

From the correlation matrix in Table 18, low correlation coefficients between long term debt ratio and total debt ratio are found for the low proportion of long term debt.

Among independent variables, based on difference between maximum (minimum) values and mean values we can detect possible spurious problems caused by extra different values from the sample. We found three observations with GO value of 45.48, 40.12, -54.95 and one observation with VOL value of 26, which are far away from the mean of the rest and we run the regressions after dropping these observations.

Table 13 Descriptive statistics of leverage ratios for main board firms.

	LTDRATI	BSL	MSL	BLL	BTL	MLL	MTL	LIA	MLIA
Mean	0.184037	0.294832	0.197642	0.068597	0.353285	0.052923	0.259935	0.493302	0.377664
Median	0.106293	0.276563	0.174929	0.030170	0.334048	0.021746	0.228329	0.486690	0.359156
Maximum	1.000000	2.179775	0.997351	0.563264	2.179775	0.501349	1.000000	1.744337	0.963068
Minimum	0.000000	-2.575758	0.000000	0.000000	-2.575758	0.000000	0.000566	0.079567	0.020929
Std. Dev.	0.224115	0.303836	0.155898	0.098844	0.307711	0.082638	0.185850	0.203827	0.185223

Table 14 Descriptive statistics of independent variables for main board firms.

	AGE	SO	PRO	TAN	SIZE	VOL	NDT	GO
Mean	6.290210	0.359669	0.033786	0.517585	7.346269	1.382738	0.029976	2.111681
Median	6.000000	0.405100	0.045277	0.517021	7.258519	0.328020	0.027876	1.685219
Maximur	13.00000	0.837500	0.304187	0.848919	11.54384	26.00000	0.104034	45.48294
Minimun	1.000000	0.000000	-1.365696	0.052191	4.844187	0.000000	0.002873	-54.95357
Std. Dev	3.583056	0.253126	0.103935	0.153890	0.906302	3.201890	0.015241	5.038185

Table 15 Descriptive statistics of leverage ratios for SME board firms.

	LTDRATI	BSL	MSL	BLL	BTL	MLL	MLT	BLIA	MLIA
Mean	0.186992	0.183704	0.090719	0.038476	0.212005	0.019098	0.109817	0.361222	0.199824
Median	0.075784	0.158126	0.073253	0.013659	0.177860	0.005841	0.090024	0.397388	0.184597
Maximum	1.000000	0.659332	0.387157	0.232862	0.679745	0.166278	0.424477	0.594557	0.445341
Minimum	0.000000	0.000000	0.000000	0.000000	0.001344	0.000000	0.000609	0.064151	0.030129
Std. Dev.	0.268530	0.161605	0.090306	0.054980	0.175062	0.032172	0.106187	0.142445	0.108060

Table 16 Descriptive statistics of independent variables for SME board firms.

	AGE	SO	PRO	TAN	SIZE	VOL	NDT	GO
Mean	0.777778	0.088450	0.085214	0.475651	6.291454	0.215133	0.031436	2.704276
Median	1.000000	0.000000	0.083532	0.492522	6.254290	0.160289	0.025086	2.140284
Maximum	1.000000	0.561500	0.172032	0.780325	7.491367	1.125000	0.098361	10.32059
Minimum	0.000000	0.000000	0.029940	0.191509	5.275560	0.000000	0.010060	1.177342
Std. Dev.	0.421637	0.173858	0.030928	0.162613	0.484913	0.219166	0.019246	1.613737

Table 17 Descriptive statistics of leverage ratios for all firms.

	BSL	MSL	BLL	BTL	MLL	MLT	BLIA	MLIA
Mean	0.276388	0.183458	0.061195	0.317641	0.045965	0.229423	0.464448	0.353945
Median	0.260103	0.156599	0.025441	0.314233	0.015485	0.202360	0.456862	0.338043
Maximum	2.179775	0.997351	0.563264	2.179775	0.501349	0.997351	1.744337	0.963068
Minimum	-2.575758	0.000000	0.000000	-2.575758	0.000000	0.000000	0.041982	0.014430
Std. Dev.	0.289459	0.154145	0.091908	0.296033	0.076148	0.182345	0.199670	0.186158

Table 18 Correlation matrix of different leverage ratios.

	BSL	MSL	BLL	BTL	MLL	MLT	BLIA	MLIA
BSL	1.000000							
MSL	0.577888	1.000000						
BLL	0.109494	0.047322	1.000000					
BTL	0.975081	0.544742	0.314393	1.000000				
MLL	0.112017	0.157957	0.926517	0.294172	1.000000			
MLT	0.532619	0.906308	0.436230	0.582780	0.560470	1.000000		
BLIA	0.415719	0.526681	0.313610	0.450043	0.283578	0.563098	1.000000	
MLIA	0.421738	0.787507	0.370722	0.465641	0.495983	0.872762	0.694828	1.000000

Correlation matrix of independent variables is reported in Table 19. It can be seen that most correlations between different independent variables used in this study are rather small except the correlation coefficients between tangibility and non-debt tax shield, 0.57, which might incur the problem of multi-collinearity. However, even though high correlation between tangibility and non-debt tax shields is found, none of them could be eliminated from our study for they proxy for different effects from different perspectives and couldn't substitute for each other.

Table 19 Correlation matrix of independent variables for the whole sample dataset.

	AGE	SO	PRO	TAN	SIZE	VOL	NDT	GO
AGE	1.000000							
SO	0.065710	1.000000						
PRO	-0.174831	0.080708	1.000000					
TAN	-0.087547	0.040041	0.181068	1.000000				
SIZE	0.251141	0.129125	0.241764	0.187587	1.000000			
VOL	0.042156	-0.070708	-0.152269	-0.001283	-0.045161	1.000000		
NDT	0.075292	0.042611	0.110764	*0.595639*	0.211968	-0.033147	1.000000	
GO	0.034866	-0.101516	0.025206	0.044236	-0.143952	0.013276	0.074070	1.000000

6.1.2. Comparison with previous studies

We don't compare descriptive statistics for the variables in the model with western studies for the accounting standards are still quite different in China from other industries countries and hence the data calculated based on accounting reports are not so comparable.

Compared with previous empirical studies on capital structures of Chinese companies as showed in Table 20, even though the dataset used in this paper is from manufacturing industry and the previous studies use firms from all industries, similar ratios are reported. The potential reason might be that manufacturing industry categorized in SSE and SZSE include quite different product lines, such as food, electrics, mechanics, textile and others. And manufacturing industry is not a too risky industry or a highly

regulated one, its leverage ratios should be close to the average of the mean value of leverage ratios for all industries.

Table 20 Comparison o f average leverage ratios with previous studies.

Paper	BLL	BTL	MLL	MTL	BLLA
This paper	**0.06**	**0.33**	**0.05**	**0.24**	**0.47**
Chen and Xue(2004)	0.06	0.48	0.03	0.19	
Huang(2005)	0.09	0.29	0.04	0.12	0.44
Chen(2004)	0.07	0.45			

6.2. Regression results

The results of OLS regression for all firms are listed in Table 21. In the following parts, we will discuss the empirical results we have derived and analyze the potential reasons.

Table 21 Regression results of determinants on different leverage ratios.

	AGE	SO	PRO	TAN	SIZE	VOL	NDT	GO	C	R-squ
BSL	0.020	-0.052	0.960	0.390	-0.004	0.020	-2.780	0.006	0.013	0.189
t-value	(4,46)**	(-0.90)	(5,91)**	(3,31)**	(-0.22)	(3,31)**	(-2,41)**	(1.03)	(0.10)	
BLL	-0.002	0.015	-0.099	0.264	0.020	0.000	-0.161	0.006	-0.230	0.253
t-value	(-1.59)	(0.84)	(-1,92)*	(-7,34)**	(3,89)**	(-0.10)	(-0.46)	(2,28)**	(-5,73)**	
BTL	0.020	-0.037	1.070	0.551	0.002	0.022	-3.130	-0.012	-0.027	0.231
t-value	(4,28)**	(-0.64)	(6,34)**	(4,70)**	(0.10)	(3,38)**	(-2,73)**	(-1.35)	(-0.21)	
BLIA	0.010	-0.035	-1.072	0.455	0.047	0.000	-3.161	0.014	-0.033	0.408
t-value	(2,7)**	(-1.02)	(-10,73)**	(6,56)**	(4,35)**	(-0.15)	(-4,65)**	(2,68)**	(-0.43)	
MSL	0.007	-0.055	-0.340	0.120	0.038	0.083	-1.150	-0.008	-0.123	0.240
t-value	(3,00)**	(-1,85)*	(-4,03)**	(2,06)*	(4,07)**	(2,38)**	(-1,94)*	(2,74)**	(-1,89)*	
MLL	0.000	0.008	-0.060	0.192	0.014	0.001	0.014	-0.002	-0.152	0.238
t-value	(-0.19)	(0.55)	(-1.43)	(6,40)**	(3,09)**	(0.72)	(0.05)	(-1.23)	(-4,55)**	
MTL	0.007	-0.049	-0.304	0.309	0.047	0.010	-1.356	-0.025	-0.200	0.331
t-value	(2,99)**	(-1.47)	(-3,12)**	(4,58)**	(4,42)**	(2,58)**	(-2,05)**	(-4,89)***	(-2,67)**	
MLIA	0.007	-0.020	-0.560	0.280	0.080	0.008	-2.110	-0.010	-0.300	0.430
t-value	(2,96)**	(-1.02)	(-6,36)**	(4,49)**	(8,05)**	(2,19)*	(-3,41)**	(-3,48)**	(-4,43)**	

Note: * significant at 0.05 level
      ** significant at 0.01 level

When dependent variable, leverage ratio, is measured by total liability to market value of total assets, R-square is the highest, 0.43 and R-square is 0.40 which is still much higher when book value of equity substitutes market value compared with when other measures are used. This indicates that total liability to total assets is a more suitable leverage ratio for it takes trades payable into consideration, which is a very important

financing source for most Chinese firms. When firms make financing decisions and also when creditors evaluate financial risks of a firm, total liability to total assets is the most widely used ratio in practice in China.

6.2.1. Determinants of capital structure

- Tangibility

As can be seen, coefficients of tangibility are highly statistically significant for all eight leverage ratios. The results show that tangibility has positive relationship with all different leverage ratios. The positive role of tangibility on long-term debt ratios and total debt ratios are consistent with most of the previous empirical studies and also with theoretical predictions of static trade-off models. But the positive relation between short-term debt ratios and tangibility is different from what have been found in some western studies, such as Bevan and Danbolt (2002), Han-Suck Song (2005). Opposite effects of tangibility on short-term debt and long-term debt are explained by the maturity matching principle, that is long-term debt are used to finance fixed assets and short-term debt are used for current assets financing in Bevan and Danbolt (2002). However, the situation is different in China. Short-term debt is usually rolled over to the next year and in essence, a large portion of short-term debt is used as long-term debt to finance long-term projects and fixed assets, which is a specific phenomenon for Chinese firms.

- Profitability

Profitability is mainly found to be inversely related to capital structure, supporting pecking-order prediction in six out of the eight leverage ratios; firms prefer using surplus generated by profits to finance investments. This result is also in line with the previous empirical studies on Chinese firms. Besides the obvious reason clarified in pecking order theory, some specific reasons for the negative effect of profitability on leverages for Chinese firms can be identified. From the supply side, banks are willing to lend more money to more profitable firms for the risk they take is smaller. But when a firm can also access funds from equity market, it usually prefers to financing through equity issues. The most important reason is by issuing new shares, firms can acquire substantial capital gains in the secondary markets for the immatureness of Chinese stock

market. And accompanied by incomplete company laws and lack of enough protection for individual shareholders, equity issue is a better choice for listed firms compared with bank loans.

And for two of the eight leverage ratios, positive relation is found to favor the trade-off models. For the tax benefits of debt, the more profitable it is, the more debt it takes.

- Size

The results reveal that size is a significant positive determinant of leverage which is consistent with the prediction of trade-off model but opposite to pecking order theory, but the effect is rather small. This indicates that for Chinese firms, larger firms do have minor advantage over smaller ones in getting more banking loans for they have smaller bankruptcy risk.

- Non-debt tax shields

As what has been found in previous studies and as predicted by trade-off models, non-debt tax shields are found to be a negative determinant for all leverage ratios except long-term debt ratio. This result is also quite interesting for it indicates that increase in non-debt tax shields affect short-term and total debt leverage negatively which means that non-debt tax shields are substitutes for the tax benefits of short-term financing and therefore for total debt financing. But when consider long term borrowing, NDT is not a determinant to make the decision. This can be explained by the small percentage of long-term debt in total debt. When firms are engaged in tax shelter schemes, they mainly consider short-term debt for this is the main part and again, specially, a rather stable financing part for Chinese firms.

- Years listed on the stock exchange

The longer a firm listed on a stock exchange, the higher leverage ratios. Firms listed for a longer time have less asymmetric information compared with new listed firms. Hence, they face with lower cost of equity financing and they would like to take more equity financing which results in decrease of leverage ratios. This is the decreasing effect of years listed on stock markets on leverage ratios. On the other hand, longer listed firms

also have longer and closer relationship with banking systems. They can get more debt compared with newly listed firms, which would result in higher leverage ratios. The empirical results can be explained by the second effect of years listed on stock exchange plays a more important role in corporate borrowing.

- Volatility

Different from what is predicted by trade-off models and main results from western studies, positive relationship between earnings variability and most of leverage ratios is found. This special result can be attributed to the highly regulated credit market in China. Currently, interest rates are still decided by the central bank rather than by market force. Commercial banks only have the authority to decide whether to approve a loan or not but have no power in lending money with different interest rates to different companies. And listed companies are all the best ones in their industries and most are state-owned companies. As a result, relative riskier companies can get loans at the regulated interest rates which are lower than the interest rates when market plays the decisive role. Under this circumstance, riskier firms tend to take advantage of the regulated credit market and would like to take more "cheaper" debt.

- Growth opportunity

Results about relation between leverage ratios and growth opportunities are quite mixed, positive between book values of leverage and growth opportunities but negative between market values of leverage ratios and growth opportunities.

According to the trade-off theory, firms with more growth opportunities also face with bigger bankruptcy risk and hence take less debt. Besides, they have more flexibility to invest sub-optimally for possessing more growth opportunities and the asset substitution problem incurred by risky debt is more serious. Therefore, the firms choose to issue more equity rather than debt. Another possible explanation is that firms with a lot of growth opportunities prefer to keep leverage low so that they don't need to give up profitable investment in the near future for lack of funds. The negative relation between market-to-book values and book leverage ratios support trade-off theory.

On the other hand, the positive relation derived between growth opportunities and market values of leverage can be explained by pecking order model. From the demanding side, firms with more growth opportunities are in cash flow deficit and in order not to give up growth opportunities, they have to turn to bank loans rather than equity financing. The reason why firms with more growth opportunities choose debt rather than equity financing is that they face more asymmetric information and hence higher cost of equity financing. From the supply side, not only the equity market but also the banks recognize the value of growth opportunities. Hence, the banks allocate bigger debt capacity for firms belong to this category.

- State-owned share ratio

State-owned share ratio is identified as a non-significant factor of leverage ratios for none of the coefficients in all regression is statistically significant.

6.2.2. Comparison between big firms and SMEs

It is often argued that significant difference should exist between big firms and SMEs in financing. By regress two samples individually with MLIA, a preliminary study is done in this part. According to the criteria used in China, firms with employees less than 2000, or total assets less than 400 million RMB, or net sales less than 300 million RMB are all categorized into SMEs.

From the results listed in Table 22, almost the exact same sets of determinants are found for both lines of firms except volatility which is positively related to SMEs but not to big firms.

Table 22 Comparison between big firms and SMEs.

		AGE	SO	PRO	TAN	SIZE	VOL	NDT	GO	C	RSQ
SMEs	**MLIA**	0.008	-0.044	-0.482	0.367	0.065	0.008	-2.069	-0.007	-0.259	0.433
	t-value	*(2,76)***	*(-1.08)*	*(-5,30)***	*(4,54)***	*(4,49)***	*(2,00)**	*(-2,66)***	*(-2,28)**	*(-2,70)***	
Big firms	**MLIA**	0.006	-0.027	-0.805	0.212	0.067	0.003	-2.955	-0.060	0.001	0.443
	t-value	*(1,89)**	*(-0.59)*	*(-3,03)***	*(2,18)**	*(4,30)***	*(-0.43)*	*(-3,00)***	*(-5,51)***	*(-0.99)*	

Note: ** significant at 0.05 level*
             ** significant at 0.01 level

6.2.2. Comparison with previous empirical studies of Chinese firms

Results of all available empirical studies on determinants of capital structure of Chinese firms and this study are listed in Table 23.

Table 23 Results of empirical studies on determinants of leverage for Chinese firms.

Characteristics	Chen(2004)	HS(2005)	Chen&Xue(2004)	T(2005)	Chen&Roger(2005)	Results of this paper
Volatility	ns	+	ns(-)		+	+
Tangibility	+	+	+			+
Non-debt tax shields	ns	-				-
Profitability	-	-	-	-	-	-
Growth opportunities	+	-	ns(+)	+		?
Size	?	+	ns(+)	ns(+)	+	+
Dividend payout			ns(-)	ns(+)		
Managerial shareholdings		ns(-)				
Institutional shareholdings		ns			-	
Years listed on stock markets					+	+
State-owned shares ratio			ns(-)			ns(-)

Note:
Ns(-)or ns(+) means non-significant with negative sign or positive sign.
? represents mixed results are given

As seen from table, the results derived from this paper are quite in line with the majority predictions, i.e. volatility, tangibility, size and years listed on stock exchange are identified as positive determinants for most of the leverage ratios we adopted. And profitability and non-debt tax shields are inversely related to most of the leverage ratios. For growth opportunities, its effect on leverage is still unclear for both positive and negative effect are found in this paper and also in previous empirical studies. And from all the results, it is difficult to decide which one should be the dominant role of growth opportunities on leverage ratios.

It is not surprising that the results are quite similar even though we adopt a different sample dataset in the study compared with the above-mentioned studies. Those studies use cross-sectional data while we only use firms in manufacturing industry. The same potential reasons could explain the similarity as in explaining the similar leverage ratios compare with previous studies. One is that firms in manufacturing industry are composed of different product categories, such as food, clothing, mechanic, metal and others. The other one is that in industry risk ranking list, manufacturing locates in the middle part. Hence, the characteristics of this industry are quite similar to the average level of all industries.

One interesting result is that in most previous studies, such as Chen and Xue (2005), market values are not suggested to measure leverage, but according to what we have found, by adopting market values of leverage ratios, similar results are derived as when book values of leverage ratios are adopted.

6.3. Summary

Based on 336 public listed firms from SSE and SZSE, identified significant positive determinants of capital structure include tangibility, size, volatility and years listed on the stock markets; negative factors are profitability and non-debt tax shields. State-owned share ratio doesn't play a significant role in capital structure. All results are quite similar to the dominant result from previous empirical studies on determinants of capital structure for Chinese firms. Besides, almost the same sets of significant independent variables are found for big firms and SMEs respectively.

7. CONCLUSTIONS

We examined the capital structure of public listed firms in manufacturing industry on Chinese stock market by using 336 firm data from 2004 to 2005. Eight independent variables are used in the study based on previous empirical studies on Chinese firms.

The results are quite consistent with theoretical predictions, partly support pecking order theory and others support trading-off theory and similar set of determinants of capital structure are found compared with western countries. It indicates somehow that even though in the past bank lending activities in china are quite dependent on relationship between firms and banks, the situation has changed a lot. If the relationship still plays dominant role in bank lending, then different determinants or different effects of relevant factors are expected to be derived from the empirical studies. However, the empirical results prove quite similar results to western studies, such as tangibility is a very important positive factor in determining leverage ratios of firms. Also, state-owned share ratios play no roles in determining the leverage ratios. It means that banks are placing more emphasis on corporate borrowers' financial and managerial conditions when they make lending decisions rather than predominantly dependent on the relationship factor. This result is consistent with Hideto and Ko (2006).

However, for the special institutional environments in China, especially the small size of bond markets, immatureness of stock markets and the highly regulated banking systems, some difference between Chinese studies and western ones are found, namely much lower long-term debt to total debt and the positive effect of volatility on leverage ratios of Chinese firms.

REFERENCE

Aboody, D., and Lev, B.(2000). Information asymmetry, R&D and insider gains. *Journal of Finance* 55, 2747-2766.

Baker Malcolm P., and Wurgler Jeffery (2002). Market timing and Capital Structure. *Journal of Finance* 57:1, 1-32.

Bennett, M. and Donnelly, R. (1993). The determinants of capital structure: some UK evidence. *British Accounting Review* 1:25, 43-59.

Berger, A. and Udell, G. (1995). Relationship lending and lines of credit in small firm finance. *Journal of Business* 68, 351-381.

Best, R., Hodges, C., and Lin, B. (2004). Does information asymmetry explain the diversification discount? *Journal of Financial Research* 27, 235-349.

Bevan, A.A. and Danbolt, J. (2002). Capital structure and its determinants in the United Kingdom: a decomposition analysis. *Applied Financial Economics* 12:3, 159-170.

Bradley, Michael, Gregg Jarrell, and E. Han Kim (1984). On the Existence of an optimal capital structure: theory and evidence. *Journal of Finance* 39, 857-878.

Brander, James A. and Tracy R. Lewis (1986). Oligopoly and Financial Structure: The limited Liability Effect. *American Economic Review* 76, 956-970.

Chang, Chun (1999). Capital structure as optimal contracts. *North American Journal of Economics and Finance* 10:2, 363-385.

Chaplinsky, Susan and Greg, Niehaus (1990). The determinants of inside ownership and leverage. Working paper, University of Michigan.

Chen Jean J & Yan Xue (2005). New Empirical Panel Study on the Capital Structure of Chinese Listed Companies. Working paper, University of Surrey, Available at: <URL:http://www.fma.org/Zurich/Papers/130206.pdf>

Chen Jean J (2004). Determinants of Capital Structure of Chinese-listed Companies. *Journal of Business Research* 57:12: 1341-1351.

Chen Jian & Roger Strange (2005). The Determinants of Capital Structure: Evidence from Chinese Listed Companies. *Economic Change and Restructuring* 38:1, 11-35.

DeAngelo, H., & R. Masulis, 1980. Optimal Capital Structure under Corporate and Personal Taxation. *Journal of Financial Economics* 8, 3-29.

DeMiguel, Alberto & Julio Pindado (2001). Determinants of capital structure: new evidence from Spanish panel data. *Journal of corporate finance* 7, 77-99.

Devic Aleksandar, Bojan Krstic (2001). Comparatible Analysis of the Capital Structure Determinants in Polish and Hungarian Enterprises. *Economics and organization* 1:9, 85-100.

Fama, E., & K. French, 2002. Testing trade-off and pecking order predictions about dividends and debt. *Review of Financial Studies* 15, 1-33.

Frank, M. & Goyal, V. (2003). Testing the Pecking Order Theory of Capital Structure. *Journal of Financial Economics* 67, 217-248.

Frank, M.Z., & Goyal, V.K. (2004). The Effect of Market Conditions on Capital Structure Adjustment. *Jounal of Financial Economics*67, 217-248.

Fraser Donald R., Hao Zhang, Chek Derashid (2006). Capital Structure and Political Patronage: The case of Malaysia. *Journal of Banking & Finance* 30, 1291-1308.

Friend, Irwin & Joel Hasbrouck (1988). Determinants of Capital Structure, in Andy Chen ed. *Research in Finance* 7, pp. 1-19.

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

Frydenberg, Stein (2003). Theory of Capital Structure - A Review. Frihet og Mangfold Frihet og mangfold. Festskrift til Odd G. Arntzen. L. Fallan & O. Gustafsson, Trondheim: Tapir/T. Available at: <URL: http://ssrn.com/abstract=556631>

Giammarino, R.M., & E.H. Neave (1982). The Failure of Financial Contracts and the Relevance of Financial Policy. Queens University Working Paper, No. 82-3.

Guanqun Tong & Christopher J. Green (2005). Pecking Order or trade-off Hypothesis? Evidence on the Capital Structure of Chinese companies. *Applied Economics* 37:19, 2179-2189.

Gonedes, Nicholas J., Larry Lang, & Mathias Chikaonda (1988). Empirical results on managerial incentives and capital structure. Working paper. The Wharton School. University of Pennsylvania.

Halov, N., & Heider, F. (2004). Capital Structure, Risk and Asymmetric Information. Working Paper, Stern School of Business, New York University.

Han-Suck Song (2005). Capital Structure Determinants: an Empirical Study of Swedish Companies. Working Paper, the Royal Institute of Technology Stockholm. Available at: <URL http://www.infra.kth.se/cesis/documents/WP25.pdf>

Harris,M. & A. Raviv (1988). Corporate Control Contest and Capital Structure. *Journal of Financial Economics* 20, 55-86.

Harris,M. & A. Raviv (1990a). Capital Structure and the Informational Role of Debt. *The Journal of Finance* 45, 321-349.

Harris,M. & A. Raviv (1991). The Theory of Capital Structure. *Journal of Finance* 46, 297-356.

Hideto Skashita, & Ko Nakayama (2006). Panel Analysis of Chinese Corporate Debt-How Far Have Market Mechanisms Penetrated? Bank of Japan Working Paper Series. Available at: <URL: http://www.boj.or.jp/en/type/ronbun/ron/wps/data /wp06e12.pdf>

Hovakimian, A.(2003). Are Observed Capital Structures Determined by Equity Market Timing? AFA 2005 Phaladelphia Meetings. Available at SSRN:<URL http://ssrn.com/abstract=413387>

Huang Samuel G.H. & Song Frank M. (2005). The Determinants of Capital Structure: Evidence from China. HIEBS (Hong Kong Institute of Economics and Business Strategy) Working paper. Available at <URL: http://ssrn.com/abstract=320088>

Israel, R. (1991). Capital Structure and the Market for Corporate Control: the Defensive Role of Debt Financing. *Journal of Finance* 46, 1391-1410.

Jensen, Michael C. (1986). Agency Costs of Free Cash Flow, Corporate Finance and Takeovers. *American Economic Review* 76, 323-339.

Jensen, Michael C. & Meckling, W.H.(1976). Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Strcuture. *Journal of Financial Economics* 3, 305-360.

Jian Chen & Roger Strange (2005). The Determinants of Capital Structure: Evidence from Chinese Listed Companies. *Economic Change and Restructuring* 38:1, 11-35.

Kayhan, A. & Titnan,S. (2004). Firms' histories and Their Capital Structure. NBER Working Paper 10526.

Kester, Carl W. (1986). Capital and ownership structure: a comparison of United states and Japanese manufacturing corporations. *Financial Management*, 5-16.

Kim, Wi Saeng & 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.

Kim, E.H.(1978). A Mean Variance Theory of Optimal Capital Structure and Corporate Debt Capacity. *Journal of Finance* 33, 45-64.

Kraus, Alan & Litzenberger, Robert (1973). A State Preference Model of Optimal Financial Leverage. *Journal of Finance* 28, 911-922.

Lemmon, M.L. & J. Zender (2002). Debt Capacity and Tests of Capital Structure Theories. Working Paper. University of Colorado and University of Utah.

Long, Michael & Ileen Malitz (1985). The investment financing nexus: some empirical evidence. *Midland Corporate Finance Journal* 3, 53-59.

MacKay Peter & Gordon M. Phillips (2005). How Does Industry Affect Firm Financial Structure? *Review of Financial Studies* 18:4, 1433-1466.

Makesimovic, V., & Titaman, S. (1991). Financial Policy and Reputation for Product Quality. *Review of Financial Studies* 4, 175-200.

Makesimovic, V. (1988). Capital Structure in Repeated Obligopolies. *RAND Journal of Economics* 19:3, 389-407.

Mamoru Nagano (2004). Determinants of Corporate Capital Structure in East Asia: Are there differences from the Industrialized Countries? Working paper series, Waseda University, WIF-04-002.

Manohar Singh, Wallace N. Davidson III, Jo-Ann Suchard (2003). Corporate diversification strategies and capital structure. *The Quarterly Review of Economics and Finance* 43, 147- 167.

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

Modigliani, F. & Merton H. Miller (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. The *American Economic Review*, Vol.48, No.3, pp. 261-297.

Modigliani, F. & Merton H. Miller (1963). Corporate Income Taxes and the Cost of Capital. *American Economic Review* 53, 433-443.

Myers Stewart C. & Majluf Nicholas S.(1984).Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have. NBER Working Papers 1396, National Bureau of Economic Research, Inc.

Rajan Raghuram G., & Zingales Luigi (1995). What do we Know about Capital Structure? Some Evidence from International Data. *Journal of Finance* 50, 1421-1460.

Schowalter, D. (1995). Oligopoly and Financial Structure: Comment. *American Economic Reviews* 85:3,647-653.

Shyam-Sunder, L. & S. Myers (1999). Testing Static Tradeoff Against Pecking Order Model of Capital Structure. *Journal of Financial Economics* 51, 219-244.

Stiglitz, Joseph E (1969). A Re-examination of the Modigliani-miller Theorem. *The American Economic Review* 59: 784-793.

Stulz, R. (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.

Subramaniam, V. (1998). Efficient Sourcing and Debt Financing in Imperfect Product Markets. *Management Science* 44:9, 1167-1178.

Tijs de Bie & Leo de Haan (2004). Does Market Timing Drive Capital Structure? A Panel Data Study for Dutch Firms. DNB Working Paper, NO.16/2004.

Titman, Sheridan (1984). The Effect of Capital Structure on a Firm's Liquidation Decision. *Journal of Financial Economics* 13, 137-151.

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

Tong Guanqun & Green Christopher J. (2005). Pecking Order or trade-off Hypothesis? Evidence on the Capital Structure of Chinese companies. *Applied Economics* 37:19, 2179-2189.

Welch, I. (2004). Capital Structure and Stock Returns. *Journal of Political Economy* 112:1, 106-131.

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

Appendix

Lists of sample firms

No.	Name	Code	Time listed
1	INNER MONGOLIA JINYU GROUP CO.LTD	201	1999
2	SHANGHAI FUSUN PHAR. CO.LTD	196	1998
3	JIANGZHONG PHAR. CO.LTD	750	1996
4	SHANGHAI PHAR.CO.LTD	849	1994
5	TIANJIN TASLY PHAR. CO.LTD	535	2002
6	BEIJING TONGRENTANG CO.LTD	85	1998
7	HAEBIN PHAR. GROUP CO.LTD	664	1993
8	NORTH CHINA PHAR. CO.LTD	812	1994
9	SHANGHAI INDUSTRIAL UNITED HOLDINGS CO.LTD	607	1992
10	ZHEJIANG MEDICINE CO.LTD	216	1999
11	KUNMING PHAR. CO.LTD	422	2000
12	JIAODA ONLLY CO.LTD	530	2001
13	JOINCARE PHARMACEUTICAL GROUP INDUSTRY CO.LTD	380	2001
14	STAR LAKE BIOSCIENCE CO.INC	866	1994
15	GUANGXI BEISHENG PHARMACEUTICAL CO.LTD	556	2001
16	GUANGDONG KANGMEI PHARMACEUTICAL CO.LT	518	2001
17	WUHAN SPRING BIOLOGICAL ENGINEERING STOCKS CO.LTD	421	2004
18	WUHAN MAYINGLONG PHARMACEUTICAL GROUP CO.LTD	993	2004
19	ZHEJIANG CONBA PHARMACEUTICAL CO.LTD	572	2004
20	GUANGZHOU PHARMACEUTICAL CO.LTD	332	2001
21	ZHUZHOU QIANJIN PHARMACEUTICAL CO.LTD	479	2004
22	ZHEJIANG HUAHAI PHARMACEUTCAL CO.LTD	521	2003
23	ZHANGZHOU PIENTZEHUANG PHARMACEUTICAL CO.LTD	436	2003
24	JIANGSU LIANHUAN PHARMACEUTICAL CO.LTD	513	2003
25	DALIAN MERRO PHARMACEUTICAL CO.LTD	297	2000
26	JIANGSU KANION PHARMACEUTICAL CO.LTD	557	2002
27	JIANGSU HENGRUI MEDICINE CO.LTD	276	2000
28	NANJING MEDICAL CO.LTD	713	1996
29	TONGHUA DONGBAO PHARMACEUTICAL CO.LTD	867	1994
30	HUBEI QIANJIANG PHARMACEUTICAL CO.LTD	568	2001
31	BEIHAI GOFAR MARINE BIOLOGICAL INDUSTRY CO.LTD	538	2003
32	HENAN LINGRUI PHARMACEUTIAL CO.LTD	285	2000
33	INNER MONGOLIA EERDUOSI CASHMERE PRODUCTS CO.LTD	295	1995
34	QINGHAI XIANCHENG INDUSTRY STOCK CO.LTD	381	2001
35	HUAFANG LIMITED COMPANY	448	2001
36	SHANGHAI SHENDA CO.LTD	626	1993
37	SHANGHAI SANMAO ENTERPRISE CO.LTD	689	1993
38	SHANGHAI WORLDBEST INDUSTRY DEVELOPMENT CO.LTD	757	1996
39	SHANGHAI HAIXIN GROUP	851	1994
40	SHANGHAI KAIKAI INDUSTRY CO.LTD	272	1997
41	SHANGHAI DRAGON CORPORATION	630	1993
42	SHANGHAI MET CORPORATION	645	1994
43	NINGBO VEKEN ELITE GROUP CO.LT	152	1998
44	YOUNGOR GROUP CO.LTD	177	1998
45	FUJIAN NANFANG TEXTILE CO.LTD	483	2004
46	ZHEJIANG FURUN CO.LTD	70	1997
47	AEROSPACE COMMUNICATIONS HOLDINGS CO.LTD	677	1993
48	HUBEI TIANHUA CO.LTD	745	1996

No.	Name	Code	Time listed
49	HUBEI MAILYARD SHARE CO.LTD	107	1997
50	HUNAN HUASHENG CO.LTD	156	1998
51	FUJIAN FENGZHU TEXTILE SCIENCE&TECHNOLOGY CO.LTD	493	2004
52	BLACK PEONY CO.LTD	510	2002
53	JIANGSU HONGDOU INDUSTRY CO.LD	400	2001
54	JIANGSU SUNSHINE CO.LTD	220	1999
55	CANAL SCIENTIFIC AND TECHONOLOGICAL CO.LTD	398	2000
56	WUXI QINGFENG CO.LTD	576	2003
57	DALIAN DAYANG TRANDS CO.LTD	233	2000
58	LIAONING TIMES GARMENTS I/E INC.	241	2000
59	JIANGSU SANFANGXIANG INDUSTRY CO.LTD	370	2003
60	HENAN REBECCA HAIR PRODUCETS CO.LTD	439	2003
61	WANXIN CO.LTD	63	1997
62	BAOTOU TOMORROW TECHNOLOGY CO.LTD	91	1997
63	MOGOLIA YILI TECHNOLOGY CO.LTD	277	2000
64	INNER MONGOLIA LANTAI INDUSTRIAL CO.LTD	328	2000
65	DAYUAN CO.LTD	146	1999
66	SHANDONG HUAYANG TECHNOLOGY CO.LT	532	
67	WEIFANG YAXING CHEMICAL CO.LTD	319	2001
68	SHANDONG LUBEI CHEMICAL CO.LTD	727	1996
69	QINGDAO JIANYE CO.LTD	229	2000
70	SHANDONG DACHENG PESTICIDE CO.LTD	882	1995
71	QINGDAO YELLOW SEA RUBBER CO.LTD	579	2002
72	YANTAI WNAHUA POLYURETHANES CO.LTD	309	2001
73	TAIYUAN CHEMICAL INDUSTRY CO.LTD	281	2000
74	SHANXI ANTAI GROUP CO.LTD	408	2003
75	SHANXI COKING CO.LTD	740	1996
76	CHINA FIBERGLASS CO.LTD	176	1999
77	SHANGHAI SANJIU TECHNOLOGY DEVELOPMENT CO.LTD	614	1992
78	SHANGHAI WORLDBEST CO.LTD	94	1996
79	SHANGHAI LIANHUA FIBRE CORPORATION	617	1992
80	SINOTEX INVESTMENT&DEVELOPMENT CO.LTD	61	1997
81	BLUE STAR NEW CHEMICAL MATERIALS CO.LTD	299	2000
82	SHANGHAI 3F NEW MATERIAL CO.LTD	636	1993
83	SHANGHAI JIAHUA UNITED CO.LTD	315	2001
84	SINOPEC SHANGHAI PETROCHEMICAL CO.LTD	688	1993
85	SHANGHAI FENGHWA GROUP CO.LTD	615	1992
86	SHANGHAI WHITECAT SHAREHOLDING CO.LTD	633	1993
87	SICHUAN TIANYI SCIENCE&TECHNOLOGY CO.LTD	378	2001
88	SICHUAN HONGDA CO.LTD	331	2001
89	USTC CHUANGXIN CO.LTD	551	2002
90	XIAMEN FARATRONIC CO.LTD	563	2002
91	XIAMEN ELECTRICS	870	1995
92	AMOI ELECTRONICS CO.LTD	57	1997
93	YANTAI XINCHAO INDUSTRY CO.LTD	777	1996
94	HISENSE ELECTRIC CO.LTD	60	1997
95	SVA INFORMATION INDUSTRY CO.LTD	637	1993
96	SHANGHAI BELLING CORP.LTD	171	1998

No.	Name	Code	Time listed
97	SVA ELECTRON CO.LTD	602	1992
98	CHENGDU XUGUANG ELECTRONICS CO.LTD	353	2002
99	SICHUAN CHANGHONG ELECTRIC CO.LTD	839	1994
100	BGRIMM MAGNETIC MATERIALS&TECHNOLOGY CO.LTD	980	2004
101	BEIJING DYNAMIC POWER CO.LTD	405	2004
102	TDG HOLDING CO.LTD	330	2001
103	ROUTON ELECTRONIC CO.LTD	355	2002
104	JILIN SINO-MICROELECTRONICS CO.LTD	360	2001
105	JIANGXI LIANCHUANG OPTOELECTRONIC SCIENCE AND TECHNOLOGY	363	2001
106	DAXIAN CO.LTD	747	1996
107	HANGZHOU SILAN MICROELECTRONICS CO.LTD	460	2003
108	JIANGSU CHANGJIANG ELECTRONICS TECHNOLOGY CO.LTD	584	2003
109	ZHEJIANG KING REFRIGERATION INDUSTRY CO.LTD	340	2003
110	CHANGSHA LYRUN MATERIAL CO.LTD	478	2003
111	CSG HOLDING CO.LTD	12	
112	BAOSHAN IRON&STEEL CO.LTD	19	2000
113	SHANDONG ALUMINIUM INDUSTRY CO.LTD	205	1999
114	BAOJI TITANIUM INDUSTRY CO.LTD	456	2002
115	SHANDONG NANSHAN INDUSTRIAL CO.LTD	219	1999
116	XINHUA METAL PRODUCTS CO.LTD	782	1996
117	SHANGHAI YAOHUA PIKINGTON GLASS CO.LTD	819	1994
118	GUODONG CO.LTD	321	2001
119	CHENGDU DR.PENG TECHNOLOGY CO.LTD	804	1994
120	JIANGSU GAOCHUN CERAMICS .LTD	562	2003
121	SICHUAN ATLANTIC WELDING CONSUMABLE CO.LTD	558	2001
122	XINJIANG BAYI IRON&STEEL CO.LTD	581	2002
123	XINJIANG JOINWORLD CO.LTD	888	1996
124	ZHEJIANG JIANFENG GROUP CO.LTD	668	1993
125	GANSU QILIANSHAN CEMENT GROUP CO.LTD	720	1993
126	GUANGZHOU RONGTAI CO.LTD	589	2000
127	GUANGZHOU IRON AND STEEL CO.LTD	894	1996
128	HUAXIN CEMENT CO.LTD	801	1994
129	WUHAN IRON AND STEEL CO.LTD	5	1999
130	MARKOR INTERNATIONAL FURNITURE CO.LTD	337	2000
131	GUANGDONG YIHUA TIMBER INDUSTRY CO.LTD	978	2004
132	JIANGSU SHUANGLIANG CO.LTD	481	2003
133	CHANGCHUN YIDONG CLUTCH CO.LTD	148	1998
134	SHANGHAI JIELONG INDUSTRY CORPORATION LIMITED	836	1993
135	ANHUI SHANYING PAPER INDUSTRY CO.LTD	567	2001
136	NANZHI CO.LTD	163	1998
137	FUJIAN QINGSHAN PAPER INDUSTRY CO.LTD	103	1997
138	SHANDONG HUATAI PAPER CO.LTD	308	2000
139	QINGDAO HAIER CO.LTD	690	1993
140	WOLONG ELECTRIC GROUP	580	2002
141	ZHEJIANG FEIDA ENVIRONMENT SCIENCE&TECHNOLOGY CO.LTD	526	2002
142	ANHUI QUANCHAIDONGLI	218	1998
143	ANHUI HELI	761	1996
144	TONGLING SANJIA	520	2002
145	CHINA TEXTILE MACHINERY CO.LTD	610	1992

No.	Name	Code	Time listed
146	ANHUI TONGFENG ELECTRONICS CO.LTD	237	2000
147	INNER MONGOLIA NORTH HAULER JOINT STOCK CO.LTD	262	2000
148	QINGHAI HUADING INDUSTRIAL CO.LTD	243	2000
149	FUJIAN LONGXI	592	2002
150	XIAMEN ENGINEERING MACHINERY CO.LTD	815	1994
151	FUJIAN LONGKING CO.LTD	388	2000
152	CITYCHAMP DARTONG CO.LTD	67	1997
153	SHANDONG HEUNGKONG HOLDING CO.LTD	162	1998
154	JINNAN QINGQI	698	1993
155	QINGDAO AOAUCMA CO.LTD	336	2000
156	DONGAN HEIBAO CO.LTD	760	1996
157	SHANDONG XINHUA	587	
158	TAIYUAN HEAVY INDUSTRY CO.LTD	169	1998
159	SHANXI BAOGUANG	379	2002
160	XIAN BIAOZHUN GONGYE	302	2000
161	HUDONG HEAVY MACHINERY CO.LTD	150	1998
162	SHANGHAI LIGHT INDUSTRY MACHINEARY CO.LTD	605	1992
163	SGSB GROUP CO.LTD	843	1994
164	SHANGHAI HAIGHLY CO.LTD	619	1992
165	SHANGHAI AEROSPACE AUTOMOBIL ELECTROMECHANICAL	151	1998
166	SHANGHAI AUTOMOTIVE CO.LTD	104	1997
167	DONGFENG ELECTRONIC TECHNOLOGY CO.LTD	81	1997
168	SHNGHAI FOREVER CO.LTD	818	1994
169	SHANGHAI JIAOYUN CO.LTD	676	1993
170	PHOENIX CO.LTD	679	1993
171	SHANGHAI POWER TRANMISSION&DISTRIBUTION CO.LTD	627	1993
172	SHANGHAI ERFANGJI CO.LTD	604	1992
173	JIANGNAN HEAVY INDUSTRY CO.LTD	72	1997
174	SHANGHAI ZHENHUA PORT MACHINERY CO.LTD	320	1997
175	SICHUAN CHENGFA AERO-SCIENCE&TECHNOLOGY CO.LTD	391	2001
176	DONGFANG ELECTRICAL MACHINERY CO.LTD	875	1995
177	DONGFANG BOILERGROUP CO.LTD	786	1996
178	TIANJIN BENEFO TEJING ELECTRIC CO.LTD	468	2001
179	BEIQI FOTO MOTOR CO.LTD	166	1998
180	BEIJING AEROSPACE CHANGFENG CO.LTD	855	1994
181	TIANDI SCIENCE&TECHNOLOGY CO.LTD	582	2002
182	BEIJING WANDONG MEDICAL EQUIPMENT CO.LTD	55	1997
183	WUZHOU MINOVO CO.LTD	873	1995
184	TEBE CO.LTD	89	1997
185	JIAODA KUNJI HIGH-TECH CO.LTD	806	1994
186	ZHEJIANG HOLLEY TECHNOLOGY CO.LTD	97	1997
187	NINGBO YUNSHENG	366	2000
188	LANZHOU CHANGCHENG	192	1998
189	CHINA JIALING INDUSTRIAL CO.LTD	877	1995
190	KEDA INDUSTRIAL CO.LTD	499	2002
191	GUANGZHOU SHIPYARD INTERNATIONAL CO.LTD	685	1993
192	GUANGDONG SHENGYI SCI.TECH CO.LTD	183	1998
193	GUANGDONG MINGZHU GROUP CO.LTD	382	2001
194	GUIZHOU GUIHANG AUTOMOTIVE CO.LTD	523	2001
195	HARBIN DONGAN AUTO ENGINE CO.LTD	178	1998
196	HARBIN AVIATION INDUSTRY CO.LTD	38	2000

No.	Name	Code	Time listed
197	C&T TECHNOLOGY DEVELOPMENT CO.LTD	149	1999
198	ZHENGZHOU YUTONG BUS CO.LTD	66	1997
199	HENAN BINGXIONG	753	1996
200	CHANGZHENG HUOJIAN	879	1995
201	HUBEI HONGCHENG	566	2001
202	XIANGTAN DIANJI	416	2002
203	CHANGCHUN FAW-SIHUAN AUTOMOBILE CO.LTD	742	1996
204	GUODIAN NANJING AUTOMATION CO.LTD	268	1999
205	AEROSUN CORPORATION	501	2001
206	SUFOMA CO.LTD	290	2000
207	JIANGXI CHANGHE AUTOMOBILE CO.LTD	372	2001
208	PHENIX OPTICAL CO.LTD	71	1997
209	ANYUAN INDUSTRIAL CO.LTD	397	2002
210	SHENYANG JINBEI AUTOMOTIVE COMPANY LIMITED	609	1992
211	LIAONING SG AUTOMOTIVE GROUP CO.LTD	303	2000
212	DALIAN BINGSHAN RUBBER&PLASTICS CO.LTD	346	2001
213	ANHUI XINGMA	375	2003
214	SHANGHAI HANGTIAN	343	2003
215	BEIJING BEIFANG TIANNIAO	435	2003
216	WUXI HUAGUANG	475	2003
217	SHANGHAI ZHIXIN	517	2003
218	SHANDONG BINZHOU	960	2004
219	GUANZHOU DONGFANG	988	2004
220	BAOTOU BEIFANG	967	2004
221	JINXI CHEZHOU	495	2004
222	FENGFAN	482	2004
223	BEIJING JIZINTIANZHENG	560	2002
224	SHANGHAI JIDIAN	835	1994
225	TONGLING JINGDA	577	2002
226	JIANGSU SHUANGLIANG CO.LTD	481	2003
227	SHANGHAI CHAIYOUJI	841	1994
228	JIANGXI CHANGLI	507	2003
229	SHANXI JIANSHE	984	2004
230	NONGBO FUDA	724	1996
231	JIANGXI HONGDU	316	2000
232	CHANGCHU YIDONG	148	1998
233	ANHUI JIANGHUAI	418	2001
234	FENGSHEN TYRE	469	2003
235	CHONGQING WANLI	847	1994
236	S&P PHARMACEUTICAL CO.LTD	869	1995
237	TOPSUN	771	1996
238	SHANGDONG LUHANG	789	1997
239	SHANGDONG JINTAI ST	385	2001
240	SHANXI YABAO	351	2002
241	JINHUA CO.LTD	80	1997
242	SHANGHAI MIDDLEWEST CO.	842	1994
243	SICHUAN DIKANG	466	2001
244	TIANJIN ZHONGXIN CO.LTD	329	2001
245	BEIJING TIANTAN CO.LTD	161	1998
246	BEIJING SHUANGHE	62	1997
247	TIBET NUODIKANG	211	1999
248	HANGZHOU TIANMUSHAN	671	1993
249	ZHEJANG QIANJIANG	796	1997
250	ZHEJIANG HAIZHENG	267	2000

No.	Name	Code	Time listed
251	CHONGQING TAIJI	129	1997
252	HENAN TIANFANG	253	2000
253	HENAN TAILONG	222	1999
254	GUIZHOU YIBAI	594	2004
255	SHANGHAI MODERN	420	2004
256	WUHAN JIANMIN	976	2004
257	HUAFANG TEXTILE	273	2003
258	ZHENGJIANG HANGMIN	987	2004
259	SHANGHAI FUREN	781	1996
260	HAINAN XINGYE	259	2000
261	ZHONGYAN TEXTILE	763	1996
262	SHANGHAI ZHUZHI	555	1999
263	NINGBO SHANSHAN CO.LTD	884	1996
264	HUBEI XINGFA	141	1999
265	HUBEI KAILE NEW MATERIAL	260	2000
266	HUNAN HAILI	731	1996
267	HUNAN LIUYANG HUAPAO	599	2001
268	ZHOUZHOU TIME NEW MATERIAL	458	2002
269	LIAOYUAN DEHENG	699	1993
270	NANTONG	389	2001
271	JIANGSU YANNONG	486	2002
272	JIANGSU CHENGXING	78	1997
273	JIANGSU ZHONGDA	74	1997
274	SINOPEC FIBER	871	1995
275	WUXI TAIJI	667	1993
276	JIANGXI CHANGJIU	228	1999
277	DAHUA GROUP	951	1997
278	TANGSHAN SANYOU	409	2003
279	SHANGHAI ZHONGKE	490	2003
280	ZHEJIANG LONGSHENG	352	2003
281	LINGYUN GONGYE	480	2003
282	NANJING FIBER	889	1996
283	JIANGSU JIANGNAN	527	2003
284	ANHUI LIUGUO	470	2004
285	ANHUI LEIMING	985	2004
286	JIANGSU SHENLONG	401	2003
287	GUANGZHOUJINFA	143	2004
288	ANHUI GUOTONG	444	2004
289	SHANGDONG HUALU	426	2002
290	WUHAN LINUO	885	1996
291	TIANYI	703	1996
292	NANNING HUAGONG	301	2000
293	YUNDA TECH.	181	1998
294	YUNNAN YUNWEI	725	1996
295	LIUZHOU HUAGONG	423	2003
296	JIANGSU SUOPU	746	1996
297	SHANGHAI TYRE	623	1992

No.	Name	Code	Time listed
298	ZHEJIANG NHU COMPANY LTD.	22001	2004
299	ZHEJIANG WEIXING INDUSTRIAL DEVELOPMENT CO.LTD	3	2004
300	CHONGQING HUABANG PHARM.CO.LTD	4	2004
301	ELEC-TECH INTERNATIONAL CO.LTD	5	2004
302	HUALAN BIOLOGICAL ENGINEERING INC.	7	2004
303	JIANGSU MIRACLE LOGISTICS SYSTEM ENGINEERING CO.LTD	9	2004
304	ZHEJIANG TRANSFAR CO.LTD	10	2004
305	ZHEJIANG DUNAN ARTIFICIAL ENVIRONMENTAL EQUIPMENT CO. LTD	11	2004
306	ZHEJIANG KAN SPECIALITIES MATERIAL CO.LTD	12	2004
307	HUBEI AVIATION PRECISION MACHINERY TECHNOLOGY CO.LTD	13	2004
308	HUANGSHAN NOVEL CO.LTD	14	2004
309	XIAKE COLOR SPINNING CO.LTD	15	2004
310	GUANGDONG WELL MEDICINE S&T CO.LTD	16	2004
311	EASTCOMPEACE SMART CARD CO.LTD	17	2004
312	ANHUI HUAXING CHEMICAL INDUSTRY	18	2004
313	ZHENGJIANG HANGZHOU XINFU PHAR. CO.LTD	19	2004
314	ZHENGJIANG JINGXIN PHAR. CO.LTD	20	2004
315	ZOJE SEWINGMACHINE CO.LTD	21	2004
316	SHANGHAI KEHUA BIO-ENGINEERING CO.LTD	22	2004
317	GUIZHOU SPACE APPLIANCE CO.LTD	25	2004
318	SHANDONG WEIDA MACHINERY CO.LTD	26	2004
319	SHANGHAI SIYUAN ELECTRIC CO.LTD	28	2004
320	FUJIAN SEPTWOLVES INDUSTRY CO.LTD	29	2004
321	DAAN GENE CO.LTD	30	2004
322	GUANGDONG GRETOO MOLDS INC.	31	2004
323	ZHEJIANG SUPOR COOKWARE CO.LTD	32	2004
324	ZHEJIANG MIZUDA PRINTING&DYEING GROUP CO.LTD	34	2004
325	ZHONGSHAN VANTAGE GAS APPLIANCE STOCK CO.LTD	35	2004
326	NINGBO YAK TECHNOLOGY INDUSTRIAL CO.LTD	36	2004
327	GUIZHOU JIULIAN INDUSTRIAL EXPLOSIVE MATERIAL DEVELOPMENT C	37	2004
328	BEIJING SL PHARMECEUTICAL CO.LTD	38	2004
329	ANHUIFEIYA TEXTILE CO.LTD	42	2005
330	DEHUA TB NEW DECORATION MATERIAL CO.LTD	43	2005
331	JIANGSU SANYOU GROUP CO.LTD	44	2005
332	GUOGUANG ELECTRIC CO.LTD	45	2005
333	LUOYANG BEARING SCIENCE&TECHNOLOGY CO.LTD	46	2005
334	NONGBO HUAXIANG ELECTRONIC CO.LTD	48	2005
335	TANGSHAN JINGYUAN YUFENG ELECTRONICS CO.LTD	49	2005
336	ZHEJIANG SANHUA CO.LTD	50	2005