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重要決定因素

Capital structure of Chinese listed companies after the 2008 financial
crisis: Reliably important determinants of financial leverage

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Abstract

The paper examines the determinants of capital structure among Chinese listed companies between the years of 2009 and 2014. Many of the researches conducted in the past returned inconsistent results regarding the variables that can be used for prediction of leverage. This research is testing if after the financial crisis of 2008 Chinese companies have changed their financial behavior and if the variables that were identified as reliably important determinants of financial leverage before 2009 are still valid. The variables used cover internal firm characteristics and external economic contexts, including: profitability, asset tangibility, asset growth, firm size, largest shareholding, industry median leverage, state control dummy, PMI, quarterly exports, foreign direct investment, domestic retail sales of consumer goods and money supply. The research finds that the companies have quite considerably changed their leverage levels compared to the earlier years and some leverage determinants changed in their significance. In addition, the results differ depending on which stock market, Shenzhen or Shanghai stock exchange, companies are listed.

Keywords: Capital structure, leverage, China, financial crisis, financial behavior, Shenzhen Stock Exchange, Shanghai Stock Exchange

Contents

- 1. Introduction 1
- 2. Literature review 4
 - 2.1. The trade-off and pecking-order theories 4
 - 2.2. Predictions 5
- 3. Data sample and model 15
 - 3.1. Data description 15
 - 3.2. Descriptive statistics and correlations 16
 - 3.3. Model and methodology 19
- 4. Results 21
 - 4.1. Linear regression 21
 - 4.2. Comparison of companies listed on Shenzhen and Shanghai Stock Exchanges 26
 - 4.3. Robustness test 30
- 5. Conclusions 32
- References 34



List of tables

- Table 1 Comparison of results in selected studies focusing on China. 6
- Table 2 Previous researches and the capital structure theories..... 13
- Table 3 Descriptive Statistics..... 16
- Table 4 Leverage by years. 17
- Table 5 Correlations..... 18
- Table 6 Results of univariate regressions of leverage..... 21
- Table 7 Comparison of linear regression results for different models. 23
- Table 8 Models of the stepwise regression. 25
- Table 9 Comparison of variables for companies listed on different stock markets..... 27
- Table 10 Comparison of models for Shenzhen data set..... 28
- Table 11 Comparison of models for Shanghai data set..... 29
- Table 12 Robustness test - R² by year..... 31
- Table 13 Capital structure theories' predictions and research results..... 32



1. Introduction

Capital structure is an important part of every firm's strategy and planning, as it is crucial for them to keep the right level of financial leverage in order to grow at competitive speed without putting too much distress on its finance. It has been the topic of many researches during the last few decades, when many researchers tried to find out what drives companies to decide how much money to borrow, but the results regarding the determining factors often varied quite significantly. Some of the initial papers in the United States of America, like the empirical study by Titman & Wessels (1988) and the survey by Harris & Raviv (1991) would state opposite results. Because of that, many studies followed in trying to find the reliably important factors in the US and other countries. One of the most recent researches by Frank & Goyal (2009) examined the factors used in various previous researches using the Bayesian information criterion (BIC) and basing on the data of publicly traded firms in the US between years 1950 and 2003 checked the results over time, in the end finding six reliably important factors: Industry median leverage, assets tangibility, profitability, firm size, market-to-book assets ratio and expected inflation. Studies in different countries have found that the factors reliable in the US are also important in other developed (Rajan & Zingales, 1995; Wald, 1999) and developing countries (Booth, Aivazian, Demirguc-Kunt, & Maksimovic, 2001; Demirgüç-Kunt & Maksimovic, 1999).

However, due to the uniqueness of the Chinese market and its environment, the studies above have all avoided including it in their studies. China differs from other countries in that it has relatively weak and ineffective laws regarding investor protection, accounting standards, quality of government, and corporate governance (Allen, Qian, &

Qian, 2005), high state influence and control in most of the industries and that the government controls the volume and price of equity issuance (Chang, Chen, & Liao, 2014). With its constantly growing economy and slowly opening to international companies market, the importance of the country in the world economy is increasing and thus determining the factors influencing capital structure decisions of Chinese companies is also becoming more important. Some studies focused specifically on China, but were again reaching different conclusions regarding the influence of some of the factors. Majority of researches agree when it comes to the positive influence on financial leverage of firm size and negative influence of profitability, but other determinants get mixed results. For example Li, Yue, & Zhao (2009) found that financial leverage decreases with asset tangibility, but according to many previous researches (Huang & Song, 2006; Qian, Tian, & Wirjanto, 2009; Zou & Xiao, 2006) it has positive relationship with leverage. A recent study by Chang et al. (2014), similarly to Frank & Goyal (2009) used the BIC to examine the available factors and identified profitability, industry median leverage, asset growth, asset tangibility, firm size, state control and the largest shareholding as the reliable determinants of capital structure in China. However, the sample used in the research was from years 1998 to 2009, which could prove to be a little bit outdated for a couple of reasons. First of all, most of the observations come from before the financial crisis of 2007-2008, which had a big impact on the markets around the world and influenced the ease with which companies can lend money. That could lead companies to use lower levels of financial leverage. Furthermore, China is still going through a transformation and the institutional changes inside the country could have an effect on the firms as well. In particular, although there are still many state-owned enterprises and

some major banks are influenced by the government, the influence of state ownership might have dwindled, as the government is trying to create more capitalistic market.

This paper focuses on how the financial crisis along with the institutional changes influenced the Chinese listed companies. This research is not going to examine the vast amount of factors that were used in previous researches and usually found unreliable, but instead is going to base the research on the findings of the analysis done by Chang et al. (2014) and use the seven determinants which they found to be reliably important, with addition of a few macroeconomic factors that were not included in previous researches but might also help explain changes in financial leverage levels. Some of the questions that I am attempting to answer are: Did the companies change their financial behavior to adapt to the new reality after 2008? Are the factors that were identified as reliable determinants of financial leverage before the crisis still as reliable as before? If not, what has changed and what are the new factors that should be used?

The subsequent parts of the paper are organized as follows. Section 2 presents the related literature, reviews relevant theories and contains hypothesis predictions. In section 3 the data sample and research methodology are described. Section 4 discusses the research results, and section 5 presents the conclusions drawn from the research.

2. Literature review

There are a few capital structure theories, most of them are based on the Modigliani-Miller Theorem (Modigliani & Miller, 1958), which states that in a perfect market leverage does not influence the cost of capital and the way company is financed does not matter. However, the real market is not a perfect one and the imperfections make the capital structure relevant. Among the capital structure theories for the real market, probably the most popular two are the trade-off theory and pecking-order theory, which are now going to be introduced shortly in this chapter and followed by predictions on the explanatory variables. Both of the theories have supporters and critics arguing about their correctness, but because it is not the main issue of this paper, for more throughout review and comparison of the theories one may refer to (Frank & Goyal, 2008).

2.1. The trade-off and pecking-order theories

The trade-off theory states that when company is choosing how to finance its operations, it seeks to balance the costs and benefits of debt. The theory in its original version was developed by Kraus & Litzenberger (1973), who considered the tax saving benefits of debt, as the interest costs are tax-deductible and the dead-weight bankruptcy cost. Others proposed to include different factors like agency costs and transaction costs. Myers (1984) states that a company that wants to follow the trade-off theory should set a debt-to-value target that is determined by the balance of debt benefit and bankruptcy costs and then slowly move towards it. However, the tax laws are more complicated than it assumes and the potential bankruptcy and agency costs are not very clearly defined, which makes it difficult in practice to calculate what is the perfect ratio (Frank & Goyal, 2008).

The pecking-order theory is based on the works of Donaldson (1961) and later modified and formulated by Myers & Majluf (1984). It has its source in the information asymmetry - that is the managers knowing more about the situation of a firm than their potential investors. According to it, a firm should have preference for financing with retained earnings over financing with debt, and only issue new equity to finance its operations as a last resort. The reasoning behind it is that investors do not have full information and must rely on many noisy signals to judge the condition of a firm and the risk of its returns. If a company is using internal financing or financing through debt, it gives the investors signal that the firm is in a good condition and that its management is confident about meeting the obligations related to the debt. On the other hand, if a company issues new equity, it gives a signal of distress which may lower the share price. Normally management should not want to bring new external ownership and doing so might mean that the management thinks the company's stock is over-valued.

2.2. Predictions

Profitability. Return on assets is going to be used as the measure for this factor. The two theories presented above have opposite predictions regarding this variable. According to the trade-off theory, as companies become more profitable, they are going to want to borrow more money in order to shield them from tax. In addition, higher profitability results in higher free cash flows and increasing the leverage could help to keep a grasp on the management and tackle the agency costs (Jensen, 1986). However, the prediction of trade-off theory does not seem to be correct in majority of studies and a new dynamic trade-off model predicts negative relationship of profitability and leverage (Strebulaev, 2007).

The pecking-order theory predicts that profitability has negative influence on the leverage, as with increased profitability the firm is going to have more internal funds to spend on its investments.

As can be seen in Table 1 almost all of the previous researches on capital structure of Chinese companies report negative relationship between the two attributes, and often a lot more significantly than in other countries. This is because of the difficulties that

Table 1 Comparison of results in selected studies focusing on China.

	Profitability	Assets tangibility	Firm size	Growth opportunities	Industry median leverage	State control
(Chen, 2004)	ROA (-)	(+)	Assets (+)	Asset growth (+)		
(Tong & Green, 2005)	ROA (-)		Invested capital (+)	Asset growth (+)		
(Huang & Song, 2006)	ROA (-)	(+)	Sales (+)	Tobin's Q (+)	Industry dummies	State ownership
(Zou & Xiao, 2006)	ROA (-)	(+)	Assets (+)	Market to Book ratio (-)		State ownership
(Bhabra, Liu, & Tirtiroglu, 2008)	ROA (-)	(+)	Assets (+)	Tobin's Q (-)	Industry dummies	State ownership
(Qian et al., 2009)	ROA (-)	(+)	Sales (+)	Sales growth	Industry dummies	State ownership (+)
(Li et al., 2009)	ROA (-)	(-)	Sales (+)		Industry median lev. (+)	State ownership (+)
(Chang et al., 2014)	ROA (-)	(+)	Natural log of assets (+)	Asset growth (+)	Industry median lev. (+)	State control dummy (-)

Source: The table was modified from (Chang et al., 2014).

Ps. (+) and (-) indicate positive and negative relationship, no sign means there is no significant relationship.

Chinese listed companies face when trying to raise external funds, whether it is in the form of debt or equity, making the retained earnings much more important to the firms in China than to those in the United States. Furthermore, the China Securities Regulatory Commission requires companies to be highly profitable for a period of time before being able to issue new equity, causing profitability to have even more negative influence on the leverage (Chang et al., 2014).

Assets tangibility. Asset tangibility increases company's credibility, because the tangible portion of assets can be used as a collateral by the lender and as a result reduce his risk. Also in case of bankruptcy, tangible assets are easier to value and liquidate than intangible assets, effectively reducing the bankruptcy costs (Jensen & Meckling, 1976). According to the trade-off theory this should have positive effect on the leverage, as the balance between tax reduction and financial distress is moved higher.

Under the assumptions of pecking-order theory, the prediction is opposite, as higher assets tangibility reduces the information asymmetry and makes issuance of new equity cheaper and debt less preferable.

Although some researches regarding non-listed companies get results showing negative relation between the variables (Li et al., 2009), majority of previous researches focusing on listed companies in China show positive relationship, as can be seen in Table 1 .

Firm size. Firm size influences the capital structure of companies in several ways. First of all, bigger firms usually have considerably lower risk of bankruptcy and higher resistance to market volatility. In addition, bigger firms are often able to access outside funding at lower costs than their smaller competitors and are overall more likely to

diversify the sources of their financing. According to the trade-off theory, these points should result in positive relationship between firm size and leverage. On the other hand, it is believed that small and large firms have different levels of information asymmetry, as the larger firms have usually been around for longer time and are better known, and sometimes are subject to higher scrutiny (Kurshev & Strebulaev, 2007). Because of that, the pecking-order theory suggests negative relationship between the variables, as firms can access equity cheaper.

Previous researches in China and other countries are generally consistent and report firm size to be positively related to firm's leverage.

Assets growth. Asset growth is a proxy variable for growth opportunities. It is not as popular as market to book asset ratio proxy, but because of the frequent mispricing existent in the Chinese stock markets, it does appear to be a better variable in China (Chang et al., 2014). Firms with higher growth opportunity often face bigger financial distress and less of free cash-flow problem. Following the trade-off theory this should move the target leverage to lower levels, as the company should want to reduce the distress and does not need to worry about agency costs as much. However, in the years before the financial crisis of 2008, many of Chinese listed companies having a considerable amount of shares in possession of government were enjoying borrowing privileges from Chinese banks (Qian et al., 2009). In addition, because of equity issuing restrictions specific to China, companies with growth opportunities might be forced to use debt in higher levels, as they are not able to raise enough financing through retained profits and equity (Chang et al., 2014). This means that growth opportunities might have much lower influence on leverage in China than in other countries.

The pecking-order theory suggests positive influence of growth opportunities on leverage, as retained earnings and debt should be the prime source for financing company's investments. However, this assumes that profitability of the firm is held at constant level (Frank & Goyal, 2008). As shown in Table 1, previous researches in Chinese market returned inconsistent results regarding the influence between growth opportunity and leverage.

Industry median leverage. There is no doubt that the level of leverage across different industries varies and the industry median leverage has been found to be one of the most important determinants of companies' financial leverage in many researches (Bowen, Daley, & Huber, 1982; Lemmon, Roberts, & Zender, 2008; MacKay & Phillips, 2005). In the studies focusing on China, only Li et al. (2009) and Chang et al. (2014) included the variable, although in their results the significance was a little lower than for example in Frank & Goyal (2009) research on US firms, where it was explaining the most variance of the factors included, both of them still found it to be one of the most important factors in predicting the capital structure.

State control dummy. State control dummy is a variable that is almost exclusive to Chinese market. Papers researching capital structure and the factors influencing it in US, developed and developing countries do not include it, because in most of the countries state controlled enterprises either do not exist or account for a fraction of the markets. In China, although the percent of state owned enterprises (SOEs) is decreasing, the change is very slow and SOEs still constitute a major part of the market and are present in virtually every industry. SOEs enjoy some benefits not available for private enterprises, as many financial institutions are also state controlled and allow for lending of money to

SOEs on privileged conditions and financial help in case of distress, suggesting that these companies should have higher level of leverage. On the contrast, because of unfair treatment they also might find it easier than privately owned enterprises to raise equity, which could result in negative influence on the leverage.

For the reasons mentioned above, state control is included in almost every research focusing on capital structure of Chinese companies, but the results are rather inconsistent. Li et al. (2009) and Qian et al. (2009) found that a positive relationship between state ownership and leverage exists. Huang & Song (2006); Zou & Xiao (2006) and Bhabra et al. (2008) find state ownership to be neutral on leverage, while Chang et al. (2014) and Firth, Lin, & Wong (2008) even found negative relationship between the two.

Largest shareholding. The percentage of total company shares held by the top shareholder. This variable similarly to state control dummy is rather specific for China. The weak rights of investors in Chinese market and the sparingly effective law enforcement induces the controlling shareholders to thinking that as long as they keep the control, new equity is a form of financing that does not bind them to anything. That would suggest that they might prefer equity to debt. The higher the percentage of shares held by the largest shareholder, the lower the risk that he loses control during dilution, so if the above assumptions are correct, then the largest shareholding should be negatively related with leverage. The variable was included and found to have significantly negative relationship by Chang et al. (2014).

Macroeconomic factors. Many different macroeconomic factors have been included in previous researches, but other than inflation being a reliable determinant in the USA

(Frank & Goyal, 2009), all of them seem to be unimportant when determining the capital structure of company. Chang et al. (2014) used three macroeconomic variables in his research focusing on China: inflation, GDP growth and the growth rate of overall after-tax profits of industrial firms, but found all of them to be insignificant. In this research I am going to include five macroeconomic factors that have not been used in previous papers and check for their importance.

First one of them is the amount of *Quarterly Exports* in whole China. Many argue that the economic growth in China in the past few decades was highly driven by foreign trade, thus the export could be a good indicator of economic developments (Cui, 2007). A bigger than usual increase in exports might be signaling growing demand and growth opportunities, driving companies to quickly borrow more money in order to finance new investments and get the most of this opportunity. On the other hand, if exports decrease it is likely that global economy is slowing down and the demand is decreasing, so companies might want to resign from some riskier investments and reduce the debt. That suggests that the growth in quarterly exports should be positively related with financial leverage.

Another factor is the *Foreign Direct Investment (FDI)*. There have been many researches done that found FDI-export linkage to exist, and it seems to be particularly major in China (Zhang, 2015). A big part of Chinese exports constitutes of exports by companies that were created by foreign investments, but the FDI also has positive effect on the exports of domestic companies. The foreign companies are usually more experienced at exporting, but because the domestic companies can mimic their behavior, their presence reduces the export costs for local companies in the same industries, making exporting more attractive and increasing its volume (Sun, 2012). For

these reasons, if a correlation between FDI and the level of financial leverage used by Chinese companies exists, it is likely to have a positive relation.

Next factor is *Domestic Retail Sales of Consumer Goods (DRSoCG)*. The variable similarly to Quarterly Exports can be considered an indicator of the demand levels, but a few important differences between the two exist. First of all, as the name suggests DRSoCG takes into account only sales within China. Furthermore, it only includes non-production and non-business physical commodity sold to individuals and social institutions, and revenue from providing catering services. Individuals include rural and urban households, population from abroad, while social institutions include government agencies, social organizations, military units, schools, institutions, neighborhood (village) committees. Predictions are then the same as in case of Quarterly Exports, of positive relationship between DRSoCG and leverage, but this variable will show if companies adjust their capital structure in reaction to domestic demand changes.

The fourth of the macroeconomic factors included is *money supply*. This variable could be considered a proxy variable for inflation. Usually when money supply grows or shrinks, the prices react in the same way. According to the trade-off theory, if money supply grows companies should want to borrow more money, as the tax-shielding is higher when inflation levels are high (Robert A. Taggart, 1985). On the other hand, when money supply is increased for example due to quantitative easing implementation by government, the money is often pumped into stocks, increasing the market value of companies' shares and making it more attractive for them to issue new equity, which in turn would lower the financial leverage levels within them.

And the last variable included is manufacturing *Purchasing Managers' Index (PMI)*. The PMI level is based on a survey of purchasing managers within manufacturing

companies, whom are asked questions about the companies' outlook compared to previous years. The fields they are asked about are production level, new orders from customers, speed of supplier deliveries, inventories, order backlogs and employment level. This is also an indicator that might suggest growing or declining demand and increasing or decreasing growth opportunities for companies, but coming from within the manufactures, rather than their customers. It might be based on some data and knowledge that is available to the managers, but not openly available to the people from outside of the company and it also might include some predictions of the future, rather than being based purely on the past data like Quarterly Exports and DRSoCG. Although also predicted to have positive relationship with the financial leverage, for the reasons above it is likely to have different level of significance than Quarterly Exports or DRSoCG.

Table 2 Previous researches and the capital structure theories.

	Profitability	Assets tangibility	Firm size	Growth opportunities
(Chen, 2004)	Pecking-order	Trade-off	Trade-off	Pecking-order
(Tong & Green, 2005)	Pecking-order		Trade-off	Pecking-order
(Huang & Song, 2006)	Pecking-order	Trade-off	Trade-off	Pecking-order
(Zou & Xiao, 2006)	Pecking-order	Trade-off	Trade-off	Trade-off
(Bhabra et al., 2008)	Pecking-order	Trade-off	Trade-off	Trade-off
(Qian et al., 2009)	Pecking-order	Trade-off	Trade-off	
(Li et al., 2009)	Pecking-order	Pecking Order	Trade-off	
(Chang et al., 2014)	Pecking-order	Trade-off	Trade-off	Pecking-order

Table 2 summarizes which theory supports results of the previous researches in China. However, as can be seen, none of the researches is fully supported by any of the theories. The trade-off theory is often criticized for its prediction of negative relationship between profitability and the leverage, which is the main reason it is often rejected (Strebulaev, 2007). Perhaps one of the updated dynamic trade-off theory models, which says companies with higher profitability face less financial distress and can borrow more money would be a better suit for the Chinese market and make it appear dominant over the pecking-order theory. However, even then only two of the researches would find consensus regarding the theory that Chinese companies follow when choosing financial leverage levels, which shows that Chinese market is indeed quite unique and what works in other countries, does not necessarily apply to China.



3. Data sample and model

3.1. Data description

This research is based on the data of companies listed on the Shanghai Stock Exchange and Shenzhen Stock Exchange main boards (SME and ChiNext growth stocks excluded) between March 31, 2009 and December, 31 2014, with the exclusion of financial firms. All the firm related data is obtained from China Stock Market and Accounting Research (CSMAR), while the macroeconomic data comes from National Bureau of Statistics of China (NBS). Industry classification by China Securities Regulatory Commission (CSRC) from 1999 is being used, despite the existence of newer classification guidelines from 2012. The reason for this is in excessive number of industry groups in the new guidelines, resulting in serious underrepresentation in some industries (often less than 5 companies) and thus incorrectly affecting the industry median leverage, which is one of the independent factors.

Originally the sample included 31,196 quarterly observations, but some observations containing missing or clearly erogenous data had to be removed and a further requirement of total assets value of at least RMB 50 million was incorporated, removing in total 196 observations. Further, in order to manage the outliers, the six-sigma principle is used on profitability, asset tangibility, asset growth and leverage, removing the observations that lie outside of $\text{mean} \pm 3\sigma$ and leaving the final sample consisting of 30,608 observations.

Some of the variables did not have readily available data and had to be calculated based on the data from balance sheets and income statements. The data reported at the end of each period was used and the variables were calculated as follows:

- *Leverage = Total debt / book value of total assets.*
- *Profitability = Operating income / total assets.*
- *Industry Median leverage = Median of book leverage (total debt / total assets) by industry and quarter of the year.*
- *Asset tangibility = Fixed assets / total assets.*
- *Asset growth = Difference in assets between the current and previous quarter / assets previous quarter.*
- *Firm size = Natural log of total assets at the end of quarter.*
- *Largest shareholding = Shares held by the largest shareholder / Total shares.*
- *State control dummy = if shares controlled by the state > 50% then = 1, otherwise = 0*
- *PMI = Average of the PMI for the last three months.*

3.2. Descriptive statistics and correlations

Table 3 Descriptive Statistics.

	N	Minimum	Maximum	Mean	Std. Deviation
Leverage	30926	.000	.771	.202	.157
Profitability	30926	-.185	.223	.021	.042
Asset Tangibility	30926	.000	.821	.249	.185
Asset Growth	30809	-.972	3.293	.036	.146
Firm Size	30926	17.728	28.517	22.150	1.424
Largest Shareholder	30717	2.197	99.000	36.268	16.298
State Control dummy	30884	.000	1.000	.063	.243
Ind. Med. Leverage	30926	.087	.232	.159	.034
PMI	30926	48.900	55.670	51.694	1.692
Quarterly Exports	30926	2456.170	6460.430	4719.531	1076.171
FDI	30926	20757.000	32207.000	27548.032	3592.508
DRSoCG	30926	29313.200	73243.300	48732.144	12081.746
Money Supply	30926	530626.710	1228374.810	880104.704	217078.445
Valid N (listwise)	30608				

Table 3 shows some basic descriptive statistics. As can be seen, the mean leverage is 0.202, considerably lower than the 0.272 reported for Chinese listed companies before 2009 by Chang et al. (2014). This alone indicates that Chinese listed companies indeed reduced their debt quite significantly after the financial crisis of 2008. The mean asset growth is also much lower than before the crisis, with 0.036 compared to 0.14. On the other hand, profitability stayed at similar level with 0.021 compared to 0.027. The mean number of shares held by the largest shareholder is 36.3% compared to 40.3% before, which means the ownership of Chinese listed companies is becoming more spread out. It is also important to note that only 6.29% of observations in the sample is SOEs, in contrast to the majority of the sample used by Chang et al. (2014) being SOEs. However, even in the private companies the state often has a considerable amount of shares and still can influence operations of the firm. The mean PMI during the period researched is 51.69, indicating that overall managers were slightly positive about the outlook of their companies during this time.

Table 4 presents the mean and median leverage of companies included in the research, separated for each year.

Table 4 Leverage by years.

Year		Mean	Median
Leverage	2009	.22227	.21195
	2010	.21277	.19761
	2011	.20210	.18178
	2012	.19773	.18205
	2013	.19237	.17435
	2014	.18757	.17359

A very clear trend of decreasing financial leverage can be seen, as the mean was decreasing considerably during each of the years included, especially in 2010 and 2011. The median at first decreased even more violently, but in 2012 increased slightly before continuing to fall. This suggests that the capital structure of Chinese listed companies has indeed changed quite significantly in the years after the financial crisis of 2008.

Table 5 presents the correlations between leverage and the other variables included in the research and their significance. There is a positive and significant at the 0.01 level correlation between leverage and asset tangibility, firm size, largest shareholder and PMI. Negative correlation exists between leverage and profitability, quarterly exports, FDI, DRSoCG and money supply at the 0.01 level of significance. No significant correlation is found between leverage and asset growth or state control dummy. These results partly differ from those reported before 2009, where asset growth, largest shareholder and state control dummy all had significant (at the level of 0.01) negative correlation with leverage.

3.3. Model and methodology

To analyze the influence of the selected variables on financial leverage of the companies the following linear regression model is going to be used in chapter 4:

$$Lev = \alpha + \beta Prof + \gamma AT + \delta AG + \theta FS + \mu LS + \pi SOE + \rho PMI + \sigma QE + \tau FDI + \varphi DRsoCG + \omega MS + \varepsilon$$

Where Lev – Leverage, α - a constant, β , γ , δ , θ , μ , π , ρ , σ , τ , ϕ and ω are the coefficients, Prof – profitability, AT – asset tangibility, AG – asset growth, FS – firm size, LS – largest shareholder, SOE – state control dummy, PMI – purchasing managers' index,

QE – quarterly exports, FDI – foreign direct investment, DRSoCG – domestic retail sales of consumer goods, MS – money supply and ε – error term.

As could be seen from the descriptive statistics, the mean leverage considerably decreased during the period researched. This raises questions regarding the reason for such decrease. For example: Have the determinants that were found to be reliably important before changed within the companies enough to account for the change in leverage? Or maybe the determinants have not changed by a lot and the source of the change in leverage is not included in the regression model? Finally, maybe factors that were initially thought to be reliably important became unimportant or their relationship with leverage changed? By checking how much of the variance in leverage the above factors can explain, it should be possible to answer these and some more questions.

In addition to the main analysis, separate regressions are going to be run for the companies listed on two separate stock markets (Shenzhen Stock Exchange and Shanghai Stock Exchange) in order to check for possible differences in financing behaviors between firms that choose each of the exchanges. Both of the markets are among the largest in the world (Shenzhen the 8th largest and Shanghai the 4th largest as of January 31st 2015), but the characteristics of firms listed on those differ. Shenzhen composite index consists mostly of technology, consumer goods, and health-care companies, while Shanghai hosts mainly big industrial companies and state-backed banks. As financial institutions, SMEs, and growth stocks are excluded from the data set of this research these differences should be reduced considerably, but still might prove to be quite significant.

4. Results

4.1. Linear regression

First, a univariate regression of leverage is conducted to see the own R^2 of each variable and the results are presented in Table 6. It can be seen that profitability has the highest explanatory power of the variables included with R^2 of 0.081 and standardized coefficient of -0.284. Although profitability was also found to have the highest explanatory power in the research by Chang et al. (2014), the results are significantly different, as in their study profitability was found to have extremely high R^2 of 0.256 with a coefficient of -1.09. The effects of profitability on leverage found in this study are much

Table 6 Results of univariate regressions of leverage.

Variable	Standardized Coefficient	R^2	t-statistic
Profitability	-0.284	0.081	-52.086
Asset Tangibility	0.265	0.070	48.239
Firm Size	0.213	0.045	38.374
Ind. Med. Leverage	0.107	0.011	18.952
DRSoCG	-0.080	0.006	-14.076
Quarterly Exports	-0.078	0.006	-13.842
Money Supply	-0.076	0.006	-13.364
FDI	-0.058	0.003	-10.179
PMI	0.040	0.002	7.108
Largest Shareholder	0.014	0.000	2.476
Asset Growth	0.010	0.000	1.753
SOE	-0.008	0.000	-1.380

closer to those reported for developing countries by Fan, Titman, & Twite (2012), where the profitability coefficient equals -0.2268. The variable with second highest R^2 and coefficient is asset tangibility with R^2 of 0.07 and coefficient of 0.265 and it is followed by firm size with R^2 of 0.045 and coefficient of 0.213 and industry median leverage as the fourth variable with R^2 of 0.011 and coefficient of 0.107. These results are also quite different from the previous research focusing on China, where industry median leverage was the second most crucial variable with R^2 of 0.079 and coefficient of 0.716, followed by asset growth in the third place with R^2 of 0.007 and coefficient of 0.082. In this research, however, the R^2 of asset growth equals 0 and has the second smallest coefficient of 0.010, only higher than SOE. Both, SOE and the largest shareholder also have lower explanatory power than before. On the other hand, firm size seems to be much more important compared to before when its R^2 was 0.001 and coefficient 0.019. The remaining variables were not used before and relatively to the top three factors seem to have relatively small explanatory power, with R^2 ranging from 0.002 to 0.006.

Next, a few models comprising different groups of variables are going to be compared. The first of the models is going to use only firm-specific factors, the second one is going to use firm and industry-specific factors, the third model is going to include industry-specific and macroeconomic factors, the fourth one is going to include all of the factors and the fifth one is going to be developed by stepwise regression. The results of these linear regressions, including R^2 of each model and the coefficient and significance of each of the variables in each model, can be seen in the Table 7.

The first model includes profitability, firm size, asset tangibility, asset growth, state control dummy and the largest shareholding as the independent variables and has R^2 of 0.199, meaning the model including only these variables explains around 19.9% of the

variation within leverage. All of the variables are significant at the 0.01 level, but the three variables with by far the highest standardized coefficients are profitability with -.304, firm size with .267 and asset tangibility with .219, followed by largest shareholding with only -.044, asset growth with .035 and state control dummy with -.020.

The second model, which only adds a single variable to the first model, industry median leverage, has R² higher by .021 and results in R² of .221. The industry median leverage itself has coefficient of .148, but adding the variable also affected the

Table 7 Comparison of linear regression results for different models.

	Model 1		Model 2		Model 3		Model 4		Model 5	
R²	0.200		0.221		0.013		0.227		0.227	
	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
Profitability	-.304	.000	-.293	.000	-	-	-.306	.000	-.306	.000
Firm Size	.267	.000	.268	.000	-	-	.278	.000	.278	.000
Asset Tang.	.219	.000	.249	.000	-	-	.243	.000	.243	.000
Asset Grwth	.035	.000	.035	.000	-	-	.034	.000	.034	.000
SOE	-.020	.000	-.025	.000	-	-	-.029	.000	-.029	.000
Lrgst. Shrhld	-.044	.000	-.043	.000	-	-	-.044	.000	-.044	.000
IndMedLev	-	-	.148	.000	.092	.000	.133	.000	.133	.000
DRSoCG	-	-	-	-	-.119	.000	-.047	.096	-	-
Money Sup.	-	-	-	-	.069	.013	-.138	.000	-.138	.000
PMI	-	-	-	-	-.011	.118	.001	.894	-	-
Qtr. Exports	-	-	-	-	.006	.676	.143	.000	.143	.000
FDI	-	-	-	-	.004	.545	.007	.315	-	-

coefficients of the firm specific factors, notably reducing the coefficient of profitability by .011 and increasing the coefficient of asset tangibility by .03 to .249.

The third model includes industry median leverage, domestic retail sales of consumer goods, money supply, PMI, quarterly exports and FDI as the independent variables and has R^2 of 0.013, explaining only around 1.3% of the variation within leverage. This already tells us that the firm-related factors are much more important when predicting the leverage levels, but the macroeconomic factors might still improve the predictions. In this model DRSoCG and industry median leverage are significant at the 0.01 level, money supply is significant at the 0.05 level and PMI, quarterly exports and FDI are insignificant. DRSoCG has a coefficient of -.119, industry median leverage of .092 and money supply of .069.

Model 4 includes all of the variables and its value of R^2 is 0.227 and thus explains around 22.7% of the variation within the leverage. This result is much lower than the explanatory power of 36% of the variation in leverage in the model using seven core factors in research basing on the data of Chinese listed companies from 1998 to 2009. The main reason for this is the big difference in explanatory power of profitability during that period and years 2009-2014. However, it is still higher than the R^2 reported in the research based on companies listed in the United States by Frank & Goyal (2009), where its value equaled 0.192. Profitability, asset tangibility and firm size are the three factors with the highest coefficient, same as in Model 1, but the coefficients are slightly different and the significance of the macroeconomic factors has changed. In this case DRSoCG, PMI and FDI are all insignificant and the rest of the factors is significant at the 0.01 level, including quarterly exports which was insignificant and money supply which was not significant on this level in Model 3. The coefficient of profitability is -.306, of firm

size .278 and asset tangibility .243, all slightly higher than in the first model. They are followed by three factors with coefficients of similar size: quarterly exports with .143, money supply with -.138 and industry median leverage with .133, the next highest coefficient is of DRSoCG, but it was found to be insignificant. The coefficients of the last three significant factors are -.044 for the largest shareholding, .034 for asset growth and -.029 for SOE. As it can be seen, money supply has negative coefficient, which suggests companies do not borrow more money during high inflation in order to shield their profits from tax and instead reduce the leverage levels. It looks like the potential to issue

Table 8 Models of the stepwise regression.

Model Summary ^j				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,283 ^a	,080	,080	,151100
2	,389 ^b	,151	,151	,145146
3	,443 ^c	,197	,196	,141211
4	,466 ^d	,217	,217	,139374
5	,469 ^e	,220	,219	,139179
6	,471 ^f	,222	,222	,138987
7	,474 ^g	,225	,224	,138731
8	,475 ^h	,226	,226	,138636
9	,476 ⁱ	,227	,226	,138569

- a. Model 1. Predictors: (Constant), Profitability
- b. Model 2. Predictors: (Constant), Profitability, FirmSize
- c. Model 3. Predictors: (Constant), Profitability, FirmSize, AssetTangibility
- d. Model 4. Predictors: (Constant), Profitability, FirmSize, AssetTangibility, IndMedLev
- e. Model 5. Predictors: (Constant), Profitability, FirmSize, AssetTangibility, IndMedLev, Largest Shareholder
- f. Model 6. Predictors: (Constant), Profitability, FirmSize, AssetTangibility, IndMedLev, Largest Shareholder, Money Supply
- g. Model 7. Predictors: (Constant), Profitability, FirmSize, AssetTangibility, IndMedLev, Largest Shareholder, Money Supply, Quaterly Exports
- h. Model 8. Predictors: (Constant), Profitability, FirmSize, AssetTangibility, IndMedLev, Largest Shareholder, Money Supply, Quaterly Exports, AsstGrwth
- i. Model 9. Predictors: (Constant), Profitability, FirmSize, AssetTangibility, IndMedLev, Largest Shareholder, Money Supply, Quaterly Exports, AsstGrwth, State Control dummy
- j. Dependent Variable: Leverage

equity at higher share price that comes with increased money supply pumped into companies' stocks outweighs the potential benefits of bigger tax shield.

Model 5 used stepwise regression, a method in which variables are being added one by one and the regression is being rerun on every step to check if there is a significant change to the model. If the next variable added to the model does not improve the model significantly, then the variable is excluded from the model in order to avoid overfitting. It can be seen that the results are the same as those for Model 4, but DRSoCG, FDI and PMI were not included at all in the final model, which further proves that these factors do not improve the regression model in any way, even though DRSoCG had the highest explanatory power when used in Model 3 which included only the macroeconomic and industry factors. The results for models created at each step of the stepwise regression can be seen in Table 8. It can be easily shown that as more factors are added, the marginal contribution to R^2 is diminishing, as the model with three factors explains 19.7% of variation within leverage, while adding the next six factors adds only 2.3% of explanatory power.

4.2. Comparison of companies listed on Shenzhen and Shanghai Stock Exchanges

After having assessed how each of the variables affects the financial leverage of Chinese listed companies and finding out the explanatory powers of different models, the next step is to compare the results of two separate analysis done for two sub-samples – the companies listed on Shenzhen Stock Exchange and the companies listed on Shanghai Stock Exchange. The data contains 10,485 quarterly observations of companies listed on Shenzhen Stock Exchange and 20,441 quarterly observations of companies

listed on Shanghai Stock Exchange. First, in Table 9 are compared the descriptive statistics of the two data sets for the firm-level variables (as the macroeconomic data used was on national level). It can be seen that differences between the levels of each variable are rather small and that the companies listed on Shenzhen Main Board have on average lower financial leverage than those listed in Shanghai by 0.2%. These companies on average are also slightly less profitable, have slightly lower level of tangible assets, slower assets growth, are overall smaller firms and have lower percentage of shares held by the largest shareholder than their counterparts in Shanghai.

Next the five models used for the full data sample including companies from both exchanges are going to be used for each of the data sets and be compared, starting with Shenzhen first. As can be seen in Table 10, the first model including just the six firm specific factors has higher explanatory power than in case of full data sample, and with R^2 of .255 compared to .199 the difference is quite significant. Adding industry median leverage variable in this case also increases the explanatory power significantly, although not by as much as in case of the whole data set. The model consisting of only macroeconomic and industry factors has even lower explanatory power than for the full

Table 9 Comparison of variables for companies listed on different stock markets.

	Shenzhen		Shanghai	
	Mean	Std. Deviation	Mean	Std. Deviation
Leverage	.201	.161	.203	.155
Profitability	.020	.043	.022	.041
Asset Tangibility	.246	.185	.250	.185
Asset Growth	.034	.148	.037	.145
Firm Size	21.944	1.382	22.252	1.436
Largest Shareholder	34.023	15.796	37.372	16.406
State Control dummy	.062	.241	.062	.242
Ind. Med. Lev.	.162	.033	.158	.034

data sample, with R^2 of only 0.008 down from 0.013. The full model's R^2 is up to .275 from .227 and the stepwise regressions returns the same R^2 as Model 4, while again excluding DRSoCG, PMI and FDI and slightly altering the coefficients and significance of other variables as a result, with the biggest change to Money Supply, which had its coefficient jump from -.098 to -.154 and became significant at the 0.01 level. Overall, it is interesting to note that in case of Shenzhen companies, the coefficient of firm size increased considerably and within every model is the most important predictor of

Table 10 Comparison of models for Shenzhen data set.

	Model 1		Model 2		Model 3		Model 4		Model 5	
R^2	0.255		0.269		0.008		0.275		0.275	
	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
Profitability	-.295	.000	-.287	.000	-	-	-.298	.000	-.299	.000
Firm Size	.326	.000	.323	.000	-	-	.338	.000	.338	.000
Asset Tang.	.247	.000	.273	.000	-	-	.263	.000	.263	.000
Asset Grwth	.021	.016	.022	.010	-	-	.021	.014	.021	.014
SOE	-.044	.000	-.047	.000	-	-	-.051	.000	-.051	.000
Lrgst. Shrhld	.060	.000	.060	.000	-	-	.058	.000	.059	.000
IndMedLev	-	-	.121	.000	.058	.000	.092	.000	.092	.000
DRSoCG	-	-	-	-	-.143	.009	-.069	.143	-	-
Money Sup.	-	-	-	-	.106	.029	-.098	.020	-.154	.000
PMI	-	-	-	-	.001	.178	.000	.982	-	-
Qtr. Exports	-	-	-	-	-.003	.896	.109	.000	.093	.000
FDI	-	-	-	-	-.006	.629	-.004	.683	-	-

leverage instead of profitability as in the full sample. The increase in explanatory power seems to come mostly from firm size and asset tangibility, with SOE, largest shareholding and money supply also contributing, while asset growth and industry median leverage seem to have less of influence on the financial leverage than in case of the full data set.

Table 11 presents the results for each of the models used with data sample consisting of data of companies listed in Shanghai. We can see that the Model 1 is having much

Table 11 Comparison of models for Shanghai data set.

	Model 1		Model 2		Model 3		Model 4		Model 5	
R²	0.186		0.210		0.017		0.216		0.216	
	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
Profitability	-.310	.000	-.298	.000	-	-	-.313	.000	-.313	.000
Firm Size	.242	.000	.246	.000	-	-	.254	.000	.254	.000
Asset Tang.	.204	.000	.235	.000	-	-	.229	.000	.229	.000
Asset Grwth	.039	.000	.039	.000	-	-	.037	.000	.037	.000
SOE	-.008	.229	-.014	.031	-	-	-.020	.003	-.020	.003
Lrgst. Shrhld	-.093	.000	-.092	.000	-	-	-.092	.000	-.092	.000
IndMedLev	-	-	.159	.000	.111	.000	.148	.000	.146	.000
DRSoCG	-	-	-	-	-.107	.005	-.029	.403	-	-
Money Sup.	-	-	-	-	.051	.131	-.165	.000	-.184	.000
PMI	-	-	-	-	-.008	.355	.003	.702	-	-
Qtr. Exports	-	-	-	-	-.012	.616	.159	.000	.153	.000
FDI	-	-	-	-	.010	.271	.011	.190	-	-

lower than in case of Shenzhen R^2 of only 0.186 and that firm size, asset tangibility and state ownership all have considerably lower coefficients, while profitability, asset growth and largest shareholder have some increase. In addition, state control dummy is found to be an insignificant factor in this case. Adding the industry median leverage increases the R^2 by 0.024 and also causes the SOE to be significant at 0.05 level. The R^2 of Model 3 increased to 0.017 in this case, but it is still a very weak explanatory power and only DRSoCG and industry median leverage are found to be statistically significant with coefficients of -.107 and .111 respectively. The full model has R^2 of 0.216, meaning that the model developed in this paper is significantly weaker at predicting the leverage of companies listed in Shanghai than those listed in Shenzhen. As in previous cases, DRSoCG, PMI and FDI are again found to be insignificant and are removed in the stepwise regression, which results with the same R^2 of the model and only small changes in the coefficients of some of the variables.

Following these findings, I have tried including Stock Market Dummy as another variable within the models predicting leverage for the whole data set, however it was found insignificant and did not improve the models in any way.

4.3. Robustness test

After evaluating the five models and the predicting factors, a robustness test is going to be done in this section. In order to do this, I am going to use two models: Model 2, including the firm and industry specific factors, and Model 4, including all of the variables and perform linear regression separate for each of the six years included in the research and compare the results. The results are similar across all of the years, with relatively minor changes in coefficients of every variable in both models. However, in both cases

SOE dummy is only significant for years 2009 and 2010 and insignificant for the remaining years. The differences in R^2 are fairly small in both models, ranging from 0.199 to 0.238 for Model 2 and from 0.201 to 0.239 for Model 4, indicating that the models are quite robust.

The R^2 of both models during each of the years is presented Table 12.

Table 12 Robustness test - R^2 by year.

Year	R^2 of Model 2	R^2 of Model 4
2009	.199	.201
2010	.232	.235
2011	.224	.227
2012	.231	.232
2013	.217	.219
2014	.238	.239

5. Conclusions

This paper investigated the capital structure and its determinants within Chinese companies listed on Shanghai and Shenzhen stock exchanges after the financial crisis of 2008 – between the year 2009 and 2014. It found that Chinese listed companies have decreased the leverage levels in these years, and although the determinants that were identified as reliably important before the crisis are still significant, their explanatory power has changed quite considerably.

According to the research nine of the factors used are helpful in determining the financial leverage levels: profitability, firm size, asset tangibility, quarterly exports, money supply, industry median leverage, largest shareholding, asset growth and state ownership. Of these, although profitability is still the most important one, its explanatory power seems to have decreased the most after the crisis. The firm-specific factors remain crucial when predicting the levels of leverage, but some macroeconomic factors can contribute to a better model slightly.

Following the results of the research, it appears that Chinese listed companies do not follow any of the two capital structures introduced in Section 2, as profitability and asset growth have the effect on leverage predicted by the Pecking-order theory, while asset

Table 13 *Capital structure theories' predictions and research results.*

	The trade-off theory	Pecking order theory	Research result
Profitability	Positive	Negative	Negative
Firm Size	Positive	Negative	Positive
Assets tangibility	Positive	Negative	Positive
Assets growth	Negative	Positive	Positive

tangibility and firm size have its effect predicted correctly by the Trade-off theory. As mentioned in Section 2, some dynamic trade-off theory models predict positive relationship with the leverage and would fit Chinese market better, while assets growth has positive relationship likely due to the equity issuing restrictions specific to China. In addition, although assets growth was predicted incorrectly by the trade-off theory, it is having low coefficients relatively to the other three variables and thus could be considered less important. Because of that it seems like a modified to account for the restrictions existing in China dynamic model of the trade-off theory would explain the behavior of Chinese listed companies better than the pecking order theory.

In the research I have also compared the capital structures of the companies listed on Shenzhen Stock Exchange and Shanghai Stock Exchange and found that some significant differences exist between the two. The significance and explanatory power of included determinants of the leverage visibly differs within the two and because of that I suggest that further studies involving Chinese listed companies also inspect this aspect, instead of only focusing on China as a whole.

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