Capital structure determinants and dynamics: A comparison of China and the United States

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Abstract

As of today, the academic literature has not yet provided a comprehensive analysis of capital structure determinants and dynamics in China. The following paper closes this gap by conducting a detailed empirical study on Chinese and US companies. With prior research on capital structure mainly having focused on the US market, findings for the developed economy serve as a benchmark in our study. Comparing the financing environments in the two countries, we find that capital markets and financial intermediation are still less developed in China in terms of size and the degree of investor protection. In light of these observations, our study examines whether firm-specific capital structure determinants and dynamics are nonetheless similar in both countries. Panel data, covering the time period from 1998 to 2012, is drawn from Compustat and Worldscope Fundamentals. We run a static OLS regression of leverage on firm-specific characteristics. Subsequently, we use the system GMM method to examine capital structure adjustments over time. Indeed, we find the same firm-specific capital structure determinants to be significant in both countries, revealing similar effects on leverage. Whilst the size and tangibility of assets as well as median industry leverage exert a positive impact, profitability is negatively related to leverage. Furthermore, we also find evidence that Chinese companies partly adjust to a target capital structure over time, similar to their US counterparts. However, given the financial constraints faced by Chinese companies and potentially high adjustment costs, the speed of adjustment is estimated to be lower than for US companies.

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1. Introduction

The composition of a firm's capital structure is one of the most intensively discussed research topics in Corporate Finance. Following the seminal study by Modigliani and Miller (1958), who find that firm value and the cost of capital are independent of the choice of leverage in perfect markets, a wide range of capital structure theories, which aim at explaining corporate leverage, has evolved. Most research, which tests the validity of these theories, has been carried out in the context of developed countries. Particularly US companies have been subject to comprehensive studies on firm-specific capital structure determinants. On the other hand, only limited research has been conducted on Chinese firms in this area.

The paper at hand examines whether leverage of Chinese companies is affected by similar firm-specific determinants as leverage of US companies and whether the dynamics of capital structure adjustments follow the same pattern in both countries. These empirical questions are particularly relevant in light of the fact that Chinese companies are oftentimes facing financial constraints. Despite having grown to the second biggest economy in the world, China is still undergoing economic transformation, and the financing environment is less developed than in the Unites States. In 2012, the World Bank conducted a survey on business obstacles in China. The owners and managers of 2,700 Chinese firms declared limited access to external financing as the biggest harm, preventing them from managing their companies effectively (World Bank, 2012). Conversely, the United States are characterised by the deepest capital markets in the world.

Regarding these distinct institutional conditions, we analyse and compare the financing environments in China as an emerging- and in the Unites States as a developed country. Data on Chinese and US companies is drawn from the databases Compustat and Worldscope Fundamentals, covering a period of the latest 15 years from 1998 to 2012. By regressing leverage on firm-specific characteristics in a static OLS setting, we estimate the target capital structures of companies in both countries. Subsequently, we apply a system GMM estimation to examine if and how fast companies move towards target leverage ratios over time. To account for the stability of our model, we apply robustness checks with regard to several dimensions, i.e. by using different specifications of leverage, by dividing up the sample period into shorter intervals and by performing sector-specific regressions. Our main conclusion is that leverage in both countries is

affected by the same firm-specific capital structure determinants and converges to a target capital structure over time, despite relevant differences in the financing environments.

The remainder of this paper is structured as follows: Chapter 2 provides an overview of the three main capital structure theories that are considered relevant for explaining the choice of corporate capital structure, i.e. the trade-off-, the pecking order- and the market timing theory. In Chapter 3, we outline the financing environments in China and the Unites States with respect to financial markets and intermediation, legal certainty as well as corporate ownership. Chapter 4 covers the methodology and dataset used to empirically assess how corporate capital structure is determined in China compared to the United States. We also provide an overview of how we manipulate the data to obtain more reliable results. In Chapter 5, we first carry out a descriptive analysis of our data in the cross-section and over time. Afterwards, we analyse our empirical results on firm-specific capital structure determinants and adjustment speed, compare them between the two countries and relate them to prior research as well as to our findings on the financing environments. Chapter 6 summarises our findings, points out the strengths and shortcomings of our study, and provides inspiration for future research.

2. Capital structure theories

To cover all relevant aspects of the choice of leverage, this chapter introduces the main capital structure theories[1], outlines their hypotheses and discusses the relevant literature.

2.1. Trade-off theory

The trade-off theory suggests that companies decide on their optimal leverage ratio with respect to tax advantages, costs of financial distress as well as agency costs and -benefits of debt (Berk and DeMarzo, 2011).

Initial capital structure research, for instance Kraus and Litzenberger (1973), focuses on tax advantages as a possible explanation as to why companies take out debt. If interest is tax deductible, implying a preferential treatment of debt versus equity, companies benefit from interest tax shields by levering up (Modigliani and Miller, 1963). As pointed out by Miller (1977), tax advantages for individual investors are smaller, since taxes on interest income exceed those on capital gains. Yet, debt financing offers great tax advantages for corporates: Graham (2000) estimates the average present value of tax shields in the US at 9.7 per cent of firm value.

High levels of debt, however, can also bring about direct and indirect costs of financial distress (Bradley, Jarrel and Kim, 1984). Whilst the former relate to transaction costs arising from bankruptcy, e.g. legal fees and financial restructuring costs, the latter include losses of customers, declines in sales or financing constraints due to reputational damages (Warner, 1977). Andrade and Kaplan (1998) estimate the total loss in value following a bankruptcy at 10 to 20 per cent of firm value, with the greater amount ascribed to indirect costs of financial distress.

Later research introduces agency conflicts into the capital structure discussion. Jensen and Meckling (1976), for instance, postulate two types of conflicts, i.e. problems between a company's capital providers on the one- and between management and shareholders on the other hand. The first type of conflict comes into being with the providers of debt and equity capital exhibiting differing degrees of risk behaviour. Shareholders implicitly own a call option on a company's assets and can benefit from increasing the risk and volatility of projects. As increased project risk takes place at the ex-

[1] We only focus on the trade-off-, the pecking order- and the market timing theory. Additional theories, e.g. the incentive signaling theory (Ross, 1977), are not included in this paper.

pense of debt holders, the asset-substitution problem arises (Berk and DeMarzo, 2011). Another agency-conflict arises in case of debt overhang. With large amounts of debt outstanding, shareholders do not want management to invest in projects with a positive net present value (NPV), since the proceeds would entirely benefit debt holders (Myers, 1977). In turn, creditors and bond holders demand a higher required return on debt. The second type of conflict refers to the principal-agent problem. If managers have excessive free cash flows at their disposal, they tend to use them lavishly and make unprofitable investments due to empire building tendencies or overconfidence (Berk and DeMarzo, 2011). The free cash flow problem is likely to decrease firm value. However, leverage also involves agency benefits of debt and can serve as a means of disciplining managers, when faced with the threat of financial distress and the obligation to serve interest payments (Jensen 1986).

The trade-off theory can also be applied to explain the dynamics of capital structure adjustments. For instance, when companies experience a strong decline in equity value due to an external shock, they can be led astray from their optimal leverage ratio (Leary and Roberts, 2005). Static considerations would suggest that firms apply balancing measures in such a situation and return to their target capital structure instantaneously. However, this view is not confirmed by empirical evidence. Jalilvand and Harris (1984) examine financing decisions of US companies and point out that market frictions, i.e. adjustment costs, explain lasting deviations from target capital structures. As companies weigh the costs of adjustment against those of a suboptimal capital structure (Chang and Dasgupta, 2009), it can be reasonable to adapt only partly to the optimal leverage ratio (Faulkender et al., 2012). Hence, temporary deviations from the target capital structure do not necessarily contradict the trade-off theory, provided that convergence is observable in the long run.

When testing the static trade-off theory, researchers have conducted both surveys and statistical analyses. Graham and Harvey (2001) question 392 CFOs on the costs and structure of their companies' capital, finding that US companies indeed follow a predetermined capital structure. When statistical methods are at use, researchers typically resort to regression analyses. Tested capital structure determinants include both company-internal measures such as asset tangibility, growth opportunities (Harris and Raviv, 1991) or overconfidence of management (Ben-David, Campbell and Graham, 2007) and macroeconomic factors such as credit ratings (Kisgen, 2006), GDP-growth (Booth et

al., 2001) or expected inflation (Cook and Tang, 2010). Most studies on corporate capital structure choice focus on US companies that often have revealed capital structure behaviour in line with the trade-off theory. Research on the Chinese market has been very limited. In 2006, Huang and Song use data on 1,200 Chinese listed companies, covering the period from 1994 to 2003, to test their capital structure determinants using a static OLS setting.

Several other papers, for instance Lemmon, Roberts and Zender (2008); Huang and Ritter (2009) as well as Öztekin and Flannery (2012), specify partial adjustment models to account for the dynamic aspects of capital structure adjustments. The difference between the observed leverage ratio at a certain point of time and its value in the previous period is regressed on the difference between the target leverage ratio and the observed leverage ratio in the previous period to estimate a coefficient of the adjustment speed. If it is statistically significant and positive, the company is assumed to follow a target capital structure (Fama and French, 2002). Applied models vary with regard to the specifications of the target leverage ratio and the coefficient of adjustment. Shyam-Sunder and Myers (1999) use the average leverage ratio as the target ratio, whereas most other studies endogenise it. The adjustment speed, on the other hand, is sometimes considered to be determined exogenously, staying constant through time, as e.g. in Fama and French (2002). Mostly, however, it is endogenised, as e.g. in Drobetz, Pensa and Wanzenried (2006). Additionally, different methodological approaches to specifying partial adjustment models exist. Many studies use a two-step approach. They firstly determine the target leverage ratio and estimate the adjustment speed in a second regression, for instance Hovakimian, Opler and Titman (2001), Fama and French (2002) as well as DeAngelo, DeAngelo and Whited (2011).

2.2 Pecking order theory

The pecking-order theory, based on research by Myers (1984), suggests that a company considers the possible signalling and adverse selection consequences of its financing choices, leading to a hierarchy of financing sources.

The theory assumes asymmetric information on a company's value, i.e. management possesses superior information about the fair firm value compared to outsiders. This notion leads to adverse selection, whenever a firm intends to issue financial securities: As investors are incapable of distinguishing high- from low-quality companies, they dis-

count the price at which they are willing to purchase financial securities (Akerlof, 1970). Acting in the interest of current shareholders, management is believed to only resort to external financing if a firm is overvalued in order for shareholders to benefit at the expense of overly optimistic investors. In contrast, management is likely to avoid external financing if the firm is undervalued, as security issues are costly for current shareholders in that case. Rational investors are aware of this mechanism and thus interpret security issuances as a signal of overvaluation (Neus and Walter, 2008). These considerations affect external financing: If companies intend to issue securities, they either have to accept a discount or they have to remove existing information asymmetries, which is also costly. Hence, internal financing, which is not affected by information asymmetries, is preferred. The costs of adverse selection and the price discount increase with security risk. Consequently, companies, which are dependent on external financing, prefer cheaper senior debt instruments to more expensive junior debt instruments and to equity offerings. If the costs of adverse selection are high and external financing is expensive, management might even refuse to invest in projects with a positive NPV, thereby lowering firm value (Korajczyk, Lucas and McDonald, 1992). Hence, the pecking-order theory suggests that a firms' capital structure is a function of past investment opportunities and profitability as well as historically available financing sources (Myers, 1984).

In 1999, Shyam-Sunder and Myers publish their seminal study on the application of the pecking order theory. The authors test whether companies in need of external financing and with leverage ratios below their maximum debt capacity close the gap entirely with debt instruments. Additionally, they specify a partial adjustment model in order to account for the trade-off theory. Shyam-Sunder and Myers (1999) test the two models separately with data points for 157 large industrial companies, covering the period from 1971 to 1989. With the pecking order theory exhibiting superior explanatory power, they conclude that it is more applicable than the trade-off theory. However, the authors acknowledge that their sample is exclusively composed of large companies exhibiting small growth, which makes it difficult to generalise these results. Frank and Goyal (2003) replicate the test design for a larger sample and find that explanatory power increases with company size. This finding fundamentally contradicts the pecking order theory, which suggests that information asymmetries decrease with company size. In another study, Fama and French (2005) examine companies' conducting equity

capital transactions. They find that the majority of companies in their sample issue equity on an annual basis. Additionally, most equity offerings were carried out in situations, when debt financing could also have been used. More than 50 per cent of the examined companies contradict the predictions made by the pecking order theory with their transactions. Leary and Roberts (2010) confirm this finding and point out that the pecking order theory does not correctly predict security issuance activities.

2.3 Market timing theory

Baker and Wurgler (2002) develop the market timing theory, claiming that a company's capital structure results from cumulative issuance of equity capital in times of advantageous market conditions when equity is the cheapest financing source available.

As opposed to the trade-off and pecking order theories, the market timing theory does not assume unlimited rationality of market participants. It was developed after studies of equity capital transactions, for instance Jung, Kim and Stulz (1996), Loughran and Ritter (1997) as well as Denis and Sarin (2001), had revealed that companies are inclined to raise capital when their market-to-book ratio is high, the current market value is above its historical average and investors are overly optimistic. Managers, acting to the advantage of shareholders, exploit fluctuations around the true firm value. Their choice of financing depends on whether they believe that the firm is currently over- or undervalued by investors (Berk and DeMarzo, 2011). If it is overvalued, companies are able to issue financial securities at only low discounts, due to irrational investors. Thus, leverage is believed to be determined by "the cumulative outcome of attempts to time the equity market" (Baker and Wurgler, 2002, p. 3) rather than by a target capital structure. However, such behaviour could also imply validity of other theories. Myers (1984), for instance, proposes a dynamic version of the pecking order theory, claiming that the costs of adverse selection are negatively correlated with the market-to-book-ratio. Under these circumstances, behavioural patterns consistent with the market timing theory, would be observed. Managerial entrenchment theories could also provide a possible explanation of market timing behaviour (Morellec, Nikolov and Schürhoff, 2012). Zwiebel (1996), for instance, develops a model based on agency problems, in which management adjusts the capital structure following personal preferences whilst ignoring shareholders' interests. Temporary overvaluations result in capital increases, regardless of their viability. Low levels of leverage decreases the risk of finan-

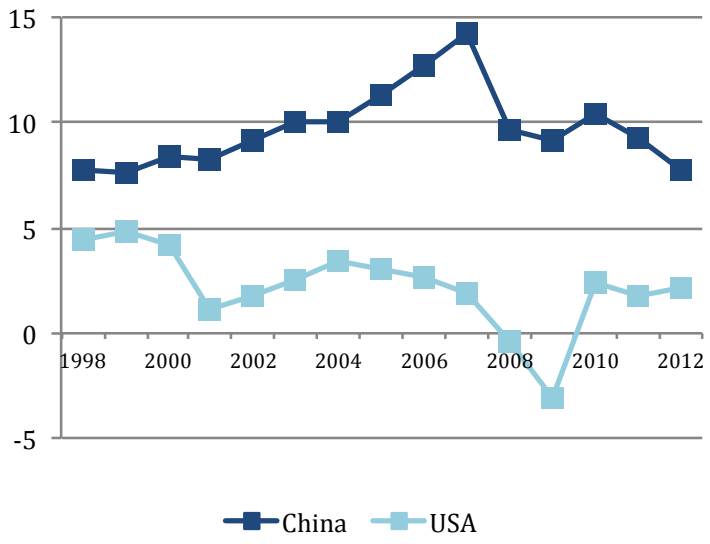
cial distress and yields higher levels of free cash flows, allowing for excessive perks.

When testing the market timing theory empirically, Baker and Wurgler (2002) try to determine whether the timing of the market only has short-term mechanical effects on capital structure or whether its effects are lasting. The authors replicate the test design of Rajan and Zingales (1995) and find that the market-to-book ratio exerts a negative impact on leverage in the short-run. Whilst Rajan and Zingales (1995) do not further examine the exact cause of the changes in leverage, Baker and Wurgler (2002) argue that they are ascribable to issuances of equity capital, and not to changes in asset values, debt financing or retained earnings. The authors further find that a high historical market valuation has a lasting impact on capital structure. Based on the seminal study by Baker and Wurgler (2002), further papers were developed to test the market timing theory, for instance DeAngelo, DeAngelo and Stulz (2006) as well as Khan, Kogan and Serafeim (2012). The market timing theory would also be supported with regard to the survey conducted by Graham and Harvey (2001): Two thirds of the interrogated CFOs confirm that current market developments are important factors when deciding on the issuance of securities. So far, evidence for market timing behaviour has, however, only been found for the United States.

3. Financing environments in China and the United States

In addition to capital structure theories, some studies explain cross-country variation in leverage with the specifics of the respective external financing environment. Although China has experienced strong economic growth during the past decade (see Figure 1), the GDP per capita amounts to US$ 6,075 in China as opposed to US$ 49,922 in the United States as of 2012 (International Monetary Fund, 2013). The country still finds itself in the transitional phase from a centrally-planned to a market-oriented economy. Given the different stages of development, we find diverging institutional circumstances between China and the United States with regard to capital markets, financial intermediation, legal certainty as well as institutional ownership. In the following subchapters, we outline their evolution throughout the past 15 years[2].

Figure 1: GDP growth rate (in %)



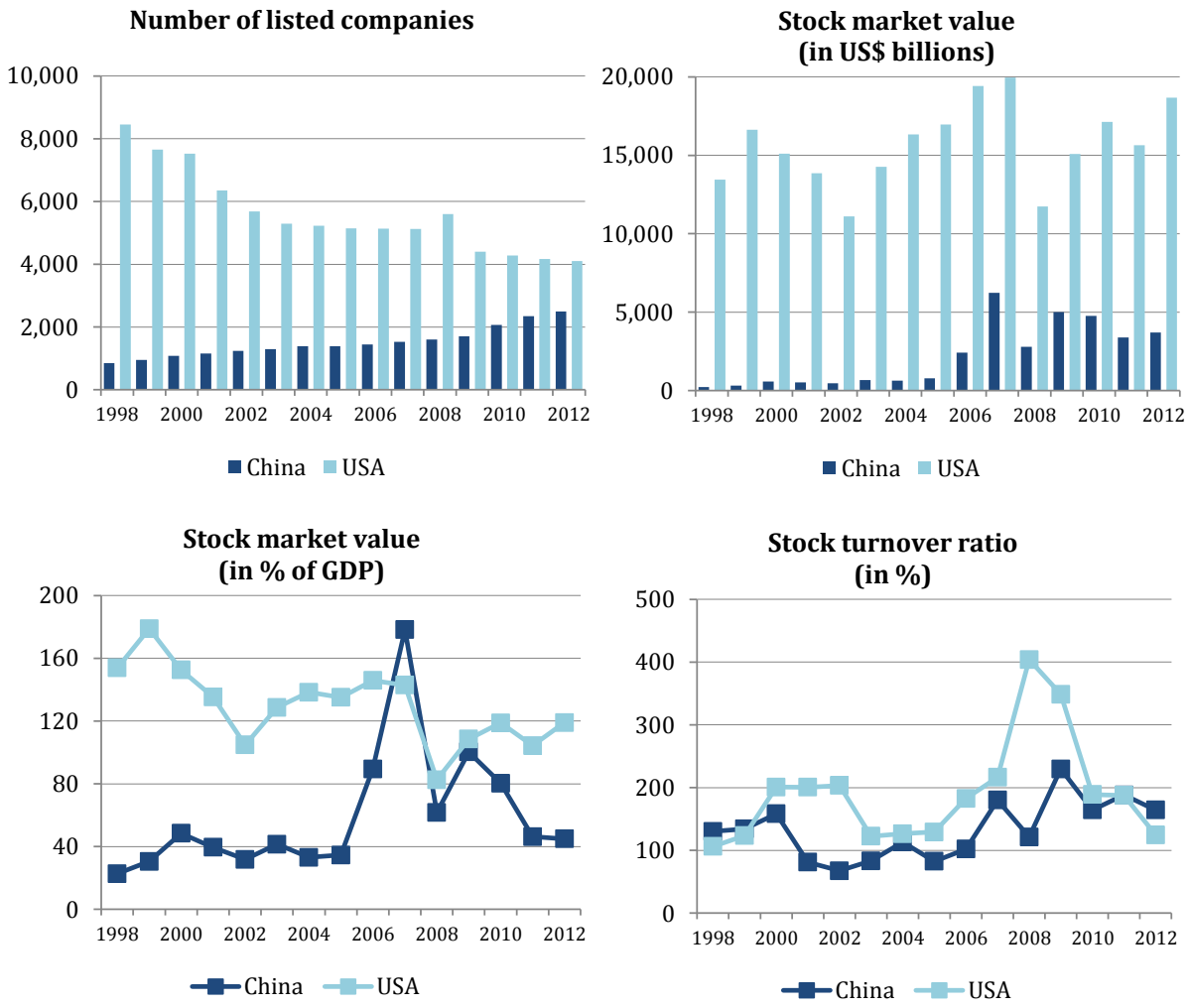
Source: International Monetary Fund (2013), own illustration.

3.1 Characteristics of financial markets and –intermediation

A detailed examination of the development of equity capital markets, debt capital markets and financial intermediation reveals to what extent Chinese and US companies have been able to resort to external financing sources over the years.

[2] See Appendix 1 for a comprehensive summary of time-series data on financing environment in the US and China from 1998 to 2012.

Figure 2: Stock market data



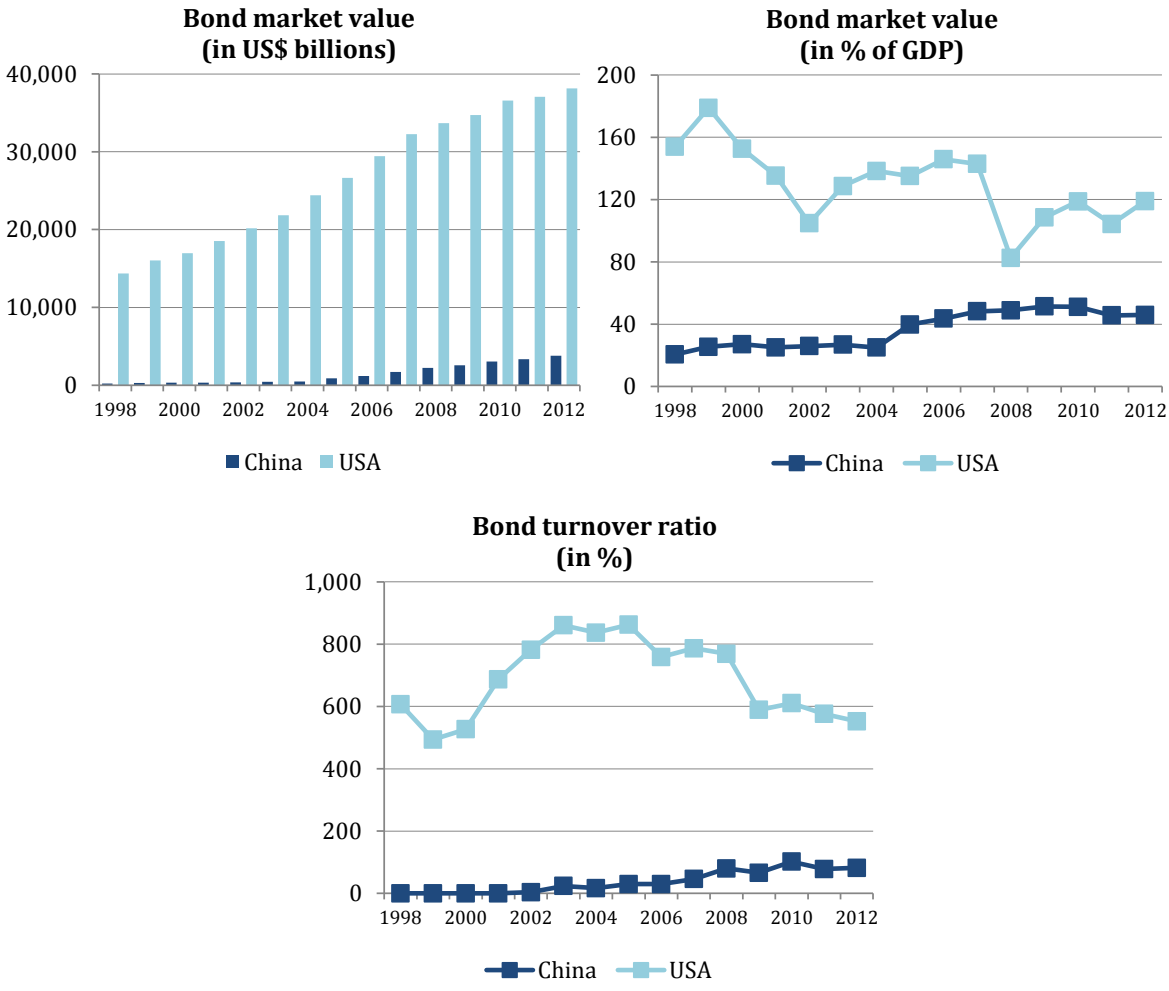
Source: World Bank (2013), own illustration.

Regarding **stock market characteristics**, Figure 2 reports the number of listed companies, stock market values and turnover ratios. The discrepancy in the number of listed companies between the two countries has been gradually decreasing. Since 1998, the number of listed companies in the United States has significantly declined due to industry consolidation and regulatory changes (Weild and Kim, 2009). Conversely, the growth rate of the number of listed companies in China even exceeds the economy's growth in output. Concerning stock market capitalisation in absolute terms, the US equity market has always been significantly bigger than the Chinese one. When examining it in relation to economic output, Figure 2 indicates the total market capitalisation of the Chinese economy has also mostly been relatively lower, except for 2007, when Chinese stock prices had risen to very high levels due to a stock market bubble. The liquidity of

the stock markets on the other hand is also important to be analysed. The turnover ratio is a common liquidity measure, defined as the value of total stocks traded over the average total stock market capitalisation in a certain period. Figure 2 reveals that Chinese equity markets have always been relatively liquid, even in comparison to the United States, known for deep and highly developed capital markets.

The distinct development stages of equity markets in China and the United States could entail direct consequences on leverage in the two countries. More specifically, firms in the US sample enjoy easier access to equity funding than those in the Chinese sample. Ceteris paribus, we would expect this finding to result in a negative effect on leverage ratios in China. This assumption is in line with Demirgüç-Kunt and Maksimovic (1996), who find that the level of stock market development is negatively related to the amount of debt capital employed.

Figure 3: Bond market data



Sources: Bank for International Settlements (2013), Securities Industry and Financial Markets Association (2013), Asian Development Bank (2013), own illustration.

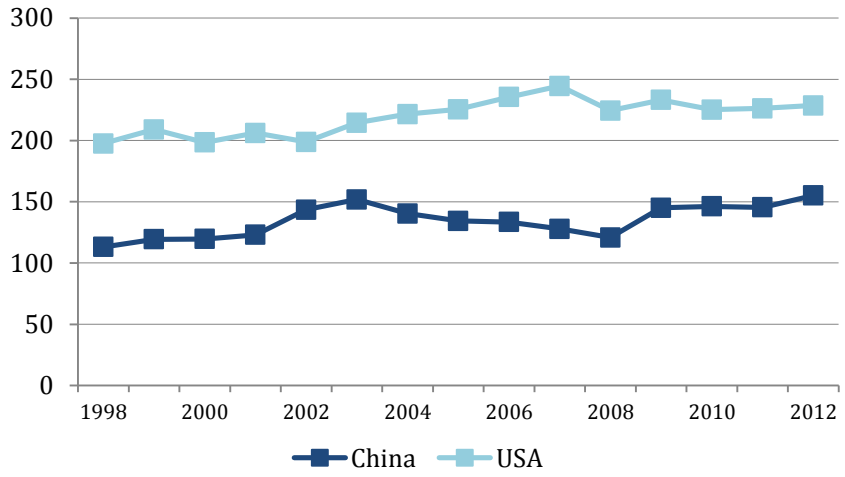
When examining the **bond markets characteristics** in China and the United States, we find the size of the US bond market to greatly exceed market size in China. Figure 3 does not only depict absolute figures, but it also illustrates the ratio of bond market capitalisation to GDP, revealing that the size of the Chinese bond market has historically also been lower in relative terms. However, it has remarkably grown in the period between 2004 and 2012, with growth rates ranging from 10 to 86 per cent. Since 2004, major reforms have been initiated concerning financial product innovation, general market infrastructure and corporate bond market development (Huaipeng, 2006). These reforms have increased investor choice by allowing for more securities, a large share of which with longer maturities, including senior and junior bonds issued by both financial and non-financial institutions as well as asset-backed securities. Consequently, an increasing number of foreign and domestic investors has been attracted. As product innovation was also targeted at promoting market liquidity and price discovery, repurchase agreements and forward transactions were established. A smoother functioning of the market was further ensured by strengthening the legal framework and by enhancing market infrastructure. For instance, an electronic settlement system, subject to lower settlement risk and higher transmission frequency, was introduced. Finally, reforms of the Chinese corporate bond market removed restrictions on issuance amounts and market pricing mechanisms in order to promote investor diversity and liquidity. However, despite all of these measures, the Chinese bond market is still relatively underdeveloped until today.

When assessing the liquidity of the bond markets in the two countries, we refer to the bond turnover ratio, i.e. the value of total bonds traded over the average total bond market capitalisation in a period. In 2012, the Chinese bond market exhibited a significantly lower turnover ratio than the US bond market as the most liquid bond market in the world according to statistics provided by the Bank for International Settlements. Nonetheless, Figure 3 also confirms that liquidity has greatly increased in China over the years.

We conclude that the US and Chinese bonds markets are still clearly distinguished by different stages of development, which is likely to have an impact on capital structure. Obtaining debt funding through capital markets is aggravated for companies in China, whereas firms in the US enjoy significantly better access to markets for bond issuance. Hence, we anticipate a negative direct effect on companies' leverage ratios in China, ce-

teris paribus. The different bond market characteristics could also explain the degree to which companies preferably resort to either short- or long-term debt. We would expect the existence of a developed bond market to lead to a higher share of long-term debt.

Figure 4: Domestic credit provided by the banking sector (in % of GDP)

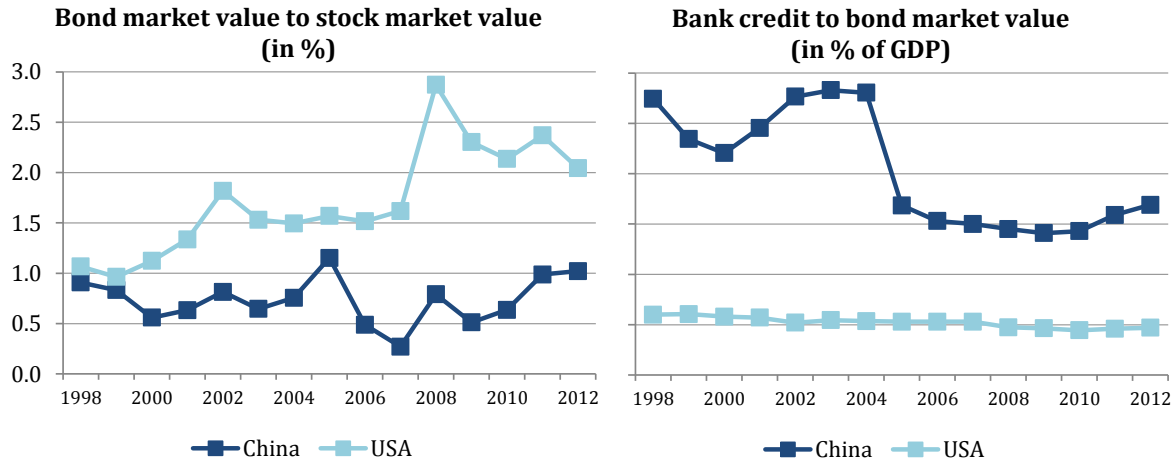


Source: World Bank (2013), own illustration.

Figure 4 illustrates the amount of credit provided through banks relative to the size of the economy, which enables us to assess the role of the banking system in China and the United States. We observe a positive trend over the years. In 2012, domestic credit provided through the banking system is, however, still smaller in China than in the United States. The country still features typical characteristics of a developing market, i.e. heavy government regulation with regard to interest rate setting and capital allocation (Wachtel, Hasan and Zhou, 2009). Further liberalisation of interest rates and privatisation of banks is required in order for China's banking system to make up leeway vis-à-vis developed market economies.

Regarding the fact that the Chinese banking system is relatively less developed compared to the United States, we would, ceteris paribus, expect lower leverage ratios for Chinese companies. Simultaneously, we assume that a developed and sound banking sector entails improved monitoring abilities of financial intermediaries to assess risks. Consequently, a higher share of long-term credit would be facilitated, suggesting a positive relationship between the development stage of financial intermediation and the amount of long-term debt employed. Thus, we also anticipate Chinese companies to resort to higher amounts of short-term debt relative to US companies.

Figure 5: Comparison of external financing sources



Source: World Bank (2013), Bank for International Settlements (2013), own illustration.

It is also interesting to examine the different external financing sources in relation to each other. Figure 5 illustrates significant differences between the two countries in this respect. In the United States, the value of the equity market relative to the value of the bond market has doubled over the last 15 years. In China, the absolute value of the equity capital market has mostly exceeded the value of the bond market. In 2012, they approximately amount to the same size. Regarding the ratio of bank credit to bond market value, Figure 5 indicates that financial intermediation plays a relatively more important role in China compared to the United States. However, the ratio of total bank credit to bond market value has significantly decreased over the years, especially since 2004, with the Chinese bond market experiencing high growth rates.

Summarising, we conclude that large and liquid capital markets leave firms in the United States with an abundance of choice regarding security issuance. In China, external financing is more difficult to obtain. Since Chinese capital markets have only recently experienced strong growth and financial intermediation is also still less advanced, we expect Chinese companies to rely heavily on retained earnings.

3.2 Legal certainty

Additionally, we also expect the legal environment in China and the United States to influence leverage ratios. It is widely perceived that legal certainty in China has by far not reached the standards exhibited by developed economies. As depicted in Table 1,

the judicial system, investor protection and enforcement of law substantially differ from the United States.

Table 1: Legal certainty

	United States	**China**
Judicial system	Common law	Civil law
Investor protection *(scale: 1-185)*	6	100
Enforcement of contracts (*scale: 1-185)*	6	19

Sources: Treismann (2000), World Bank (2013).

China is classified as a civil law country, where the primary source of court ruling is a law code. The United States adheres to common law, which relies on court decisions and develops with cases. La Porta et al. (1998) find that investor protection tends to be more pronounced in countries with common law. The World Bank defines investor protection as the safeguarding of minority shareholders against management's misuse of corporate assets for their personal gain. Investor protection across countries is compared using an index on a scale between 1 and 185. As depicted in Table 1, investors indeed exhibit poor protection in China. The degree of law enforcement, applying to both shareholders and creditors, is also rather low in China (Allen, Qian and Qian, 2005) when compared to the United States.

Regarding the low level of legal certainty in China, we expect a negative impact on the leverage of companies. Chinese investors have an incentive to refrain from financial investments in China and allocate their funds abroad. Especially bond holders should be threatened by a lack of law enforcement. The rationale is that equity holders' expected return in case of bankruptcy is only marginal, given their lower-ranking claim. Debt holders on the other hand are dependent on efficient enforcement of their claims in order to recover at least a certain portion of their investment. Thus, we expect them to be more reluctant to provide funds than equity holders. The lack of legal certainty in China is further likely to affect the degree to which companies employ long-term debt. The risk of opportunistic firms' taking advantage of the legal situation and exploiting investors increases with debt maturity. Therefore, we assume that Chinese companies face more difficulties issuing debt instruments with long maturities than their US counterparts.

3.3 Corporate ownership

Another institutional feature, which distinguishes China from the United States and which could induce possible differences in capital structure, is the higher corporate ownership concentration through state involvement. Although many of the previously state-owned enterprises (SOEs) in China have been privatised from the late 1980s onwards, a high proportion of Chinese companies is still owned to at least 50 per cent by the government (State-owned Assets Supervision and Administration Commission of the State Council, 2013). Companies in the United States, on the other hand, are characterised by more diffuse ownership (Denis and McConnel, 2003).

With regard to ownership concentration, some studies argue for a negative correlation with leverage. If controlling shareholders prefer to keep the risks of bankruptcy and the costs of financial distress low, they are likely to prefer equity instruments (Mishra and McConaughy, 1999). In addition, principal-agent conflicts, e.g. the misuse of free cash flows to the firm, are lower in the presence of a large shareholder, who can monitor managers more efficiently. Most studies, however, argue for a positive correlation of concentrated government ownership with leverage, claiming that large shareholders prefer debt instruments in order to avoid dilution of their equity stakes (Grossman and Hart, 1986; Anderson, Mansi and Reeb; 2003). Furthermore, SOEs enjoy improved access to funding, benefiting from improved lending terms due to their higher creditworthiness (Dewenter and Malatesta, 2001). Chinese SOEs, in particular, reveal higher leverage ratios than other firms. Given that the government also owns major banks, it primarily encourages lending to SOEs, stipulating preference loan rates (Gordon and Li, 2003; Allen, Qian and Qian, 2005). Hence, borrowing by SOEs is largely determined by political rather than commercial considerations and non-SOEs potentially face discrimination when applying for loans.

Summarising, we assume that the relatively high ownership concentration in China exerts a positive influence on leverage. Ceteris paribus, we further anticipate a negative trend in leverage ratios over time with respect to ownership, since the share of highly levered SOEs in the Chinese economy has significantly decreased (Szamosszegi and Kyle, 2011).

4. Methodology and dataset

In this section, we describe the methodology and dataset to empirically assess how corporate capital structure is determined in China compared to the United States. We use a static OLS model to regress leverage on firm-specific characteristics. Subsequently, we apply a system generalised method of moments (system GMM) estimation to examine if and how fast companies move towards the estimated target leverage ratios over time. Further, an overview on how we manipulate the data to obtain more reliable results is provided.

4.1 Leverage and its firm-specific determinants

Capital structure refers to the relation of debt and equity claims on firm value. Given the complex composition of debt, **leverage** is assessed differently in literature and the applicable ratio depends on the research objective.

A broad definition of leverage is total liabilities to total assets. It measures, which share of assets is assigned to shareholders in case of the company's liquidation. As total debt also includes obligations such as accounts payable that do not necessarily serve as financing but primarily as transaction sources, this ratio can deter the assessment of leverage of a company (Rajan and Zingales, 1995). Oftentimes, leverage is regarded as a measure of transferring control to bondholders when a company is in financial distress and unable to meet interest payments. From this perspective, it is more appropriate to define leverage as short- and long-term interest-bearing debt over total assets. Even though this measure also reveals shortcomings, as non-interest bearing liabilities are still included in total assets, it is widely used in literature, which examines capital structure and its determinants, for instance in Frank and Goyal (2009) as well as in Halling, Yu and Zechner (2011). In order to ensure comparability of our empirical results to previous capital structure research, we apply the latter definition of leverage in this paper.

We further differentiate between book leverage, i.e. equity is measured at book value, and market leverage, i.e. equity is represented by the company's market capitalisation. Table 2 lists the proxies that we use for both ratios. Myers (1977) argues that book leverage is of greater use, as it is not distorted by market expectations that are rather uncertain and volatile over time. He states that investors are more interested in a company's assets in place than in its growth options. This opinion is supported by Graham and

Harvey (2001), who find that managers focus on target leverage ratios based on book values. On the other hand, advocates of market based valuations point out that the book value of equity is only a residual on the balance sheet (Welch, 2004) and that the risk of mismeasurement is lower if market values are considered (Bowman, 1980). However, even when applying market-based definitions, many researchers use the market value of equity but the book value of debt, the market value of which is more difficult to quantify and oftentimes well estimated by the book value. In this paper, we primarily base our empirical analysis on book leverage, but test the robustness of our estimates by running regressions with market leverage as the dependent variable.

Table 2: Proxies of leverage and its determinants

Item	Definition
Book Leverage	$\frac{\text{short} - \text{and long} - \text{term debt}}{\text{total assets}}$
Market Leverage	$\frac{\text{short} - \text{and long} - \text{term debt}}{\text{total assets} - \text{common equity} + \text{market capitalisation}}$
Size	ln (total assets)
Tangibilty	$\frac{\text{property, plants and equipment}}{\text{total assets}}$
Market expectations	$\frac{\text{market value of equity}}{\text{book value of equity}}$
Profitabilty	$\frac{\text{EBITDA}}{\text{total assets}}$
Dividend payer	if dividends > 0, dummy = 1 if dividends = 0, dummy = 0
Industry Median	median leverage of industry sector

Research has examined a wide range of both firm-specific and macroeconomic factors that are considered to potentially impact the leverage of companies. As we compare only two countries in this paper, the variation of macroeconomic data is too limited to empirically derive reliable results with regard to their direct influence on leverage in regression models. Studies, which assess the influence of the macroeconomic financing environment on leverage, typically cover a large number of countries, for instance De Jong, Kabir and Nguyen (2008). Instead, we focus on the six firm-specific factors listed and defined in Table 2, that literature has repeatedly found to be the most relevant and significant capital structure determinants. Frank and Goyal (2009), for example, test 25

potential factors, finding the size of assets, the tangibility of assets, the market-to-book ratio, profitability and the industry median of leverage to explain 27 per cent of the variation in leverage, whilst the remaining factors altogether account for only 2 per cent. Examining data on the G7 countries, Rajan and Zingales (1995) also declare the first four of these factors to be highly correlated with leverage. Another factor that has been considered in various studies refers to the earnings retention policy of companies. To account for the fact that profits might not be entirely utilised for internal financing purposes, we add a dividend payer dummy as a further explanatory variable. Including all of the aforementioned factors in our model enables us to compare our empirical results to previous research. The capital structure theories introduced in Chapter 2 allow us to discuss the impact, which each of the determinants to be examined could have on leverage.

With regard to **company size**, it can be argued that large companies are usually more diversified with less volatile cash flows. As a consequence, their cash flows should be relatively stable, leading to a decrease in the risk of bankruptcy and the possibility to benefit from higher tax shields. Thus, we would expect a positive influence of company size on leverage according to the trade-off theory. Further, since large companies underlie strict reporting requirements, information asymmetries usually decrease with company size. Hence, against the background of the pecking order theory, large companies should be increasingly inclined to issuing external financing instruments, where debt is preferred to equity. Thus, the pecking order theory also suggests an increase in leverage with company size. However, a negative effect of company size on leverage would also be justifiable. Large companies have typically already existed for a relatively long time, during which they could accumulate reserves. Consequently, large companies could be inclined to using retained earnings for financing purposes.

Considering **asset tangibility**, the trade-off theory would suggest a positive correlation with leverage. First, tangible assets can be used as loan collateral. Thus, in case of bankruptcy, the associated costs would be lower, since outsiders can more easily assign a value to property, plant and equipment than to intangible assets, facilitating liquidation. Second, the risk of asset substitution, i.e. replacing low- with high-risk assets, is smaller with a higher portion of tangible assets at disposal (Frank and Goyal, 2009). Additionally, a high amount of tangible assets in place removes information asymmetries between companies and investors. From a pecking order theoretical point of view,

the costs of adverse selection decrease if information asymmetries are removed. Consequently, security issuance is facilitated with increasing asset tangibility, whereby debt is preferred to equity.

Market expectations, measured by the market-to-book ratio, are considered to reflect a company's growth options. Against the background of the pecking order theory, we expect a positive relationship between growth options and leverage. Given the same degree of profitability, theory would predict that a company with high investment opportunities prefers debt financing to equity financing when having resort to funding beyond retained earnings. The market timing theory, on the other hand, states that companies prefer to raise equity capital in times when their market value is high and not undervalued. Companies with high market values and thus high growth options are typically in the early stage of their life cycle, often with rather low cash flows that do not allow for a large portion of debt. Further, a high degree of growth options is typically associated with agency problems, asset substitution in particular. Managers of high-growth businesses, where innovation is a key factor, are likely to increase the risks of their projects to the benefit of shareholder and to the disadvantage of bondholders. These agency problems also point to a negative correlation of growth options and leverage, following the trade-off theory.

The effect of **profitability** on leverage is highly debated in the literature on capital structure theory, as most empirical studies have found the correlation to be negative. With regard to the trade-off theory, however, we would clearly expect a positive correlation. Profitable companies could benefit from taking out debt and realise high tax shields. Additionally, profitable companies exhibit lower expected costs of financial distress. Also, in order to prevent management from misusing free cash flows, for instance through empire building, a higher share of debt with fixed payment obligations could serve as a disciplining measure. Strebulaev (2007) argues that the static considerations as stipulated above are not applicable in a dynamic environment and explains why the correlation between profitability and market leverage should be negative: High current profitability points at higher future profitability, increasing the current market value of the firm and decreasing market leverage. The pecking order theory would also suggest a negative correlation, as profitable companies can accumulate high amounts of retained earnings, the preferred source of financing, which decreases the share of a company's debt.

Intuitively, leverage should increase with **dividends** paid out, as companies accumulate smaller cash reserves and the share of retained earnings decreases. If profitable companies with attractive investment opportunities regularly distribute profits to shareholders in the form of dividends, they might have to resort to external financing sources to cover their financing needs. With debt as the preferred external financing source against the background of the pecking order theory, a positive correlation of the dividend dummy and leverage is to be expected. However, if dividends are only paid out because mature companies lack positive NPV projects and intend to avoid large amounts of cash for low returns, an increase in leverage is not necessarily implied. If a large share of earnings is still retained after dividends have been allocated, leverage ratios could even decrease in the presence of dividends.

We expect leverage to vary across different sectors but to be rather similar within one industry. The **median industry leverage** accounts for sector-specific factors, e.g. the type of assets, the business risk or the regulatory environment, which could exert a similar degree of influence on companies operating in the same business sector. Additionally, Graham and Harvey (2001) find that managers choose leverage with regard to their competitors and Hovakimian, Opler and Titman (2001) claim that industry leverage serves as the benchmark ratio for many executives, who intend to adjust their company's capital structure in order to converge to this target. Hence, we anticipate that industry leverage is positively related to corporate leverage.

4.2 Regression models

The first step in our dynamic capital structure framework is to regress the leverage ratio on the firm-specific capital structure determinants as introduced in Table 2. Assuming that management bases its decision on known data from the previous period, we use lagged values of the firm-specific capital structure determinants, i.e.

$$L^*_{i,t} = \alpha + \beta X_{i,t-1} + \delta_t + \gamma_i + \varepsilon_{i,t} \qquad (1),$$

$$X = \begin{pmatrix} Size \\ Tangibility \\ Market\ e\ \ xpectations \\ Profitabilty \\ Dividend\ payer \\ Industry\ median \end{pmatrix} \qquad (2),$$

where firms are indexed by i and periods by t, L* represents the target capital structure, α is the axis intercept of the regression line, β is a vector of regression coefficients relating to $X_{i,t-1}$, the vector of lagged firm-specific determinants δ_t controls for year-fixed effects, γ_i for firm-fixed effects, and $\varepsilon_{i,t}$ represents the error term. Table 2 lists the proxies that we use for both the dependent and explanatory variables in our model.

We apply the ordinary least squares (OLS) estimation method, which allows us to compare our results with those of former studies, which have mostly resorted to OLS. However, in order to guarantee for unbiased and efficient OLS estimates, a number of assumptions has to be made. We assume that all firm-specific determinants except for size are linearly related to leverage. In order to also establish linearity for the size of assets, we take its natural logarithm. Further, in case of heteroskedasticity, standard errors of the regression coefficients could be distorted. Hence, we use Huber-White standard errors, which are robust against heteroskedasticity (Wooldridge, 2009). Concerning the distribution, the OLS method assumes that the six firm-specific capital structure determinants follow a normal distribution. It is to highlight that the regression coefficients would not be biased, even if this assumption was violated. Also, with a large number of observations, the t-test statistics asymptotically converge towards their correct value (Auer, 2007). An additional criterion for an unbiased OLS estimator is low multicollinearity of the explanatory variables. However, firm-specific variables are likely to follow a similar trend. To detect the severity of multicollinearity in our OLS regression model (1), we determine variance inflation factors, i.e.

$$V_j = \frac{1}{1 - R_j^2} \qquad (3),$$

where R_j^2 represents the coefficient of determination when regressing the explanatory variable X_j on all other firm-specific explanatory variables. Severe degrees of multicollinearity would be indicated by variance inflation factors of 5 and beyond (Kutner, Nachtsheim and Neter, 2004). As long as the correlation among the explanatory variables remains low, the reliability of our results is not threatened (Getzmann, Lang and Spremann, 2010).

A correct model should also adhere to the assumption that error terms have an expected value of zero. Error terms with expected values different from zero, though, would only shift the axis intercept and the correlation with firm-specific capital deter-

minants would not be affected (Wooldridge, 2009). The latter is of greater concern to us, as correlation between the error term and the explanatory variables leads to endogeneity and could severely bias our regression estimates and also impact their efficiency (Petersen, 2009). Given that we use panel data observations of a large number of companies over several years, error terms can be subject to both serial and cross-sectional correlation, which poses econometric challenges. Cross-sectional correlation occurs if error terms of companies are correlated within one period, for instance due to macroeconomic factors, which are not captured in the model. In order to mitigate this problem, we include time-fixed effects to control for time varying unobserved factors that affect all companies in one country, such as the macroeconomic or institutional conditions, e.g. the financing environment as exemplified in Chapter 3. Serial correlation of error terms, on the other hand, occurs if firm-specific factors that are constant over time are not captured in the model. In contrast to cross-sectional correlation, a positive serial correlation does not bias the estimates. Standard errors, however, will be smaller, leading to the false conclusion that estimates are more precise than they actually are (Wooldridge, 2007). In order to avoid such problems, we also include firm-fixed effects in our regression model. Further, median industry leverage accounts for unobservable factors, which are specific within an industry sector. Endogeneity could also arise in a setting where the dependent variable determines the explanatory variables. We counteract reverse causality by regressing leverage on lagged values of the explanatory variables.

Using Equation (1), we estimate the target leverage ratio that would preponderate in the absence of transaction and further adjustment costs. Dynamic models further account for the fact that a company's capital structure can deviate from its equilibrium, i.e.

$$L_{i,t} - L_{i,t-1} = \lambda\left(L^*_{i,t} - L_{i,t-1}\right) + \varepsilon_{i,t} \qquad (4),$$

$$L_{i,t} = (1-\lambda)L_{i,t-1} + \lambda L^*_{i,t} + \varepsilon_{i,t} \qquad (5),$$

where $L_{i,t}$ is the leverage ratio of company i in period t, $L^*_{i,t}$ is the target leverage ratio predicted by Equation (1), λ is the speed of adjustment towards the target capital structure and $\varepsilon_{i,t}$ is the error term. Equation (4) can be transformed in Equation (5). A company reveals target behaviour if it bases its financing choice on both its current and its target leverage ratio, as depicted in Equation (5).

Compared to the static OLS model, this dynamic approach increases the econometric challenges arising due to the use of panel data even further. As the dependent variable in Equation (5) is regressed on its past value, endogeneity through autocorrelation poses a severe problem (Baltagi, 1995). As mentioned above, model consistency is at risk when an explanatory variable is correlated with the error term. To counteract this problem, instrumental variables that are uncorrelated with the error term but correlated with the endogenous variable should be applied. Consequently, only the variation of the explanatory variable, which is independent of the error term, is used (Bauer, Fertig and Schmidt, 2009). In order to achieve robust results in our dynamic setting, we apply the system GMM method, which was first published by Arellano and Bover (1995) and later extended by Blundell and Bond (1998). It does not only use the lagged levels of the specified variable as instruments but also the contemporaneous first differences of lagged values[3]. When using dynamic models, the system GMM method is perceived to overcome endogeneity and to derive consistent estimates (Greene, 2008). Yet, it has to be mentioned that recent academic research has found this method to use rather weak instruments[4]. Nonetheless, the system GMM method is still widely considered the most suitable method for studies on capital structure dynamics, for instance in Lemmon, Roberts and Zender (2008) as well as in Halling, Yu and Zechner (2011).

4.3 Dataset and data manipulation

All accounting data has been drawn from the database Compustat, which we find to cover a larger number of Chinese companies with less missing values than the alternative database Worldscope Fundamentals. Whilst firms in the United States adhere to US-GAAP reporting guidelines, Chinese companies follow the Chinese Accounting Standards for Business. In light of the latitude of accounting and disclosure, Compustat standardises accounting data in order to remove effects arising from reporting variability. Thus, different data items have been made comparable in our two samples. Since Compustat does not publish data on market capitalisations, the latter has been drawn from Worldscope Fundamentals. Accounting and market data on Chinese companies is matched via the International Securities Identification Numbers (ISIN), data on US com-

[3] See e.g. Bond (2002) for further explanations of the method, the econometric specifics of which are not covered in this paper.

[4] See e.g. Bun and Windmeijer (2010) for further explanations of the shortcomings of the system GMM method, the econometric specifics of which are not covered in this paper.

panies via the Committee on Uniform Security Identification Procedures Numbers (CUSIP).

For a company to be eligible for our study, it has to be both listed and incorporated in either China or the United States during the period of 1998 to 2012. Prior data on Chinese listed firms turns out to be rather limited and incomplete. Sectors are categorised with regard to the Standard Industry Classification Code (SIC). We exclude financial institutions from our sample, as the choice of leverage in the financial sector is heavily influenced by the regulatory environment and not fully comparable across countries.

In order to create the proxies for leverage and its firm-specific determinants, we draw all data items, which are depicted in Table 2, from the databases[5]. The size of assets of listed companies widely differs in both country samples. This fact could distort our results, since company size affects relative financing costs (Hennessy and Whited, 2007) and could also have an impact on target leverage behaviour. In particular, small companies are typically riskier than large companies and have to pay a risk premium when seeking external financing. Consequently, adjustment speed might vary with significantly different distributions of the size of listed companies in both samples and could distort our aggregate results. In order to avoid such distortion, we restrict our study to companies with a total amount of assets of US$ 100 million and above. We find this cut-off point to render both samples more similar with respect to size. Compustat and Worldscope Fundamentals state all reported items in the local currency of the country under consideration. In order to consistently cap our observations with regard to asset size, we calculate inflation adjusted asset values as of end-2012 in both country samples, and further convert the Chinese data to US$ by means of the exchange rate as of end-2012. Note that data items other than total assets do not have to be adjusted. Except for size, the variables in our model represent ratios with equally scaled values in the denominators and numerators.

Our original dataset includes a few extreme outliers, which are likely to be incorrectly stated. In order to improve the quality of our dataset, we winsorise both ends of the data points for each item at 1 per cent. Outliers beyond the percentile limits are exchanged for the most extreme values of data at the limit. We herewith assume that the correct values for misstated data points nonetheless adhere to an extreme trend. Final-

[5] See Appendix 2 for a more detailed definition of the data items drawn from the databases.

ly, in order to avoid losing a significant number of relevant observations in our regressions, we interpolate the data for each item except for dividends. Whenever both the lagged and the forward value of a missing data point are known, we replace it with the average of the two known values.

Table 3 shows the number of companies per sector in the United States and China according to the classification using SIC codes. The data, which we consider for our study, has been manipulated as described above. Furthermore, all observations per firm and year with missing data points, which could not be interpolated, have been dropped. Table 3 reveals that the number of companies in the US sample significantly exceeds that in China. It is to highlight that we have found the number of companies in China to be particularly limited in the early years of the sample period when examining our data. In both countries, Manufacturing constitutes the industry sector with the highest number of available observations. With a total of 30,750 observations per firm and year in the United States and 13,673 observations per firm and year in China, the average period a company has been covered amounts to 6.28 in the United States and to 6.27 in China.

Table 3: Number of companies across sectors

Sector	**United States**		**China**	
	Absolute	%	Absolute	%
Agriculture	18	0.4	31	1.4
Construction	68	1.4	37	1.7
Manufacturing	2,165	44.2	1,596	73.2
Mining	301	6.2	50	2.3
Retail	385	7.9	77	3.5
Services	1,107	22.6	139	6.4
Transportation	641	13.1	191	8.8
Wholesale	208	4.3	59	2.7
Total	**4,893**		**2,180**	

Sources: Compustat (2013), Worldscope Fundamentals (2013), own illustration.

5. Data analysis

In the following, we firstly conduct a descriptive analysis of the data. In light of the theoretical considerations in previous chapters, we then interpret our empirical results and relate them to prior research.

5.1 Descriptive analysis

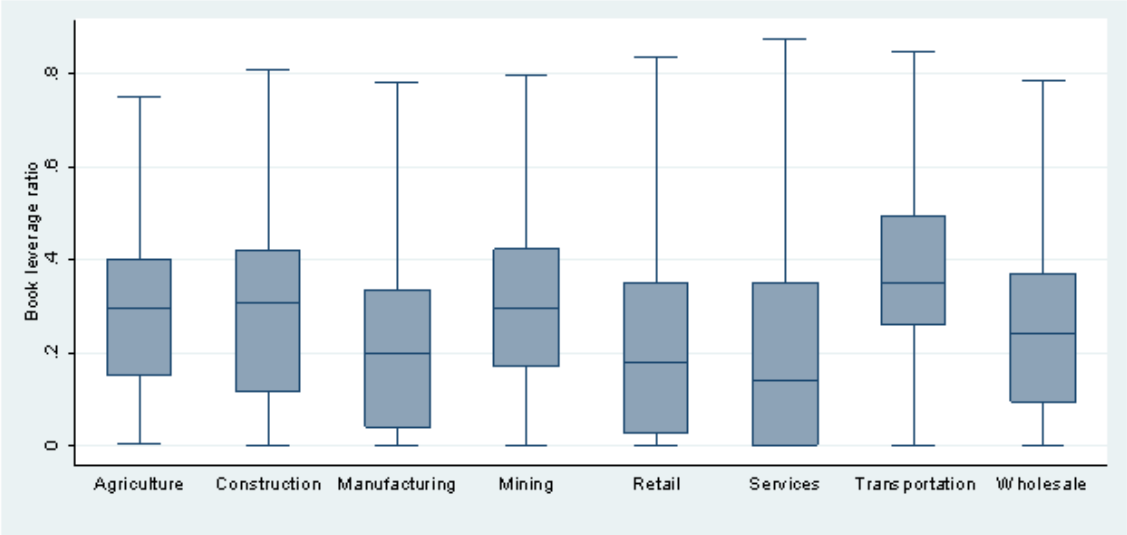
When describing our data throughout this section, we focus on quartile instead of average values in order to avoid potential biases caused by high concentrations of extreme values at either end of the data distribution.

First of all, Figure 6 shows the box plots of book leverage ratios for each sector, both in China and the United States. The box plots depict the quartiles of the observed data points. The lower end of the boxes, i.e. the 1st quartiles and the upper ends, i.e. the 3rd quartiles, encase the median value as the 2nd quartiles, indicated by the horizontal lines in the middle. The vertical lines extending from the whiskers illustrate the variability outside the upper and lower quartiles. Outliers beyond the adjacent minimum and maximum values illustrated by the adjacent lines are not illustrated. As anticipated, leverage varies significantly across sectors and quartile values highly alternate. Particularly capital-intensive industries, such as Transportation, with a high share of tangible assets serving as collateral, exhibit higher leverage ratios than industries such as Services, which are not highly dependent on fixed assets. It is notable that we observe relatively similar sector-specific data variations in the two countries. It is to add that we only illustrate our findings with book leverage ratios, as we have observed that a similar picture evolves when using market leverage ratios. The main difference between the two specifications is a downward shift of median values in all sectors, since market values of equity are typically higher than book values. Also variation in the data is higher when examining market leverage ratios.

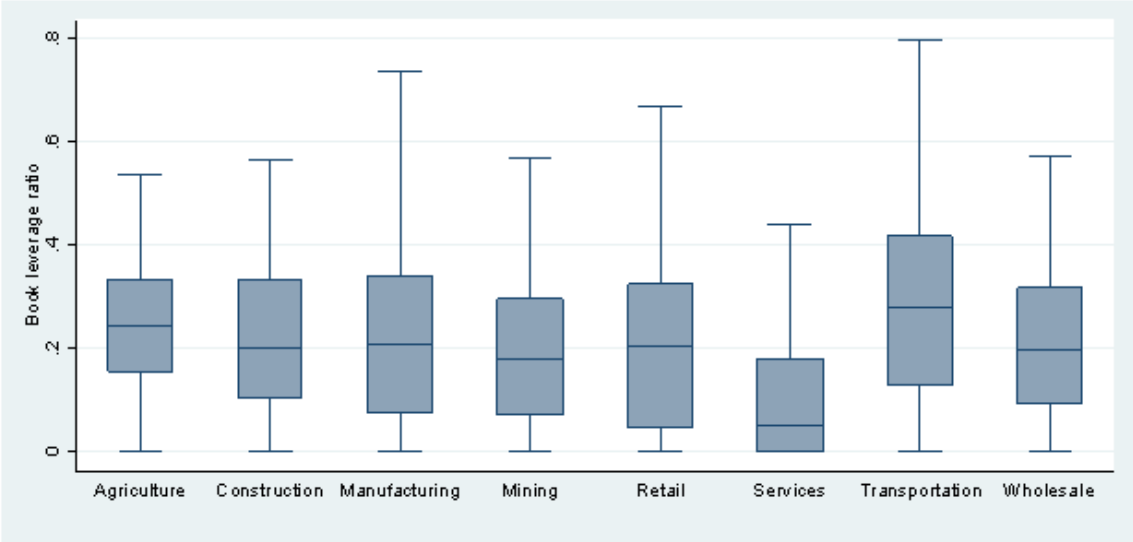
The fact that there are significant differences in leverage across sectors suggests that possible changes in sector weights over time could bias our analysis of the dependent variable. In order to prevent such bias, the descriptive analyses of leverage over time are carried out for the sector with the highest number of observations in the two samples, i.e. Manufacturing (see Table 3). Ensuring consistency of our results, we also analyse the remaining sectors. We generally find similar developments over time, however with differences in the level of leverage attributable to industry- specific characteristics.

Figure 6: Box plots of sector-specific book leverage ratios

United States



China



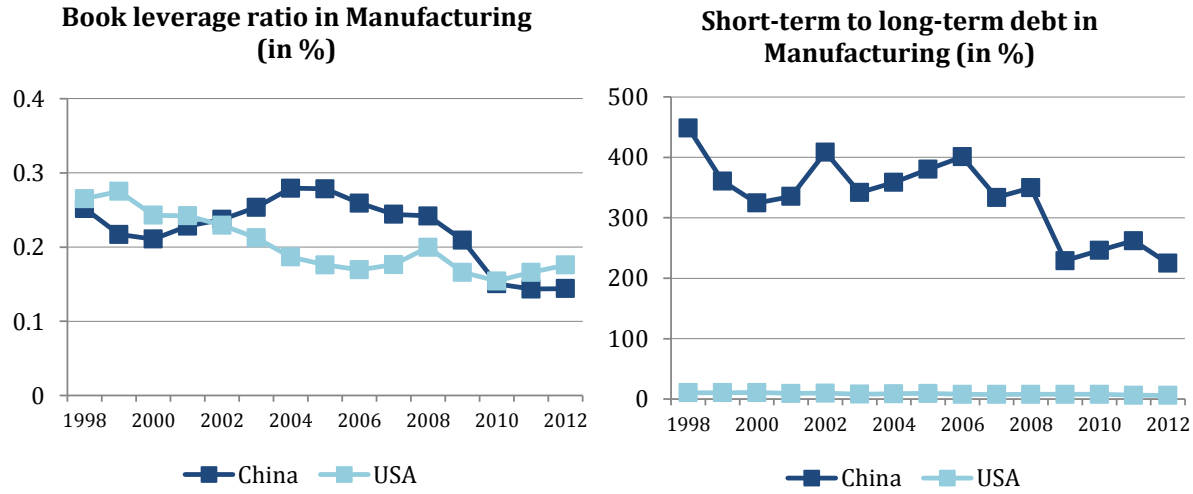
Source: Compustat (2013), own illustration.

Figure 7 depicts the development of median leverage ratios in Manufacturing in China and the United States over the course of the sample period. Both countries reveal a downward trend in the observed leverage ratios, with ratios in China sharply decreasing since 2005. It is to highlight that the median levels of leverage in both countries do not substantially differ.

Prior studies on capital structure, for instance Borio (1990) as well as Rajan and Zingales (1995) have classified countries as either "high leverage" or "low leverage". The

academic literature suggests that the United States as a capital-market-oriented economy generally reveals lower leverage ratios than its bank-oriented counterparts in Continental Europe or Japan. Hence, we conclude that leverage in China is also to be classified as relatively low. As outlined in Section 3.1, its equity capital market is more developed than its debt capital market and grows at a faster pace. Also the downward trend in leverage in China could be explained by the decrease in SOEs, which enjoy better access to bank loans.

Figure 7: Median leverage ratios in Manufacturing over time



Source: Compustat (2013), own illustration.

Considering the ratio of short-term to long-term debt, companies in the United States reveal a significantly higher share of long-term debt. The ratio of the median manufacturing company ranges between 6 and 11. China, on the other hand, exhibits a very high ratio, which has, however, decreased by 50 per cent from 1998 to 2012. We relate this finding to our analysis of the financing environment in China. Both the Chinese bond market and the domestic banking sector are still less developed than their US counterparts. However, the reforms in the mid-2000s targeted at the improvement of investor protection and the provision of financial products with longer maturities have led to a sharp increase in the share of long-term debt in Chinese companies in recent years.

Summarising our analysis of the observed capital structures, we find leverage ratios to amount to relatively similar levels in both countries, whereas the composition of debt differs considerably with a higher share of short-term debt utilised by Chinese companies.

Table 4 lists the median values of the six explanatory variables over the course of the entire sample period for Manufacturing. Size is measured by taking the natural logarithm of total assets in current US$ millions. After having restricted our data to companies with assets of above US$ 100 millions, median asset size is relatively similar in the United States and China, and only reveals a slight upward trend in the United States.

Table 4: Median firm-specific capital structure determinants in Manufacturing over time

United States						
Year	**Size**	**Tangibility**	**Market expectations**	**Profitability**	**Dividend payer**	**Industry median**
1998	5.98	0.26	2.11	0.14	1	0.27
1999	6.05	0.25	2.03	0.14	1	0.28
2000	6.10	0.22	1.90	0.13	0	0.24
2001	6.12	0.22	2.07	0.11	0	0.24
2002	6.16	0.21	1.59	0.11	0	0.23
2003	6.24	0.20	2.32	0.11	0	0.21
2004	6.32	0.18	2.44	0.12	0	0.19
2005	6.39	0.17	2.36	0.12	0	0.18
2006	6.40	0.16	2.52	0.12	0	0.17
2007	6.42	0.16	2.37	0.12	0	0.18
2008	6.43	0.18	1.32	0.12	0	0.20
2009	6.44	0.18	1.91	0.10	0	0.17
2010	6.54	0.17	2.24	0.12	0	0.15
2011	6.57	0.17	1.89	0.13	0	0.17
2012	6.70	0.17	2.03	0.12	0	0.18
China						
Tangibility	**Size**	**Tangibility**	**Market expectations**	**Profitability**	**Dividend payer**	**Industry median**
1998	5.84	0.30	0.50	0.07	1	0.25
1999	5.86	0.24	1.64	0.09	1	0.22
2000	5.89	0.27	2.09	0.08	1	0.21
2001	5.63	0.27	2.65	0.06	1	0.23
2002	5.26	0.34	2.53	0.07	1	0.24
2003	5.39	0.35	2.19	0.07	1	0.25
2004	5.46	0.35	1.76	0.07	1	0.28
2005	5.53	0.39	1.38	0.07	1	0.28
2006	5.58	0.40	2.08	0.07	1	0.26
2007	5.73	0.31	4.99	0.08	0	0.24
2008	5.70	0.32	1.87	0.07	0	0.24
2009	5.75	0.29	4.19	0.07	0	0.21
2010	5.78	0.23	4.20	0.07	0	0.15
2011	5.85	0.24	2.40	0.07	0	0.14
2012	5.94	0.26	2.21	0.06	0	0.14

Sources: Compustat (2013), Worldscope Fundamentals (2013), own illustration.

The degree of asset tangibility decreases over time in both China and the United States. This development, although relatively less pronounced in China, demonstrates the increasing importance of knowledge and intellectual property in the industry.

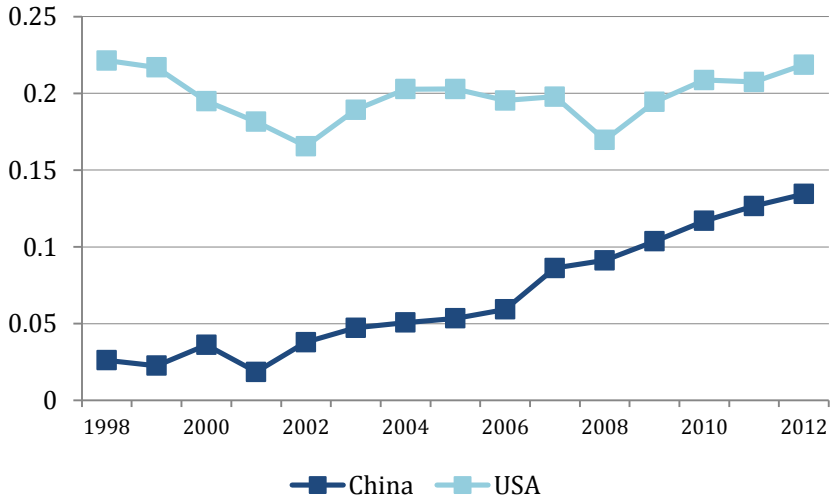
The market-to-book ratio is very volatile. It approximately follows the development of the stock market value in the two countries (see Figure 1). We relate the low values of the market-to-book ratio in 2002 and 2008 in the United States to the Dot-com bubble and the recent financial crisis, when stock prices plummeted and market values of equity decreased heavily in relation to book values. The high market-to-book ratios for China since 2007 are also in line with the development of the Chinese equity market.

In terms of profitability, Chinese companies have performed worse than their counterparts in the United States throughout the course of the entire sample period. We relate the pronounced differences in profitability to a high share of SOEs. Song, Storesletten and Zilibotti (2011) confirm that SOEs in China tend to be less profitable, with no incentives for management to operate these firms efficiently.

Despite the relatively lower profitability, the median Chinese company in Manufacturing has paid out dividends for a longer time than the median US company. State involvement lowers the degree of financial constraints of SOEs, although they are generally unprofitable. With an increasing share of private companies in the Chinese economy, aggregate financial constraints have aggravated over time. Consequently, the median Chinese company stopped paying dividends to shareholders in 2007, with an increased need for retained earnings as internal financing sources. Figure 8, which illustrates retained earnings over assets in the manufacturing sector, confirms this finding. We observe an increasing trend in retained earnings over assets. Despite of this development, retained earnings are still lower in China than in the United States, where more mature companies with high free cash flows have been able to accumulate high amounts of retained earnings over time.

As already outlined above and as illustrated in Figure 7, the median industry leverage ratios in China and the United States have been relatively similar. Thus, Chinese manufacturing companies show similar leverage ratios but lower retained earnings. It is to conclude that they resort to equity capital as a financing source to an even higher extent than US companies.

Figure 8: Retained earnings over assets in Manufacturing over time (in %)



Source: Compustat (2013), own illustration.

5.2 Regression analysis

Table 5 displays the estimates for the coefficients of the capital structure determinants, when running regressions with the static regression model as depicted in Equation (1). As outlined in Chapter 4, we have determined variance inflation factors in order to examine whether our model is subject to multicollinearity. With variance inflation factors mostly amounting to values below 2, we conclude that the six explanatory variables in our model are not exposed to a severe degree of multicollinearity (see Appendix 4). Given the high levels of adjusted R-squared when running regressions for both countries, our model reveals a relatively high explanatory power. With an adjusted coefficient of determination of 71 per cent when using the Chinese sample and of 74 per cent when using the US sample, the explanatory power of the model is only marginally lower for China than for the United States. Further, it is to highlight that our model exhibits significantly higher explanatory power than the study on capital structure determinants, which has been conducted by Huang and Song in 2006. The authors obtain values of adjusted coefficients of determination ranging from 21 to 52 per cent in their static model setting, depending on the specification.

Table 5: Static model estimates (book leverage)

Note: The model is specified by Equation (1), with the book leverage ratio as dependent variable. Year-fixed effects (FE) are shown. Firm-fixed effects have been used, but are not displayed. Standard errors are stated in parentheses. Coefficients that are significantly different from zero at a 1%-, 5%- or 10% level are indicated by ***, ** or *, respectively.

	United States	**China**
Size	0.0175***	0.0704***
	(0.00)	(0.00)
Tangibility	0.1631***	0.1884***
	(0.01)	(0.01)
Market expectations	-0.0000	0.0000
	(0.00)	(0.00)
Profitability	-0.1483***	-0.5415***
	(0.01)	(0.02)
Dividend payer	0.0020	-0.0051
	(0.00)	(0.00)
Industry median	0.3046***	0.2909***
	(0.04)	(0.04)
Fe 2000	-0.0026	0.0062
	(0.00)	(0.02)
Fe 2001	0.0021	-0.0617***
	(0.00)	(0.02)
Fe 2002	-0.0087*	-0.0685***
	(0.00)	(0.02)
Fe 2003	-0.0214***	-0.0697***
	(0.00)	(0.02)
Fe 2004	-0.0263***	-0.0688***
	(0.01)	(0.02)
Fe 2005	-0.0290***	-0.0805***
	(0.01)	(0.02)
Fe 2006	-0.0180***	-0.1028***
	(0.01)	(0.02)
Fe 2007	-0.0079	-0.1133***
	(0.01)	(0.02)
Fe 2008	0.0089	-0.1063***
	(0.01)	(0.02)
Fe 2009	-0.0245***	-0.1240***
	(0.01)	(0.02)
Fe 2010	-0.0250***	-0.1317***
	(0.01)	(0.02)
Fe 2011	-0.0130**	-0.1218***
	(0.01)	(0.02)
Fe 2012	-0.0062	-0.1310***
	(0.01)	(0.02)
Constant	0.0541***	-0.1600***
	(0.02)	(0.03)
Adj. R squared	0.74	0.71

It is to be noted that all significant firm-specific factors reveal the same signs of correlation in both countries. As to the first factor, **size** is positively correlated with leverage and statistically significant at the 1 per cent level. Yet, the coefficients for size amount to values, which are closest to zero, when comparing them with the other statistically significant coefficients. This fact makes the impact of company size seem less relevant than others. The positive relationship between asset size and leverage could be explained by the trade-off theory as outlined in Section 4.1. Large, diversified companies exhibit relatively stable cash flows throughout the business cycle, lowering both the probability of default and bankruptcy costs. Consequently, large companies are able to take out higher amounts of debt and benefit from the arising tax shield. The pecking order theory postulates the same positive effect of size on leverage, but uses a different reasoning. Since information asymmetries are smaller between large companies and investors, the discounts related to security issuance drop, allowing large companies to use external financing sources, preferably debt. The positive impact on leverage is in line with former capital structure research in the United States (Rajan and Zingales, 1995; Flannery and Rangan, 2006; Lemmon, Roberts and Zender, 2008; Frank and Goyal, 2009). However, it is to mention that different proxies of size have been used in these studies. Whilst Rajan and Zingales (1995) use the natural logarithm of sales to proxy for company size, Flannery and Rangan (2006), for instance, also apply the natural logarithm of total assets. The study on the Chinese market by Huang and Song (2006) also obtains a positive correlation between asset size and leverage.

When comparing the size coefficients in the two countries, it is to note that the effect on leverage in China is approximately four times stronger than in the United States. This remarkable difference could be attributable to specifics concerning the Chinese financing environment. In addition to direct effects on leverage, we also expect indirect effects to occur via firm-specific capital structure determinants. In particular, the impact of size on leverage could be strengthened. In the large and highly liquid debt capital markets in the United States, bond issuers become subject to strict supervision both by market participants and rating agencies. Since detailed information is publicly available, information asymmetries between firms and investors are at least partly removed. As already addressed in Chapter 4.1, information asymmetries tend to decrease with size. Consequently, we assume that the well-developed debt capital market in the United States already captures part of the variation in leverage, which would otherwise have

been attributed to the size factor. In China, on the other hand, the effect of asset size on leverage should be reinforced due to a lack of strict market supervision.

The second firm-specific capital structure determinant, **tangibility**, is also positively correlated with leverage and statistically significant at the 1 per cent level for both countries. This result can be reconciled with the predictions of the trade-off theory. Leverage is likely to increase with the share of tangible assets on the balance sheet, since the threat of high bankruptcy costs and agency problems, particularly asset substitution, is mitigated. Our results are in line with previous research on capital structure in the United States, which has found the same positive relationship between asset tangibility and leverage (Rajan and Zingales, 1995; Flannery and Rangan, 2006; Lemmon, Roberts and Zender, 2008; Frank and Goyal, 2009). Huang and Song (2006) also observe a positive correlation of asset tangibility and leverage in their study on the Chinese market.

The third factor, **market expectations**, is not significantly different from zero in the United States and China. The academic literature offers possible explanations for both a positive and a negative correlation of the market-to-book ratio with leverage. Whilst the former is based on agency benefits of debt for high-growth companies, the latter follows from severe agency problems, costs of financial distress and market timing considerations. However, our empirical results suggest that these considerations are not relevant to managers in either country when deciding on their companies' capital structure. In light of recent market crunches in the United States, e.g. the Dot-com bubble and the financial crisis, we argue that market expectations have become too volatile to serve as a reliable indicator for capital structure adjustments. In former capital structure research, mixed results concerning market expectations have been obtained for the United States. Whilst Rajan and Zingales (1995) find strong negative relationships between the market-to-book ratio and leverage, Flannery and Rangan (2006) mostly report coefficients, which are not statistically different from zero. Since Huang and Song (2006) do not test the market-to-book ratio in their study covering the Chinese market, a comparison with our results with previous research is not possible for China.

The **profitability** factor exerts a negative impact on leverage and is statistically significant at the 1 per cent level. This finding is in line with the pecking order theory. If firms operate profitably, they accumulate large cash reserves, which they resort to first when seeking financing. Former studies on corporate capital structure in the United

States have come to the same conclusions with regard to the profitability factor (Rajan and Zingales, 1995; Flannery and Rangan, 2006; Lemmon, Roberts and Zender, 2008; Frank and Goyal, 2009). A negative correlation between profitability and leverage for the Chinese market has also been observed by Huang and Song (2006). However, they use return on assets as a measure for profitability in their study. When comparing the coefficient estimates of profitability for both countries, it is worth noting that the negative effect is approximately four times stronger in China. As we have already highlighted, Chinese companies are more financially constrained than companies in the United States. Thus, it is reasonable that profitable companies in China strive even more to use their earnings for internal financing purposes than companies in the United States.

Like market expectations, the **dividend** payer dummy is not statistically significant in either of the two countries when using book leverage as the dependent variable. It is to mention, though, that we observe a negative and significant effect at the 1 per cent level for China when market leverage is used in the regression model (see Appendix 5). As outlined in Section 4.1, we would intuitively suggest that leverage increases, when dividends are paid out and a firm's equity is lowered. A negative correlation, on the other hand, could be explained if companies with high cash flows are not in need of further investments and financing sources. Even if dividends have been paid out, a large share of their earnings could still be retained or used to pay down debt. Thus, both directions of influence could be justified. As will be further specified below, we have run several regressions with different specifications and the effect of the dividend dummy has shown to be both negative and positive depending on the respective regression. Mostly, however, it has proven to be insignificant. To the best of our knowledge, no prior research has been conducted for China with regard to the effect of a firm's dividend policy on leverage. However, it has been included in studies examining the US market. Lemmon, Roberts and Zender (2008) do not obtain statistically significant results for this variable either. Welch (2004) argues that US companies do not even out changes in capital structure, resulting from a change in retained earnings and simultaneously from the share of dividends paid out. This finding could be attributed to transaction costs that render capital structure adjustments too expensive. Yet, it could also imply that a firm's capital is not actively structured by management. The latter conjecture would be supported by our finding that management does not base its choice of capital structure on market expectations either.

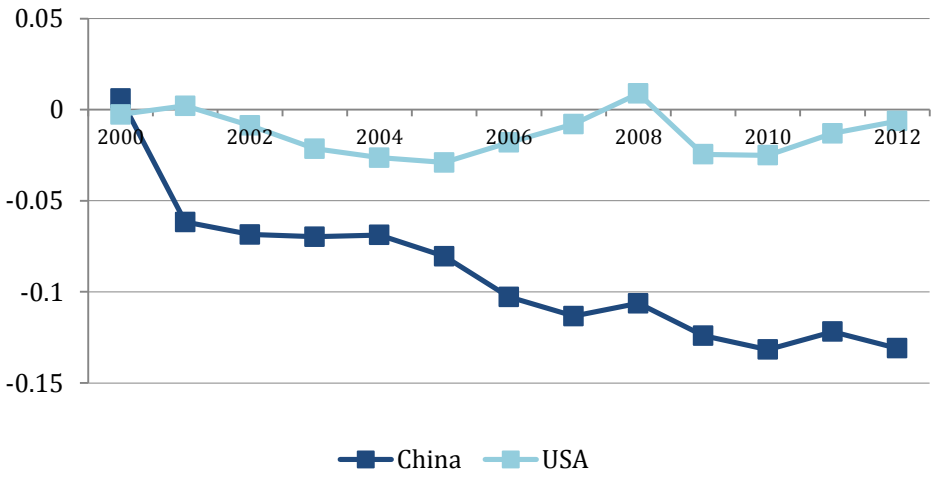
As expected, the **median industry leverage ratio** is positively correlated with the leverage ratio of a specific firm in the United States and China and statistically significant at the 1 per cent level. For both countries, this factor reveals to exert the most relevant impact on the dependent variable among the statistically significant capital structure determinants. The positive correlation in both countries can be explained by industry-specific influential factors, which result in convergence towards similar leverage ratios of companies operating in the same industry sector. Another conjecture is that managers regard industry leverage as the benchmark leverage ratio, which they adjust to. Our finding is in line with previous capital structure research for the United States (Lemmon, Roberts and Zender, 2008; Frank and Goyal 2009). Again, we cannot relate our findings for this factor to prior research in China, since Huang and Song (2006) do not include median industry leverage in their study.

With regard to the **constant term** in the regression model, it strikes that we find it to be significantly negative for China, as opposed to a significantly positive value for the Unites States. Its estimates amount to -0.16 for China and to 0.05 for the United States. Since the constant term captures unobserved factors that affect all companies in one country, such as the financing environment, the signs of the coefficients could, among others, be related to the aforementioned financial constraints faced by Chinese companies. Consequently, they are eager to resort to internal financing first. Further, the Chinese banking sector and capital markets are smaller than their US counterparts, both in absolute and in relative terms. Additionally, investor protection in China is considerably lower than in the United States. These considerations suggest a negative influence on corporate leverage in China and could thus explain our estimates for the axis intercept, which stays constant over the years.

Annual changes of the macroeconomic environment that are either added to or deducted from the constant term are captured by the **year-fixed effects**. Table 5 shows our model estimates of these time-fixed effects from 2000 to 2012, most of which are highly significant at the 1 per cent level. We do not report a year-fixed effect for 1998, since it serves as the base year in which the constant term captures all influential factors that are not explained by firm-specific determinants. We also do not include a year-fixed effect for 1999, as we find it to trigger multicollinearity of our model. Figure 9 plots the values of the year-fixed effects for both countries over time. In the United States, they alternate around zero and their development seems to reflect the business

cycle. They show positive values in 2001, when stock prices plummeted following the burst of the Dot-com bubble and in 2008 when Lehman Brothers went bankrupt, triggering the financial crisis. In China, on the other hand, we observe a clear downward trend over time. The magnitude of this trend suggests that the year-fixed effects are not only statistically significant but also economically relevant. One possible explanation is the increasing privatisation of former Chinese SOEs. As outlined in Section 3.3, private companies in China exhibit lower leverage ratios than SOEs, since they are more financially constrained. Thus, a decreasing share of SOEs affects leverage ratios negatively. Furthermore, Chinese equity markets have experienced higher growth than the bond markets in recent years.

Figure 9: Year-fixed effects estimates



In order to account for the stability of our static regression model, we apply robustness checks with regard to several dimensions. Firstly, we test whether our results for the firm-specific capital structure determinants, which we find to be significant when using book leverage, are dependent upon the definition of the leverage ratio. When exchanging book- for market leverage ratios, only the statistical significances but not the signs of the coefficients change (see Appendix 5), indicating robustness. Secondly, we run sector-specific regressions for both country samples, which are reported in Appendices 6 and 7. The signs of the coefficients for size, tangibility and profitability, which we find to be significant in our static regression model, also prove to be robust in all sectors, except for Agriculture. Yet, this finding does not necessarily imply a lack of robustness, as the number of companies, which operate in Agriculture, is very limited. Lastly,

we examine whether our results for the static model differ when running separate regressions for shorter time intervals, namely from 1998 to 2004 and from 2005 to 2012. Appendix 8 summarises the results of this third robustness check for both China and the United States. Again, the signs of the statistically significant coefficients are not affected by the choice of different time periods. Only the significance level changes in very few cases. We conclude that our static model, predicting that size, tangibility and median industry leverage exert a positive influence on leverage whereas profitability has a negative effect, proves to be robust with regard to all three consistency checks. Thus, our results can be generalised for both countries.

Table 6: Dynamic model estimates for adjustment speed

Note: The model is specified by Equation (5). Both book and market leverage ratios have been examined separately. Standard errors are stated in parentheses. Coefficients that are significantly different from zero at a 1%-, 5%- or 10% level are indicated by ***, ** or *, respectively.

	United States		**China**	
	Book leverage	**Market leverage**	**Book leverage**	**Market leverage**
Adjustment speed	0.23*** (0.05)	0.51*** (0.02)	0.22*** (0.06)	0.35*** (0.02)

Finally, Table 6 summarises our estimates for the speed of capital structure adjustment predicted by the dynamic model. Coefficients are positive and significantly different from zero at the 1 per cent level for both countries. This finding firstly confirms that the target leverage ratios predicted by Equation (1) could indeed serve as a proxy of the real target capital structure. Secondly, it indicates that the leverage ratios of companies in both countries converge towards a target capital structure over time as postulated by the dynamic considerations of the trade-off theory. For the United States, adjustment speed is estimated at 23 per cent per annum when using book leverage ratios and at 51 per cent when using market leverage. Estimates for China amount to 22 per cent per annum when using book- and to 35 per cent per when using market leverage ratios. The fact that the values are far below 1 is related to management's taking into account the costs associated with capital structure adjustments. Consequently, companies do not fully adjust their capital ratios in each period.

While the speed of adjustment is only slightly lower for China when using book leverage, a high difference is observable when using market leverage ratios. Due to the relatively less developed financing environment in China, we assume that capital structure

adjustments by means of external financing are more costly for companies in China than in the United States. This inference is confirmed by previous research. Clark, Francis and Hasan (2009) analyse dynamic aspects of capital structure in 40 countries and attribute variations in adjustment speeds across countries to specifics in the respective legal-, institutional- and other country-specific factors. Particularly, they find the development of financial markets to be positively related to adjustment speed, since increases in capital supply bring about lower costs of capital, rendering adjustment to the target capital structure less costly.

Again, it is to highlight that the system GMM method also brings about shortcomings. Coefficients measuring the adjustment speed are very sensitive to the underlying econometric model, as indicated by significant differences in estimated levels across different studies on the US market (Getzmann, Lang and Spremann, 2010). Nonetheless, our estimates derived by the system GMM method seem reasonable in the context of our discussion of the financing environments. Like US companies, Chinese companies also partly adjust to a target capital structure over time, albeit at a lower speed, since adjustment costs are likely to exceed those in the United States.

6. Conclusion

In the following, we firstly provide a resume of our findings. Finally, we also comment on the shortcomings of our study and give suggestions for future research.

Leverage ratios for the United States and China amount to relatively similar low levels. Whilst leverage ratios of companies in the United States as a capital market driven developed economy have historically been low, financial constraints are likely to induce Chinese companies' small shares of debt. Capital markets and financial intermediation are still less developed than in the United States, both in terms of size and investor protection. The latter also explains why we observe a significantly smaller share of long-term debt for Chinese firms, which has, however, been increasing since reforms on financial markets were initiated in the mid-2000s. Further, we observe a downward trend of leverage in China during recent years, which can be related to the fact that Chinese stock markets have grown at an even higher rate than bond markets. Also, the number of SOEs, which enjoy improved access to bank loans, has steadily been decreasing. Access to external financing is aggravated for private companies, making them highly dependent on internal financing sources. Compared to US companies, the share of retained earnings is, however, lower for Chinese companies. This finding is in line with our observation that the median company is less profitable in China than in the United States, which could be attributed to both inefficient management of SOEs and a lack of financing resources for private companies to invest in positive NPV projects. The observed trends of leverage ratios in both countries are also predicted by our estimates for the constant term and the year-fixed effects, both of which we assume to capture all macroeconomic influences that are not controlled for in our static OLS model. As opposed to the United States, we estimate a significantly negative effect of the macroeconomic environment on leverage, the amount of which has been increasing over the years.

Despite the observed differences of the financing environments between both countries, we find the same firm-specific capital structure determinants to be significant, revealing similar impacts on leverage. The size and the tangibility of assets as well as the median industry leverage exert a positive influence on leverage, whereas profitability is estimated to be negatively correlated with a company's share of debt. We do not estimate a significant effect on capital structure for the dividend dummy and the mar-

ket-to-book ratio. This result suggests that management does not actively adjust its capital ratios with regard to its dividend policy and market expectations, neither in the United States, nor in China. Finally, we find the leverage ratios of companies in both countries to converge towards a target capital structure over time. However, lower estimates for the adjustment speed of Chinese firms suggest that the costs of adjustment are likely to be higher in the less developed Chinese financing environment.

It is to conclude that corporate leverage in China as an emerging country is determined by similar firm-specific factors as in the United States as a developed country, and that companies in China also partly adjust to a target capital structure, albeit at a lower speed. These findings contribute to the academic literature since, to our knowledge, a comprehensive study on capital structure determinants in China within a dynamic setting has not been conducted before. Our static OLS model reveals high explanatory power, both for China and the United States, and additionally proves to be robust. We have also ensured to meet the necessary econometric assumptions for obtaining unbiased and efficient OLS estimates. For instance, we attain low variance inflation factors, indicating that a severe degree of multicollinearity is unlikely. Further, we use the system GMM method in order to avoid endogeneity through autocorrelation of our panel data when estimating the dynamics of capital structure adjustments.

At this point, we would also like to point out the potential shortcomings of our work. Firstly, despite the fact that the system GMM method is widely considered the most suitable method for examining capital structure dynamics, our estimates for the adjustment speed in both countries still have to be interpreted with caution. Recent research has found that the applied instruments are oftentimes rather weakly correlated with the regressors. Furthermore, the coefficient of the adjustment speed is very sensitive to the underlying econometric model. Secondly, the number of data points in the Chinese sample, particularly in the initial years of our sample period, is relatively limited. We have counteracted this problem to a certain degree by interpolating some of the missing data points. Also, it is to emphasise, that we already resort to a more comprehensive data set with a longer sample period than Huang and Song (2006), who conducted the only other reliable academic study we encountered in the context of capital structure determinants in China. Finally, given that we only examine data for two countries in our study, the variation of macroeconomic data is too limited to empirically derive reliable results with regard to their direct influence on leverage. Instead, we use

our analysis of the distinct financing environments in China and the United States for our descriptive analyses and the interpretation of our empirical results.

Hence, with regard to future research on capital structure dynamics in China, we suggest resorting to a data sample covering many countries at the same time and including both firm-specific- and macroeconomic factors in the model. A high number of countries would allow for sufficient variation of macroeconomic factors. Thus, also the direct effects of the specifics of the financing environment could be estimated. Regarding the potential shortcomings of the system GMM method, we suggest using other methods suitable for examining capital structure dynamics and to compare the results as a robustness check. Examples of alternative methods would be the Lagrange Multiplier by Kleibergen (2005) or the GMM extension of the Conditional Likelihood Ratio by Moreira (2003).

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Appendices

Appendix 1: Time series of financing environment data

		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Capital market characteristics																
No. of listed companies[1]	China	853	950	1,086	1,160	1,235	1,296	1,384	1,387	1,440	1,530	1,604	1,700	2,063	2,342	2,494
	USA	8,450	7,651	7,524	6,355	5,685	5,295	5,231	5,143	5,133	5,130	5,603	4,401	4,279	4,171	4,102
Stock market value *(in US$ billions)* [1]	China	231	331	581	524	463	681	640	781	2,426	6,226	2,794	5,008	4,763	3,389	3,697
	USA	13,451	16,635	15,104	13,855	11,098	14,266	16,324	16,971	19,426	19,947	11,738	15,077	17,139	15,641	18,668
Stock market value *(in % of GDP)* [1]	China	23	31	48	40	32	42	33	35	89	178	62	100	80	46	45
	USA	154	179	153	135	105	129	138	135	146	143	83	108	119	104	119
Stock turnover ratio *(in %)* [1]	China	130	134	158	81	68	83	113	83	102	180	121	230	164	188	164
	USA	106	123	201	201	203	123	127	129	183	216	404	349	189	188	125
Bond market value *(in US$ billions)* [2]	China	210	276	325	332	377	440	483	899	1,184	1,687	2,210	2,565	3,031	3,345	3,777
	USA	14,355	16,022	16,966	18,518	20,179	21,847	24,413	26,634	29,448	32,265	33,699	34,717	36,595	37,054	38,161
Bond market value *(in % of GDP)*	China	21	25	27	25	26	27	25	40	44	48	49	51	51	46	46
	USA	164	172	171	181	191	197	207	212	221	231	237	250	254	247	243
Bond turnover ratio *(in %)* [3]	China	NA	NA	NA	NA	4	24	17	30	30	46	80	66	102	78	82
	USA	607	494	527	687	782	860	837	862	759	786	769	589	611	576	552
Importance of financial intermediation																
Domestic credit through banks *(in % of GDP)* [1]	China	113	119	120	123	143	152	140	134	133	128	121	145	146	145	155
	USA	198	209	198	206	199	214	222	225	236	244	224	233	225	226	229
Bank credit to bond market value *(in %)*	China	549	469	441	491	553	566	561	337	306	300	290	282	286	318	338
	USA	120	121	116	114	104	109	107	106	106	106	95	93	89	92	94
Bond market value to stock market value *(in %)*	China	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1
	USA	1	1	1	1	2	2	1	2	2	2	3	2	2	2	2
Bank credit to Bond market value *(in %)*	China	6	5	3	4	5	4	5	5	2	1	3	2	2	4	4
	USA	2	2	2	3	4	3	3	3	3	3	6	4	4	5	4

[1] Data has been taken from the World Bank Database [2] Data has been taken from BIS and SIFMA [3] Data has been taken from SIFMA and Asian Development Bank [4] Data has been taken from the IMF World Economic Database

Appendix 2: Definitions of variables

Data item	Definition in database
Total assets	Sum of total current assets, total non-current assets and other assets
Common equity	Common shareholders' interest in the company
Short-term debt	Interest-bearing debt payable within one year including the current portion of long-term debt
Long-term debt	Interest-bearing debt due in more than one year
EBITDA	Earnings before interest, taxes, depreciation and amortisation
Property, plant and equipment	Gross tangible fixed property less accumulated depreciation
Dividends	Total amount of dividends paid during a year
Market capitalisation	Year-end share price * common shares outstanding

Appendix 3: Median firm-specific determinants across sectors

United States						
Sector	**Size**	**Tangibility**	**Market expectations**	**Profitability**	**Dividend payer**	**Industry median**
Agriculture	6.10	0.34	1.85	0.10	1	0.26
Construction	6.59	0.05	1.54	0.10	0	0.29
Manufacturing	6.32	0.19	2.07	0.12	0	0.19
Mining	6.84	0.74	2.06	0.14	1	0.28
Retail	6.34	0.33	1.93	0.15	0	0.16
Services	6.05	0.10	2.23	0.11	0	0.13
Transportation	7.12	0.52	1.67	0.10	1	0.35
Wholesale	6.33	0.11	1.59	0.11	0	0.22
China						
Sector	**Size**	**Tangibility**	**Market expectations**	**Profitability**	**Dividend payer**	**Industry median**
Agriculture	5.39	0.26	3.15	0.05	0	0.25
Construction	6.43	0.19	2.19	0.05	0	0.21
Manufacturing	5.68	0.30	2.52	0.07	0	0.21
Mining	6.43	0.48	2.97	0.13	0	0.19
Retail	5.64	0.33	2.86	0.07	0	0.19
Services	5.38	0.14	3.23	0.06	0	0.01
Transportation	6.30	0.54	2.21	0.09	0	0.29
Wholesale	5.75	0.15	2.56	0.05	0	0.20

Appendix 4: Variance inflation factors

Note: The variance inflation factor is specified by Equation (3). R squared represents the coefficient of determination when regressing the respective explanatory variable on all remaining firm-specific explanatory variables.

	United States		China	
	R squared	**VIF**	**R squared**	**VIF**
Size	0.40	1.66	0.58	2.37
Tangibility	0.06	1.06	0.17	1.21
Market expectations	0.00	1.00	0.01	1.01
Profitability	0.02	1.02	0.06	1.06
Dividend payer	0.02	1.02	0.52	2.10
Industry median	0.57	2.33	0.74	3.92

Appendix 5: Static model estimates (market leverage)

Note: The model is specified by Equation (1), with the market leverage ratio as the dependent variable. Year-fixed effects (FE) are shown. Firm-fixed effects have been used, but are not displayed. Standard errors are stated in parentheses. Coefficients that are significantly different from zero at a 1%-, 5%- or 10% level are indicated by ***, ** or *, respectively.

	United States	**China**
Size	0.0484***	0.0841***
	(0.00)	(0.00)
Tangibility	0.1477***	0.1365***
	(0.01)	(0.01)
Market expectations	-0.0000	-0.0000
	(0.00)	(0.00)
Profitability	-0.1842***	-0.3216***
	(0.01)	(0.02)
Dividend payer	-0.0021	-0.0059**
	(0.00)	(0.00)
Industry median	0.3034***	0.3728***
	(0.03)	(0.03)
Fe 2000	0.0051*	-0.0303*
	(0.00)	(0.02)
Fe 2001	-0.0115***	-0.0898***
	(0.00)	(0.02)
Fe 2002	-0.0064**	-0.0695***
	(0.00)	(0.02)
Fe 2003	-0.0491***	-0.0618***
	(0.00)	(0.02)
Fe 2004	-0.0563***	-0.0470***
	(0.00)	(0.02)
Fe 2005	-0.0564***	-0.0406***
	(0.00)	(0.02)
Fe 2006	-0.0582***	-0.1084***
	(0.00)	(0.02)
Fe 2007	-0.0471***	-0.1761***
	(0.00)	(0.02)
Fe 2008	0.0092**	-0.0661***
	(0.00)	(0.02)
Fe 2009	-0.0605***	-0.1746***
	(0.00)	(0.02)
Fe 2010	-0.0670***	-0.1523***
	(0.00)	(0.02)
Fe 2011	-0.0442***	-0.1148***
	(0.00)	(0.02)
Fe 2012	-0.0510***	-0.1317***
	(0.00)	(0.02)
Adj. R squared	0.76	0.72

Appendix 6: Static model estimates across sectors in China (book leverage)

Note: The model is specified by Equation (1) excluding median industry leverage with the book leverage ratio as the dependent variable. Year-fixed and firm-fixed effects have been used, but are not displayed. Standard errors are stated in parentheses. Coefficients that are significantly different from zero at a 1%-, 5%- or 10% level are indicated by ***, ** or *, respectively.

	Agriculture	**Mining**	**Construction**	**Manufacturing**
Size	0.1119***	0.0713***	0.1096***	0.0694***
	(0.03)	(0.02)	(0.02)	(0.00)
Tangibility	0.0783	0.1105	0.2186***	0.2084***
	(0.08)	(0.07)	(0.08)	(0.02)
Market expectations	-0.0006	0.0005	-0.0063	0.0000
	(0.00)	(0.00)	(0.01)	(0.00)
Profitability	-0.3119*	-0.3319***	0.0933	-0.5662***
	(0.17)	(0.11)	(0.26)	(0.03)
Dividend payer	-0.0331	-0.0487**	-0.0531**	-0.0010
	(0.02)	(0.02)	(0.02)	(0.00)
Constant	-0.3020*	-0.2320*	-0.4015***	-0.0356
	(0.17)	(0.12)	(0.14)	(0.04)
Adj. R-squared	0.77	0.67	0.65	0.70
	Transportation	**Wholesale**	**Retail**	**Services**
Size	0.0670***	0.0982***	0.0576***	0.0754***
	(0.01)	(0.01)	(0.01)	(0.01)
Tangibility	0.1877***	0.1463**	0.0651	0.1300***
	(0.02)	(0.06)	(0.04)	(0.05)
Market expectations	-0.0014***	0.0040	0.0000	0.0031*
	(0.00)	(0.00)	(0.00)	(0.00)
Profitability	-0.6145***	-0.2788**	-0.6101***	-0.4016***
	(0.07)	(0.14)	(0.13)	(0.11)
Dividend payer	0.0086	-0.0195	-0.0156	-0.0283**
	(0.01)	(0.02)	(0.01)	(0.01)
Constant	-0.1828***	-0.3682***	0.2927***	-0.2372***
	(0.06)	(0.10)	(0.10)	(0.08)
Adj. R squared	0.71	0.68	0.68	0.86

Appendix 7: Static model estimates across sectors in the US (book leverage)

Note: The model is specified by Equation (1) excluding median industry leverage with the book leverage ratio as the dependent variable. Year-fixed and firm-fixed effects have been used, but are not displayed. Standard errors are stated in parentheses. Coefficients that are significantly different from zero at a 1%-, 5%- or 10% level are indicated by ***, ** or *, respectively.

	Agriculture	**Mining**	**Construction**	**Manufacturing**
Size	-0.1598***	0.0295***	0.0181	0.0217***
	(0.05)	(0.01)	(0.01)	(0.00)
Tangibility	-0.1511	0.0864***	0.1237	0.1711***
	(0.17)	(0.03)	(0.09)	(0.02)
Market expectations	0.0018	0.0001	0.0003*	0.0000
	(0.00)	(0.00)	(0.00)	(0.00)
Profitability	-0.5854***	-0.2197***	-0.5440***	-0.1743***
	(0.16)	(0.04)	(0.07)	(0.02)
Dividend payer	0.0620*	0.0122	-0.0334*	0.0130***
	(0.03)	(0.01)	(0.02)	(0.00)
Constant	1.3996***	0.1855***	0.2895***	0.0934***
	(0.31)	(0.05)	(0.07)	(0.02)
Adj. R-squared	0.75	0.65	0.80	0.70
	Transportation	**Wholesale**	**Retail**	**Services**
Size	-0.0089	0.0621***	0.0243***	0.0199***
	(0.01)	(0.01)	(0.01)	(0.00)
Tangibility	0.2038***	0.1441**	0.0313	0.1920***
	(0.03)	(0.06)	(0.04)	(0.03)
Market expectations	-0.0000	0.0007	-0.0002	-0.0001
	(0.00)	(0.00)	(0.00)	(0.00)
Profitability	-0.2129***	-0.3128***	-0.1804***	-0.0578**
	(0.04)	(0.07)	(0.04)	(0.03)
Dividend payer	-0.0092	0.0005	-0.0237***	-0.0018
	(0.01)	(0.01)	(0.01)	(0.01)
Constant	0.3772***	-0.0624	0.1366***	0.0721**
	(0.04)	(0.05)	(0.05)	(0.03)
Adj. R squared	0.70	0.77	0.82	0.75

Appendix 8: Static model estimates for two periods (book leverage)

Note: The model is specified by Equation (1) with the book leverage ratio as the dependent variable. Year-fixed and firm-fixed effects have been used, but are not displayed. Standard errors are stated in parentheses. Coefficients that are significantly different from zero at a 1%-, 5%- or 10% level are indicated by ***, ** or *, respectively.

	United States		**China**	
	1998-2004	**2005-2012**	**1998-2004**	**2005-2012**
Size	0.0306***	0.0125***	0.0727***	0.0589***
	(0.00)	(0.00)	(0.01)	(0.00)
Tangibility	0.1094***	0.2038***	0.1108***	0.1578***
	(0.02)	(0.02)	(0.03)	(0.01)
Market expectations	0.0000	-0.0000	-0.0000	0.0000
	(0.00)	(0.00)	(0.00)	(0.00)
Profitability	-0.1681***	-0.1140***	-0.1912***	-0.4206***
	(0.02)	(0.01)	(0.06)	(0.03)
Dividend payer	0.0126**	0.0021	0.0147*	-0.0029
	(0.01)	(0.00)	(0.01)	(0.00)
Industry median	0.2276***	0.2201***	0.1969*	0.1994***
	(0.05)	(0.08)	(0.11)	(0.05)
Constant	0.0170	0.0599**	-0.1896***	-0.1745***
	(0.03)	(0.03)	(0.07)	(0.03)
Adj. R squared	0.78	0.84	0.83	0.77