TWO ESSAYS ON CORPORATE DEFAULT RISK

DU ZHE

(*B. Eng., TSINGHUA UNIVERSITY, CHINA; M. Sc., CITY UNIVERSITY OF HONG KONG*)

A THESIS SUBMITTED

FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF FINANCE

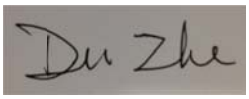
NATIONAL UNIVERSITY OF SINGAPORE

2014

DECLARATION

I hereby declare that this thesis is my original work and it has been written by me in its entirety. I have duly acknowledged all the sources of information which have been used in the thesis.

This thesis has also not been submitted for any degree in any university previously.



_____

Du Zhe

27 May 2014

Acknowledgements

I would like to express my deepest gratitude to Professor Anand Srinivasan, my supervisor, for his patient guidance and enthusiastic encouragement throughout the Ph.D. program. Without his help and support, the completion of this thesis would not have been possible. My heartfelt thanks also go to the other two thesis committee members, Professor Joseph Cherian and Professor Charles Shi, who gave me valuable comments and insightful feedbacks for this thesis. I am also very grateful to the research grant "Role of government in credit markets, No. R-315-000-104-646" for providing the financial support for Chapter 1. Moreover, I would like to express my gratitude to the Risk Management Institute at NUS for providing me the comprehensive data used in this thesis. I also want to thank Professor Duan Jin-Chuan at RMI for providing many valuable comments.

Besides, I am grateful to the professors in the Department of Finance and my Ph.D. classmates, for their great help and support on my Ph.D. journey during the past five years. I want to express my apology for not listing each name of you here individually.

Last but not least, I am deeply indebted to my parents Du Junlong and Shen Lingwan for their unconditional love and support. They inspire me to be always positive, passionate and self-confident. They let me know the meaning of the life and the beauty of the life.

Table of Contents

Summary

This thesis includes two essays on corporate default risk.

The first essay directly tests the association between state ownership and firm default risk, using a sample of Chinese listed firms from 1990 to 2011. I find strong evidence that higher state ownership leads to lower default risk due to soft budget constraints. State ownership has a stronger effect when firms are facing global negative industry return. Moreover, the effect of state ownership will be more significant for firms operating in competitive industries. Also, I find that state ownership has a less significant effect for firms located in regions with less government intervention and a better legal environment, where the budget constraint is harder.

In the second essay, I find strong evidence for the prediction power of currency return on firm default risk. And large local currency deprecation is a major reason for the positive association between currency return and default risk. Using country-level international trade data (the sum of exports and imports) as proxy for the likelihood of using foreign currency debt, I find that currency return has a greater effect for countries that more rely on international trade, providing supporting evidence for the channel of foreign currency debt that connects the exchange rate and firm default risk. Moreover, I find that while large currency depreciation could lead to higher default risk, small depreciation is good for countries with trade surplus (exports are larger than imports) and small appreciation is good for countries with trade deficit. In addition, the effect of currency return is less significant for countries with restrictions on exchange rate and less significant for countries with better financial market development.

List of Tables

Chapter 1

Chapter 2

List of Figures

Chapter 1: State Ownership and Firm Default Risk: Evidence from China

1.1. Introduction

Reporting on the Yunwei Co., Ltd., a manufacturing company in China, the *Financial Times*, Asia Edition, August 28, 2013, noted that:

"It (Yunwei) lost Rmb 1.2bn ($196m) last year, at times using just two-thirds of its production capacity….As things deteriorate, Yunwei at least has a cushion to fall back on. Its parent company is owned by the Yunnan provincial government, and officials in China have shown repeatedly that they are extremely reluctant to see their local champions fail…."

Financial Times, Asia Edition, August 28, 2013

The author of this article clearly expresses his view that the government will provide guarantees to state-owned enterprises (SOEs), a view widely accepted by the public and assumed in many studies. However, the relationship between firm default probability and state ownership has not been directly examined in academia, although we can see some hints or indirect evidence from past studies. Using data from China, this paper provides strong evidence for the negative association between state ownership and firm default risk, and endeavors to help us better understand the roles of government, competitions and market development in the economy.

Throughout history, politicians and economists have debated the role of government in the economy. The mass of previous literature examined the effectiveness of state ownership and private ownership, providing strong empirical evidence for the advantages of private ownership (see Eckel and Vermaelen, 1986; Chen, et al., 2008; Firth, et al., 2010; etc.). Moreover, many studies show that there is significant improvement in operating performance or equity value after privatization (Megginson and Netter (2001) summarize earlier findings; Sun and Tong, 2003; Megginson, et al., 2004; Boubakri, et al., 2011; etc.). However, the impact of state ownership on default risk has not been investigated.

The objective function that the government faces differs from that of private investors. The government might need to maximize social welfare, maintain a high employment rate, improve education and infrastructure, maintain the stability of society, and provide support to some industries of strategic importance to the country. SOEs play a crucial role for the government to achieve these goals. Thus, the government is reluctant to allow these firms to default and might provide guarantees for SOEs. This phenomenon is known as a soft budget constraint, a term first introduced by Kornai (1979, 1980, and 1986). Kornai and many other economists believe that the soft budget constraint arises from various state-imposed policy burdens and is the major source of inefficiency for firms in socialist economies (Lin, et al., 1998; Berglof and Roland, 1998; and Frydman, et al., 2000; etc.). In addition, some studies suggest that capitalist economies also have the soft budget constraints (Maskin, 1999; Kornai, et al., 2003). Government subsidies, soft taxation, soft credit and soft administrative prices are all means to soften the budget

constraint. Cull and Xu (2003) examine the two major methods of government bailout in China from 1980-1995: direct government transfers and loans from state-owned banks. They suggest that the bailout responsibilities were increasingly imposed on banks after 1990. Moreover, some studies provide indirect evidence for the soft budget constraint by comparing some characteristics of SOEs and non-SOEs. For example, Acharya and Kulkarni (2012) show supporting evidence that state-owned banks have access to stronger government guarantees and forbearance, by examining the deposit and lending growth of banks during the financial crisis. Borisova and Megginson (2011) and Borisova, et al. (2012), find that state ownership leads to lower cost of debt during the financial crisis due to the guarantee effect, using the European privatization and government investment sample, respectively. Therefore, due to the existence of a soft budget constraint, companies with higher state ownership might have a lower default risk.

However, conversely, a soft budget constraint might worsen the moral hazard, increase the agency cost, lead to lower firm value, and thus lead to a higher risk of default. Managers might not focus on firm value maximization, and instead will try to find the cash and credit subsidies from the government, and might give priority to the social and political goals of the government. Furthermore, state ownership provides a lower level of monitoring and the government guarantees also remove the monitoring incentive of other stakeholders (Bortolotti, et al., 2010). Also, the presence of a soft budget constraint will affect the firm's investment behavior. SOEs might take more risky investment and have lower investment-cash flow sensitivities (Chow, et

al., 2010). Therefore, the agency costs arising from the soft budget constraint might lead to a higher default risk.

Therefore, empirical investigation is needed for the association between state ownership and default risk due to the direct soft budget constraint effect and the agency cost effect arising from the soft budget constraint. In this paper, I present empirical evidence that state ownership leads to lower default risk, using Chinese listed firms' data from 1990-2011. I find strong predicting power of state ownership on firm default events after controlling several popular measures of default risk. These measures of default risk include Altman's (1968) Z-Score, Merton's (1974) Distance-to-Default (DTD), and the Probability of Default (PD) of Duan, Sun and Wang (2012), which mainly incorporate firm's financial and market information. I also test the effect of state ownership when a firm is facing global negative industry return, which can be viewed as an exogenous shock to the firm. I find that state ownership has a more significant effect on default risk during the shock period. This shock can be used to address potential endogeneity problem.

To examine whether the negative association between state ownership and default risk is only driven by some SOEs in natural monopoly industries, I conduct regressions using different subsamples based on industry competitiveness. I find that the effect for state ownership is more significant for firms in competitive industries. This finding helps differentiate the effect of state ownership with the effects of natural monopolies.

I also test the effect of state ownership when the budget constraint becomes harder. I find that state ownership has less effect for firms located in areas

with a better legal environment and less government intervention. The index of legal environment and government intervention is from Fan and Wang (2011). The results suggest that the effect of state ownership on default risk is less significant when the budget constraint becomes harder. Moreover, using the data of bank loans from China Stock Market & Accounting Research (CSMAR), I test one channel of the soft budget constraint. I find that firms with state ownership are more likely to get loans from state-owned banks.

There are several reasons why I use Chinese data in this study. First of all, state ownership is still very popular among Chinese firms and more than 60% of listed firms in China are SOEs. According to an Organisation for Economic Co-operation and Development (OECD) study by Christiansen (2011), there are only 48 listed SOEs among 27 countries. Thus, China-listed firms provide a large sample for analysis. Secondly, Chinese SOEs cover almost every industry sector, whereas among the 27 OECD countries, almost 75% of SOEs are in the utilities and financial sectors. Firms in the utility sector are probably natural monopolies and financial institutions play a special role in the economy. Thus, using Chinese data, it is possible to examine the state ownership effect and to avoid the natural monopoly effect and the financial sector effect. Thirdly, in the geographic dimension, there are significant differences among different regions in terms of market development. Thus we can examine the effect of state ownership under different legal environments and market development levels. This helps us better understand the role of government and the role of the market.

This paper contributes to the literature on government guarantees. In previous studies, it is assumed that government provides a guarantee to SOEs and is

reluctant to allow SOEs to default. Although this view is widely accepted by the public, the direct empirical evidence is missing. This paper is the first to directly test the effect of state ownership on default risk, and provide evidence that the presence of state ownership leads to lower default probability. The finding could help us better understand the role of government in the economy. Moreover, this paper makes contributions to the default forecast literature. Previous default forecast models mainly incorporate a firm's financial and market information. This study suggests that the ownership structure, which might affect firm value over a longer period of time, should also be incorporated into the forecast model, at least into the forecast model with the longer time window.

Most previous studies on state ownership focus on effectiveness, and only two papers (Borisova and Megginson, 2011; Borisova, et al., 2012) examine the association between tate ownership and cost of debt, areas which are the closest to this study. This paper differs from their studies in several aspects. Firstly, the samples are different. Borisova and Megginson (2011) use the European privatization sample, and Borisova, et al. (2012) use the European government investment sample. Nearly 60% of the observations in Borisova and Megginson (2011) are for banks, and 34% of the investment deals are in the financial sector in Borisova, et al. (2012). My sample includes all the Chinese listed firms with data available on CSMAR and the National University of Singapore Risk Management Institute (NUS-RMI) database (NUS-RMI, 2013). And only 29 firms are in the financial sector. Because of the different economic roles of financial firms and non-financial firms in society, they should have different abilities to access government guarantees.

Secondly, our findings are different. Borisova and Megginson (2011) find that state ownership leads to lower cost of debt, but fully privatized firms (zero state ownership) have lower cost debt compared to partially privatized firms. And Borisova, et al. (2012) find a negative association between state ownership and cost of debt only during a financial crisis period. The results in this paper suggest a linear relationship between state ownership and default risk.

The remainder of the paper is organized as follows. Section 2 develops testable hypotheses. Section 3 introduces some background on Chinese SOEs. Section 4 describes data and summary statistics. Section 5 performs and discusses empirical analyses. Section 6 concludes.

1.2. Hypotheses Development

It is widely accepted by the public that the government will provide guarantees to SOEs and is reluctant to allow SOEs to default. This phenomenon is referred to as soft budget constraint, in many studies. The motivation for the government is to achieve its social and political goals, such as maintaining the employment rate, improving education and medical services, supporting industry sectors of strategic importance to the safety of the country. Government guarantees through bank loans, fiscal subsidies, and soft taxation might lead to lower default risk. However, on the other hand, the presence of soft budget constraints might worsen the managerial moral hazard and increase agency costs. The corporate governance problem arising from soft budget constraint might increase the firm's default risk. Thus, the relationship between state ownership and default risk is still an empirical question. In

China, the legal system is not well developed, and a modern corporate governance scheme has yet to be established in both SOEs and non-SOEs. Many non-SOEs are family-owned firms, and might suffer more severe moral hazard problems. Thus, the government guarantee effect might be more significant than the agency cost effect arising from the soft budget constraint, for Chinese firms. We could expect that firms with state ownership have lower default risk.

> **Hypothesis 1 (H1):** *The presence of state ownership leads to lower probability of default.*

I can conduct a test to examine the effect of state ownership when the firm is facing global negative industry return, which can be viewed as an exogenous shock to the firm. If the negative association between state ownership and default risk is due to the soft budget constraint, we could expect that the effect of state ownership will be stronger during the shock period. This shock to default risk can be used to deal with potential endogeneity problem.

> **Hypothesis 2 (H2):** *State ownership has more significant effect on default risk when firms are facing global negative industry shock.*

Since many SOEs are in concentrated industries such as utilities, natural resources and telecommunications, the negative association between state ownership and default risk might be driven by those SOEs. To differentiate the government soft budget constraint effect and the natural monopoly effect, we can test the relationship using different subsamples based on industry competitiveness. And due to the soft budget constraint, we could expect that state ownership still would have a significant effect for firms in competitive

industries. Furthermore, because of the strong competition, SOEs operating in competitive industries are more likely to acquire government guarantees, and the state ownership effect will be stronger in competitive industries.

Hypothesis 3 (H3): *The effect of state ownership is more significant for firms in competitive industries.*

Moreover, in an environment with a better legal system and less government intervention, the budget constraint will be much harder. Fan and Wang (2011) provide a marketization index for China's provinces, which is widely used in research on China. Among the 23 indicators of the comprehensive index, there is one indicator for the legal environment, and another one for government intervention. The two indicators are based on the survey of more than 4,000 enterprises in China. Using the two indicators, we can test the effect of state ownership under different legal and market environments; and, we could expect that the effect of state ownership is less significant for firms located in regions with a better legal environment and less government interventions.

Hypothesis 4 (H4*):* *The effect of state ownership is less significant for firms located in regions with a better legal environment and less government intervention.*

1.3. Some Background on Chinese SOEs

1.3.1. Overview

The state sector in China includes the following categories: 1) enterprises managed by the State-owned Assets and Supervision and Administration

Commission (SASAC) of the State Council, provincial SASACs and municipal SASACs, China Banking Regulatory Commission (CBRC), China Insurance Regulatory Commission (CIRC), China Securities Regulatory Commission (CSRC), or government ministries such as Ministry of Commerce, Ministry of Education; 2) enterprises effectively controlled by SOEs or their subsidies; 3) urban collective enterprises and village enterprises. Usually, the first two categories are considered as SOEs. Central SOEs include entities managed by SASAC of the State Council; state-owned financial institutions supervised by CBRC, CIRC, CSRC; entities owned by central government ministries. When China was a centrally planned economy, SOEs were fully owned by the state. Nowadays, the SOEs refer to state-owned and state-holding enterprises. After nearly 35 years of privatization, restructuring, joint ventures, mergers and acquisitions, the ownership structure of SOEs has become much more complicated, and thus it is difficult to clearly define the state shares and to provide accurate statistics on SOEs. According to OECD (2009), a study of Chinese SOEs, it is difficult to find a consistent data set that could distinguish between state-owned and non-state-owned legal entity shares. And based on this study, 70% of listed Chinese non-financial firms are SOEs in 2004, by identity of the largest shareholders. By the end of 2008, there are 149 central SOEs controlled by SASAC of the State Council, and the subsidies of these central SOEs might exceed 10,000.

The contribution of SOEs on gross domestic product (GDP) is large. Based on a report for the U.S.-China Economic and Security Review Commission performed by Szamosszegi and Kyle (2011), SOEs accounted for 45% of non-agricultural GDP and 40% of GDP in 2007. For employment, pure SOEs

(fully owned by the SASACs or government ministries) account for nearly 30% of the urban employment rate in 2009, based on the National Bureau of Statistics of China. Although there is a clear diminishing trend of SOEs' contribution, SOEs still remain a significant component in the economy.

Strategic industries, which are important to China's economic and national security, including defense, electric power and grid, petroleum and petrochemical, telecommunications, coal, civil aviation and shipping, are wholly or largely controlled by the state. For some other important industries, so-called pillar industries, including equipment manufacturing, auto, information technology, construction, chemicals, iron and steel, non-ferrous metals, and surveying and design, the state holds significant ownership, not majority ownership. For historical reasons, SOEs still exist in other industries, such as food and beverage, hostel. SOEs are present in almost all the industries.

The government maintains significant influence over SOEs. The government decides on the appointments of top executives of SOEs and on their future career paths after leaving the SOE. Thus, the executives of SOEs have strong incentives to follow the government's policy and to achieve the social and political goals of the government. SOEs, as an instrument of government policy, play significant roles in technology innovation (high speed rail), importing raw materials from other countries, and will continue their important role in the Chinese economy.

1.3.2. History of SOE reform

SOE reform since 1978 can be divided into two stages:

Stage 1: 1980s and early 1990s. Prior to 1978, the government determined the production level of SOEs. SOE reform was focused on revitalization by giving incentives and providing managers with more decision-making power. At this stage, the SOEs had more flexibility in production and could make adjustments to their production plans based on market information. Moreover, SOEs started to establish the Manager Responsibility System in the late 1980s. Under this system, the manager took full responsibility for the SOE's operation and the government should not intervene in the SOE's decision making. However, at this stage, there was no significant change in the ownership structure and governance structure, and the low efficiency problem had not been solved. SOEs' profitability was decreasing in the late 1980s and early 1990s. According to OECD (2009), in 1997, 6,599 companies out of about 22,000 large- and medium-sized SOEs recorded losses. SOE reform became a priority for the premier, Zhu Rongji.

Stage 2: Since 1997, when Zhu Rongji became the premier of China. First of all, the government realized that it could not manage so many SOEs, and therefore adopted the strategy "Zhua Da Fang Xiao" (Keep the larger SOEs, release the smaller SOEs). The smaller SOEs were allowed to go bankrupt, to be acquired or become privatized. Secondly, to enhance SOE performance, the government implemented strategies such as huge layoffs, debt reduction, and technology improvement. Thirdly, four Asset Management Corporations were established to deal with the bad loans of the four largest state-owned banks. By the end of 2001, 4,000 out of 6,599 money-losing SOEs earned positive net profits (OECD, 2009). At the same

time, the ownership structure and corporate governance structure started to reform. According to OECD (2009), the SOEs began to establish the "Modern Enterprises System": 1) clarification of property rights; 2) clarification of rights and responsibilities; 3) separation of politics and business; and 4) scientific management. SOEs were encouraged to be listed in stock exchanges and raise capital from the public.

1.3.3. SOEs in other countries

According to an OECD study conducted by Christiansen (2011), there are only 48 listed SOEs in 27 OECD countries. In terms of sectoral distribution, most of the listed SOEs are in the utilities sectors, while some are financial institutions. In fact, due to the financial crisis, Germany and the United Kingdom have become minority owners of large financial institutions. Only Finland, France, Italy, Norway and Poland maintain minority state ownership in listed manufacturing companies. Around half of all SOEs, including non-listed SOEs, are in the network sectors (transportation, power generation and other energies). Financial institutions account for one-fourth of SOEs' total valuation. For some Scandinavian nations or countries that have recently made a transition towards market economies, such as the Czech Republic, Finland, Israel, Poland and Norway, SOEs account for 20% to 30% of the GDP. On average, for the 27 countries studied in Christiansen (2011), SOEs account for 15% of the GDP.

Also according to Christiansen (2011), for the 27 OECD countries, there are two types of state-owned shares: those directly held by the state; those held by

state-controlled financial institutions such as government-owned insurance and pension schemes, and government-owned investment funds.

1.4. Data and Summary Statistics

1.4.1. Data and sample selection

The sample includes all listed firms in China's Shanghai Stock Exchange and Shenzhen Stock Exchange with relevant data available in CSMAR, a widely used Chinese financial database, and the NUS-RMI database. The Credit Research Initiative database of the Risk Management Institute (RMI) of the National University of Singapore provides several measures of default probability, such as Probability of Default (PD) and Distance-to-Default (DTD). Moreover, the RMI database also provides comprehensive information on both market data and financial data on about 60,000 exchange-listed firms of 106 economies around the world. I retrieved the data used in this paper from the RMI database in January 2012. For those firms with both A shares and B shares traded on the stock exchange, I only include observations for A shares. I obtain the state share data and the firm ultimate controlling shareholder data from CSMAR. After the split share reform introduced in 2005, non-tradable shares become tradable, but the tradable state shares are not recorded in CSMAR. Thus, only the state share data before the split share reform are used for analysis. I also define SOE based on the type of firm ultimate-controlling shareholder. I merge the ownership data with the RMI database, and obtain around 14,000 firm-year observations for regression analysis.

1.4.2. State ownership

China's two stock exchanges, the Shanghai Stock Exchange and the Shenzhen Stock Exchange, were established in 1990. There are two types of shares traded on these exchanges: A shares (RMB-denominated) and B shares (foreign currency-denominated). Under the split share structure, established from the beginning, A shares are further divided into tradable shares and non-tradable shares. In 1990, approximately two-thirds of the A shares are non-tradable shares. The two major holders of non-tradable shares are the state (government departments and agencies) and legal entities (the underlying companies and executives) (Guo and Keown, 2009). In April 2005, the Chinese government initiated a split share structure reform to convert all non-tradable shares into tradable shares. By the end of 2007, the reform was complete for most companies, which represent over 97% of the total A-share market capitalization (Li, et al., 2011).

In this paper, I construct two variables for state ownership. The first is a dummy variable, *SOE*. A firm is defined as SOE if the ultimate controlling shareholder is: 1) SASAC of the State Council, provincial SASACs or municipal SASACs; 2) CBRC, CIRC, or CSRC; 3) government ministries; 4) Other SOEs. The ultimate controlling shareholder information is available on the CSMAR database and is extracted from firm annual reports. The yearly data are available from 2003 to now. Since the listed firms usually are large and there is almost no complete privatization of large SOEs before 2003, I assume for years before 2003, the ultimate controlling shareholder is the same as that in 2003. I also define the central SOEs based on the ultimate controlling shareholders. CSMAR's definition of controlling shareholder is

based on CSRC's Administration of Takeover of Listed Companies Procedures. That is, a shareholder is classified as controlling shareholder if he satisfies any one of the following scenarios: 1) the one holds more than 50% of the total shares; 2) the one who holds more than 30% of the voting rights; 3) the one who can decide the appointments of over half of the board directors in a listed company. The ultimate controlling shareholder is the last layer of the shareholding relation chain.

The other state ownership variable is the percentage of state shares, defined as the ratio of the number of state-owned shares divided by the total number of shares. The state-owned shares are non-tradable shares owned by the state. After the split share structure reform, the non-tradable shares become tradable shares, and many shares are owned by other state-owned companies, making the ownership structure much more complicated. Thus the state share is very difficult to define clearly. In my sample, only the state share data before the reform are included.

Panel A of Table 1.1 reports the summary statistics for *SOE*. The percentage of SOEs is more than 60% for the years before 2009. Then it decreases to around 40% after 2009, probably due to the state share reduction in the split share reform and the state share transmission reform starting from 2009. The statistics are similar to OECD (2009). Panel B reports the summary statistics for state shares. Approximately, 70% of the total companies have state-owned shares. The mean of state shares is in the range of (0.265, 0.360). The mean of the state shares of the whole sample is 35.1%, from Panel E, and the standard deviation is 26.1%, statistics almost the same as those in Li, et al. (2011).

Among all the observations, 25% are below 3.6% and almost 50% are above 40%.

The first variable *SOE*, the dummy variable, is defined based on the control rights, while the second one State Shares uses ownership data. To investigate the correlation of the two variables, I examine the state share distribution of SOE sample and non-SOE sample. The results are presented in Panel C and Panel D. The mean of state shares of SOE sample (*SOE* = 1) is 43.2%, while the mean of non-SOE sample is 18.4%. Panel C also reports the mean of state shares by year. In most years, the mean of state shares for SOE sample is higher than 40%, which is much higher than non-SOE sample. From 1997, the difference between the two samples is increasing, probably due to the SOE reform "Zhua Da Fang Xiao" (Keep the larger SOEs and release the smaller SOEs). Panel D reports more details for the comparison. For SOE sample, almost 75% of the observations have more than 30% state shares. Among the observations of non-SOE sample, 50% are below 4.2%.

1.4.3. Default events

The dependent variable in the main regressions is Default, a dummy variable indicating the happening of default events. The default events are extracted from the RMI database. These events are collected from many resources, including Bloomberg, Wind Financial database, Compustat, The Center for Research in Security Prices (CRSP), Moody's reports, Taiwan Economic Journal (TEJ), exchange web sites and news sources. A challenging problem is that the definition of default might vary across different data sources. RMI applies a default definition consistently across different economies. Based on

the RMI technical report (2013), the default events can be classified under one of the following events:

1. Legal impasse to the timely settlement of interest or principal payments, such as bankruptcy filing, receivership, administration, liquidation;
2. Missed or delayed payments of interest or principal, not including delayed payments made within a grace period;
3. Debt restructuring or distressed exchange, in which a new security or package of securities is offered to debt holders, resulting in a diminished financial obligation (such as a conversion of debt to equity, debt with lower coupon or par value, debt with lower seniority, debt with longer maturity).

1.4.4. Measures of default probability

The main control variables used in my analysis are several popular default risk measures from previous default risk models:

Z-Score: Altman's Z-Score is calculated by the following equation:

$$Z = \sum_{j=1}^{k} \beta_j X_{jt}$$

where β_j are the discriminant coefficients and X_{jt} are discriminant variables. Altman's variables include five accounting ratios: working capital to total assets (WC/TA), retained earnings to total assets (RE/TA), earnings before interest and taxes to total assets (EBIT/TA), market equity to total liabilities (ME/TL), and sales to total assets (SL/TA). In calculating Altman's Z-score

for a developing country (China in this paper), the variable SL/TA, is not used. Distance-to-Default (DTD): Based on Merton's (1974) Distance-to-Default model, distance-to-default measures the distance between the current value of assets and the debt amount in terms of asset volatility. It can be calculated as the following:

$$DTD = -\frac{\ln(V_t / L) + (\mu - (\sigma_V^2 / 2))(T - t)}{\sigma_V (T - t)}$$

where V_t denotes the current value of assets, L denotes the liabilities, and σ_V is the asset volatility. These data are available in the RMI database. Duan and Wang (2012) discuss the estimation methods for DTD calculation. For financial and properties firms, which typically have higher leverage, the KMV Corporation's estimation seems ill-suited. Thus, a transformed-data maximum likelihood estimation (MLE) approach is applied to the DTD calculation in the RMI database.

Probability of Default (PD): Duan, et al. (2012) propose a forward intensity approach for the prediction of corporate defaults over different future periods. And the prediction is very accurate for short periods, with the accuracy ratios exceeding 90% for 1- and 3-month horizons and 80% for 6- and 12-month horizons using U.S. data. The accuracy ratio decreases when the horizon is increased to two or three years, but its performance remains reasonable. This measure incorporates the profit, liquidity and market information of the firm. The data are available on the RMI database. The PD for a 1-year horizon is used in this paper.

1.4.5. Summary statistics and univariate analysis

Table 1.1 Panel E reports the summary statistics for the variables in the main regressions. All the variables except *SOE*, *State Shares*, *Default* and *PD* are winsorized at 1%. The default ratio is calculated as the number of defaults divided by the total number of firm-year observations. The default ratio for the whole sample is 2.0%. Based on Panel F, the default ratio for SOEs is 1.4%, while non-SOEs' default ratio is 2.6%. Non-SOEs have a significantly higher default ratio.

I divide the whole sample into quartiles Q1 to Q4 based on the state shares. Q1 represents the quartile with smallest state share, and Q4 represents the largest state share quartile. Panel G of Table 1.1 reports the default ratio of these four subsamples. The default ratio of Q1 is 0.036, which is significantly higher than that of Q4 (0.01), suggesting that firms with lower state ownership have a larger likelihood to default. The t-statistic for equality test (Q1 vs. Q4) is 5.95, which is significant at the 1% level.

Panel H describes the state ownership and default ratio in terms of industry sectors. The sample covers almost all the industry sectors, and only 29 financial firms (1.4% of the total number of firms) are included. The Properties sector has the second lowest percentage of SOEs (52.7%), and the highest default ratio (4.1%, much higher than the average 2%). This table also suggests a negative association between state ownership and default risk. Appendix 2 reports the state ownership and default ratio in terms of a much narrower industry classification.

[Insert Table 1.1 Here]

Table 1.2 presents the Spearman rank correlation matrix. The correlation between *Default* and *State Shares* is -0.061, and is significant at the 1% level, suggesting a negative association between state ownership and default risk. The correlations between *Default* and *PD, Z Score* and *DTD* are 0.158, -0.160 and -0.071, respectively, and all are significant at the 1% level, suggesting that these several previous measures of default probability work very well. These measures capture the firm's liquidity, profit, competitive position in the industry and market information, and will be the main control variables in the following regression analysis.

[Insert Table 1.2 Here]

1.5. Empirical Results

In this section, I first test the predicting power of state ownership on corporate default events. To address the potential endogeneity problem, I examine the effect of state ownership when firms are facing shocks on default risk. Moreover, the effect of state ownership under different industry competitiveness is investigated. I also examine the effect of state ownership for the firms located in regions with a better legal environment and less government intervention, when the budget constraints become harder. In addition, I use the data on bank loans from CSMAR to test whether firms with state ownership could more easily obtain loans from banks or state-owned banks. This test could provide evidence for one of the channels of soft budget constraints.

1.5.1. The predicting power of state ownership on corporate default events

Using probit regressions, I test the predicting power of state ownership on a corporate default event. I employ the following yearly regression model:

$$Default_{it+1} = \delta_0 + \delta_1 StateOwnership_{it} + \delta_2 ZScore_{it} + \delta_3 DTD_{it} + \delta_4 PD_{it} + \delta_5 Other\ Controls + Fixed\ Effect + e1_{it},$$

where the dependent variable $Default_{it+1}$ is a dummy variable indicating the presence of corporate default events in year t+1. The coefficient on state ownership is expected to be negative due to the soft budge constraint effect, which suggests the government will provide a guarantee for firms with state ownership.

The regression results are reported in Table 1.3. I include industry fixed effects and year fixed effects for all four regressions. In column (1), after controlling for *PD*, the coefficient on *SOE* is -0.240 (z-statistics = -3.93), which is negative and significant at the 1% level, providing evidence for Hypothesis 1 that the presence of state ownership leads to lower default risk. In column (2), after controlling *PD*, *DTD* and *Z Score,* the coefficient on *SOE* is still negative and significant (-0.254, z = -3.55). I include *SOE_Central* in column (3), but the coefficient is not statistically significant. This suggests that central state ownership does not have a stronger effect on firm default risk. The possible reason might be that local SOEs still could access local government guarantees, and thus there is no significant difference in default risk between central SOEs and local SOEs. In column (4), I add more control variables, several firms' standard financial variables, such as *Size, Market-to-*

book ratio, Profit margin, ROA, Leverage. The coefficient on SOE (-0.354. z = -4.55) is still negative and significant. There is almost no change in the coefficients on *SOE* when I use different control variable sets.

As expected, the coefficient on *PD* is positive and significant for all regressions, and the coefficient on *DTD* is negative and significant. Since the *PD, Z Score* and *DTD* have included the information on firm's liquidity, profit and market returns, the coefficients on many financial variables in column (4) are not significant. In the following regressions, I only include *PD* as the main control variable.

[Insert Table 1.3 Here]

1.5.2. The effect of state ownership when a firm is facing global negative industry shock

The global negative industry return can be viewed as an exogenous shock to firm default risk. If state ownership does have an effect on the default risk, we could expect that the effect will be stronger during the negative industry shock period. This also can address potential endogeneity problem caused by some unobservable variables. In particular, state ownership and default risk might be both determined by some unobserved firm or industry characteristics. For example, natural monopolies usually have lower default risk by nature, but at the same time they also have higher state ownership.

I define the negative industry shock as an event when the industry return for the last year is smaller than -10%. The industry return is calculated as the mean of stock returns of all the firms from 30 economies of the world, with

the data available on the NUS-RMI database. The database covers the major economies from North America, Europe and Asia, such as the U.S., U.K., China, Japan, Germany, and France. The industry is defined based on the Bloomberg Industry Subgroup Classification. Since the industry return is calculated globally, the event can be viewed as an exogenous shock to firm default risk to the specific firm.

Table 1.4 reports the regression results. The sample of column (1) only includes observations with a negative industry shock, and the sample of column (2) includes observations without negative shocks. I use the dummy variable *State_Dummy* to indicate the presence of state ownership (equals 1 when the state share is not 0). The coefficient on *State_Dummy* is negative and significant at the 1% level (-0.503, z = -2.72). However, the coefficient on state ownership is not significant in column (2). The combination of columns (1) and (2) shows the supporting evidence for Hypothesis 2, that the effect of state ownership is stronger when firms are facing shocks on default risk. Using the whole sample, I add the interaction term *State_Dummy*Negative Industry Shock* in column (3). The *Negative Industry Shock* is a dummy variable indicating the presence of the industry shock. The coefficient on this interaction term is negative and significant (-0.402, z = -1.78), supporting Hypothesis 2.

[Insert Table 1.4 Here]

1.5.3. The reduction of state shares

There is possibility that the government can choose the companies which have lower default risk. To address this concern, I investigate the motivation of the government behind the events of the reductions in state shares.

First, I construct a reduction sample including the events that there is a reduction in state shares of a company in a year. Then I compare some firm-specific characteristics before the reduction in state shares of the reduction sample and the whole sample. The results are reported in Table 1.5. It shows that the government reduces the state shares of smaller SOEs, even when the smaller SOEs have larger profit margin and higher ROA. The mean of *Size* of the reduction sample (*Size*=20.92) is significantly smaller than that of the whole sample (*Size*=21.31). The reduction might be because the SOE reform "Zhua Da Fang Xiao" (Keep the larger SOEs and release the smaller SOEs) started by Premier Zhu Rongji.

For the reduction sample, I further divide it into three subsamples: 1), *PD* increases by more than 10% after the reduction; 2), *PD* decreases by more than 10%; 3), the change in *PD* is less than 10%. Then I compare the firm characteristics before the reduction of the subsample 1) and 3). Table 1.5 also reports this comparison. The difference in *Size* is significant, suggesting that larger firms are more likely to have a decrease in default risk. Before the reduction, the firms with higher past stock return, higher Market-book ratio and lower leverage are more likely to have an increase in *PD*. This might be because the firms with higher past stock return possibly will have lower return

in the future. In general, the findings do not support the argument that the government will choose the companies with lower default risk.

[Insert Table 1.5 Here]

1.5.4. The effect of state ownership under different industry competitiveness environments

Many SOEs are in natural monopoly industries or the financial industry. Due to the special roles of natural monopolies and financial institutions in the economy, they have more access to government guarantees. Thus, the negative association between state ownership and default risk might be driven by the natural monopoly effect or the financial sector effect, not the soft budget constraint effect. To address this concern, I examine the effect of state ownership under different industry competitiveness environments.

There are two interesting questions here. First of all, does state ownership still have an effect on default risk in competitive industries? If the negative association is driven by the SOEs in concentrated industries, state ownership will not have an effect in competitive industries. Secondly, does state ownership have a more significant effect on default risk in competitive industries? SOEs operating in competitive industries face stronger competition from private firms, and they are more likely to acquire government guarantees. Thus, we could expect that the effect of state ownership should be stronger for firms in competitive industries.

I use two definitions for competitive industries: 1) HHI is smaller than the median value; 2) HHI is smaller than 0.15. The industries are defined based on

CSMAR Industry B classification (166 industry sectors). HHI is the *Herfindahl-Hirschman Index (HHI)*, defined as the sum of the squares of the market shares of the firms in the same industry. Table 1.6 presents the analysis results. Column (1) uses the competitive industry sample based on definition 1. Column (2) uses the non-competitive industry sample based on definition 1. Based on definition 2, the competitive industry sample is used in column (3) and the non-competitive industry sample is used in column (4). The coefficient on *SOE* for column (1) is -0.282 and significant at the 1% level. But the coefficient in column (2) is not significant, suggesting that the effect of state ownership is stronger for competitive industries and providing evidence for Hypothesis 3. Similarly, the coefficient on *SOE* in column (4) is not significant, while the coefficient is negative and significant in column (3).

[Insert Table 1.6 Here]

1.5.5. The effect of state ownership when budget constraint becomes harder

Budget constraints are much harder for firms located in regions with less government intervention and a better legal environment. The indicators of government intervention and legal environment are from Fan and Wang (2011),[1] and the two indicators are based on the survey of more than 4,000 enterprises in China. Using the two indicators, I test the effects of state ownership under different legal and market environments and the results are

[1] Fan and Wang (2011) provide a marketization index at the provincial level, which captures the regional market development of the following aspects: 1) relationship between government and market; 2) development of non-state business; 3) development of product market; 4) development of factor market; 5) development of market intermediaries and legal environment. There are 23 indicators included in the comprehensive marketization index. The data are either from statistics or enterprise and household surveys.

presented in Table 1.7. $GovIntervention_{it}$ is a dummy variable, which equals 1 when the government intervention index for the region is greater than the median value of all the regions at year t. In column (1), the coefficient on the interaction term *SOE*GovIntervention* is positive but not significant. However, in column (3), using the state share variable, the coefficient on the interaction term *State*GovIntervention* is 0.512 and statistically significant, suggesting that state ownership has less effect on firms located in regions with less government intervention. Moreover, the coefficient on the interaction term *SOE*LegalEnviron* is 0.256 and significant in column (2). In column (4), the coefficient on *State*LegalEnviron* is 0.650 (z = 2.17), which is positive and significant at the 5% level. *LegalEnviron* is a dummy variable, which equals 1 when the legal environment index for the region is greater than the median value of all the regions at year t. This table reports evidence for Hypothesis 4.

[Insert Table 1.7 Here]

1.5.6. State ownership and the probability of obtaining bank loans

In the 1980s and early 1990s, loans from state-owned banks are one of the major channels of soft budget constraints (Cull and Xu, 2003). Using the data on bank loans from CSMAR from 1990 to 2006, I can examine whether firms with state ownership have a larger likelihood of obtaining loans from banks or state-owned banks. I conduct a probit regression using the following model:

$$BankLoan_{it+1} = \delta_0 + \delta_1 StateOwnership_{it} + \delta_2 Other\ Controls + Fixed\ Effects + e2_{it},$$

$StateBankLoan_{it+1} = \delta_0 + \delta_1 StateOwnership_{it} + \delta_2\ Other\ Controls + Fixed\ Effects + e3_{it}$,

where *BankLoan* is an indicator of obtaining loans from banks and *StateBankLoan* is the indicator of obtaining loans from state-owned banks. Since state-owned banks are more likely to be affected by the government (Dinc, 2005; La Porta, et al., 2002), we could expect that firms with state ownership have a larger likelihood of getting loans from state-owned banks. The effect of state ownership on the probability of obtaining loans from all banks still needs empirical investigation since government guarantees are more likely through the channel of state-owned banks.

The empirical results are reported in Table 1.8. The coefficient on state ownership in column (2) is 0.212 (z = 1.91), which is positive and significant, providing supporting evidence that firms with state ownership are more likely to get loans from state-owned banks. This also provides evidence for one of the channels of soft budget constraints for firms with state ownership. Although the coefficient on state ownership (0.037) is positive, it is not significant, suggesting that private firms could obtain loans from non-state-owned banks. Based on some unreported regression results, the bank loan interest for firms with state ownership is not significantly higher than that of other firms. The reason might be that the bank loan interest is controlled by the central government during the sample time period.

[Insert Table 1.8 Here]

1.5.7. Discussions on the dummy variable *SOE*

The dummy variable *SOE* is defined based on firm's controlling shareholder. Although I have shown the high correlation between *SOE* and state shares, there are still some concerns. Firstly, the definition of SOE using control rights is very strict. It usually requires the firm has more than 30% state shares. There are some possibilities that some firms with high state ownership are classified as non-SOEs. Secondly, the findings that firms controlled by the government have lower default risk might not be generalized to firms with state shares. The controlling effect might be stronger than the ownership effect. In the regressions not reported in the paper, I conduct analysis directly using data on state shares before the split stock reform. I find that higher state shares lead to lower default risk. The state shares are absolute values, not dummy variables based on some criteria. This provides evidence for the ownership effect.

1.6. Conclusion

This paper is the first to directly test the association between state ownership and firm default risk. I find that the presence of state ownership leads to lower default risk due to the soft budget constraints. And the effect of state ownership is more significant for firms operating in competitive industries. Then, I examine the effects of state ownership when the budget constraint becomes harder. I find evidence that state ownership has a less significant effect for firms located in regions with less government intervention and a better legal environment. These results could help us better understand the role of government, competitions and market development. To address the

potential endogeneity problem, I examine the effects of state ownership on default risk when firms are facing negative shocks to default risk. I find that state ownership has a stronger effect on default risk when firms are facing global negative industry shock. In addition, this paper suggests that the ownership information should be incorporated into the default forecast model, at least in longer time-window forecasting.

Bibliography 1

Acharya, V. V., and N. Kulkarni, 2012. "State Ownership and Systemic Risk: Evidence from the Indian Financial Sector during 2007-09." Working paper.

Altman, E., 1968. "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy." *The Journal of Finance*, 23: 589-609.

Berglof, E., and G. Roland, 1998. "Soft Budget Constraints and Banking in Transition Economies." *Journal of Comparative Economics* 26: 18-40.

Black, F., and M. Scholes, 1973. "The Pricing of Options and Corporate Liabilities." *Journal of Political Economy*, 81 (3): 638-654.

Borisova, G., V. Fotak, K. V. Holland and W. L. Megginson, 2012. "Government Ownership and the Cost of Debt: Evidence from Government Investments in Publicly Traded Firms." Working paper.

Borisova, G., and W. L. Megginson, 2011. "Does Government Ownership Affect the Cost of Debt? Evidence from Privatization." *Review of Financial Studies*, 24: 2693-2737.

Bortolotti, B., V. Fotak, and W. Megginson, 2010. "Quiet Leviathans: Sovereign Wealth Fund Investment, Passivity, and the Value of the Firm." Working paper.

Boubakri, N., J. Cosset, O. Guedhami and W. Saffar, 2011. "The Political Economy of Residual State Ownership in Privatized Firms: Evidence from Emerging Markets." *Journal of Corporate Finance* 17: 244-258.

Chen, G.M., M. Firth, Y. Xin and L. P. Xu, 2008. "Control Transfers, Privatization and Corporate Performance: Efficiency Gains in China's Listed Companies." *Journal of Financial and Quantitative Analysis* 43: 161-190.

Chow, C. K. W., F. M. Song, and K. P. Wong, 2010. "Investment and the Soft Budget Constraint in China." *International Review of Economics and Finance*, 19(2): 219-227.

Christiansen, 2011. "The Size and Composition of the SOE Sector in OECD Countries", *OECD Corporate Governance Working Papers, No.5,* www.oecd.org/daf/corporateaffairs/wp

Cull, R., and L. C. Xu, 2003. "Who Gets Credit? The Behavior of Bureaucrats and State Banks in Allocating Credit to Chinese SOEs." *Journal of Development Economics*, 71 (2): 533-559.

Dinc, I. S., 2005. "Politicians and Banks: Political Influences on Government-owned Banks in Emerging Markets." *Journal of Financial Economics*, 77 (2): 453-479.

Duan, J., J. Sun, and T. Wang, 2012. "Multiperiod Corporate Default Prediction – A Forward Intensity Approach." *Journal of Econometrics*, 170 (1): 191-209.

Duan, J., and T. Wang, 2012. “Measuring Distance-to-Default for Financial and Non-Financial Firms.” *Global Credit Review*, 02 (1): 191-209.

Eckel, C. C., and T. Vermaelen, 1986. “Internal Regulation: The Effects of Government on the Value of the Firm.” *The Journal of Law and Economics* 29: 381-403.

Fan, G., Wang, X.L., 2011. “NERI Index of Marketization of China’s Provinces.” *Economics Science Press* (In Chinese).

Firth, M., C. Lin, and H. Zou, 2010. “Friend or Foe? The Role of the State and Mutual Fund Ownership in the Split Shares Structure Reform in China.” *Journal of Financial and Quantitative Analysis* 45: 685-706.

Frydman, R., C. W. Gray, M. Hessel, and A. Rapaczynski, 2000. “The Limits of Discipline: Ownership and Hard Budget Constraints in the Transition Economies.” Working paper.

Guo, E. Y., and A. J. Keown, 2009. “Privatization and Non-Tradable Stock Reform in China: The Case of Valin Steel Tube & Wire Co. Ltd.” *Global Finance Journal* 20: 191-208.

Kole, S. R., and J. H. Mulherin, 1997. “The Government as a Shareholder: A Case from the United States.” *Journal of Law and Economics*, 40: 1-22.

Kornai, J., 1979. “Resource-constrained versus Demand-constrained systems.” *Econometrica* 47: 801-819.

Kornai, J., 1980. *Economics of Shortage*. Amsterdam: North-Holland.

Kornai, J. 1986. “The Soft Budget Constraint.” *Kyklos* 39: 3-30.

Kornai, J., E. S. Maskin, and G. Roland, 2003. “Understanding the Soft Budget Constraint.” *Journal of Economic Literature* 41: 1095-1136.

La Porta, R., F. Lopes-De-Silanes, and A. Shleifer, 2002. “Government Ownership of Banks.” *The Journal of Finance*, 57(1): 265-301.

Li, K., T. Wang, Y. L. Cheung and P. Jiang, 2011. “Privatization and Risk Sharing: Evidence from the Split Share Structure Reform in China.” *Review of Financial Studies* 24 (7): 2499-2525.

Lin, Y. F., F. Cai and Z. Li, 1998. “Competition, Policy Burdens, and State-Owned Enterprise Reform”. *The American Economic Review* 88(2): 422-427.

Maskin, E. S., 1999. “Recent Theoretical Work on the Soft Budge Constraint.” *American Economic Review* 89: 125-133.

Megginson, W., R. Nash, J. Netter and A. Poulsen, 2004. “The Choice of Public versus Private Markets: Evidence from Privatizations.” *The Journal of Finance* 59: 2835-2870.

Megginson, W. L., and J. M. Netter, 2001. “From State to Market: A Survey of Empirical Studies on Privatization.” *Journal of Economic Literature* 39 (2): 321-389.

Merton, R., 1974. “On the Pricing of Corporate Debt: The Risk Structure of Interest Rates.” *The Journal of Finance* 29 (2): 449-470.

NUS-RMI Credit Research Initiative Technical Report – Version: 2013 Update 1. *Global Credit Review* 03 (1): 77-129.

OECD, 2009. “State Owned Enterprises in China: Reviewing the Evidence.” *OECD Working Group on Privatisation and Corporate Governance of State Owned Assets, Occasional Paper*.

Sun, Q., and W. Tong, 2003. “China’s Share Issue Privatization: The Extent of Its Success.” *Journal of Financial Economics* 70: 183-222.

Szamosszegi and Kyle, 2011. “An Analysis of State-owned Enterprises and State Capitalism in China.” *Washington, DC: U.S.-China Economic and Security Review Commission*.

Appendix 1: Variable Definitions

Variable Name	Definition
State Ownership	
SOE	A dummy variable equals 1 when the company is classified as state-owned enterprise (SOE). A company is defined as SOE if the ultimate controlling shareholder is: 1) State-owned Assets Supervision and Administration Commission (SASAC) of the State Council, 2) China Banking Regulatory Commission (CBRC), 3) China Insurance Regulatory Commission (CIRC), 4) China Securities Regulatory Commission (CSRC), 5) government ministries such as Ministry of Commerce, Ministry of Education, 6) Provincial SASACs or municipal SASACs, 7) Other SOEs. The Ultimate Controlling Shareholder information is available on CSMAR database. In CSMAR, the ultimate controlling shareholder is defined as the standard of the Measures for Administration of Takeover of Listed Companies
SOE_Central	A dummy variable equals 1 when the company is classified as central SOE. Central SOEs include entities managed by SASAC of the State Council; state-owned financial institutions supervised by CBRC, CIRC, CSRC; entities owned by central government ministries; subsidies or departments of central SOEs.
State Shares	Calculated as the number of state-owned shares divided by the total number of shares. The state share data is available on CSMAR database and only the data before split share reform is used for analysis.
Default Events	
Default	Indicator of default events happening at year t. The default events are extracted from the RMI database. These events are collected from many resources, including Bloomberg, Wind Financial Database, Compustat, CRSP, Moody's reports, TEJ, exchange web sites and news sources. The default events can be classified under one of the following events: 1, Legal impasse to the timely settlement of interest or principal payments, such as bankruptcy filing, receivership, administration, liquidation; 2, Missed or delayed payments of interest or principal, not including delayed payments made within a grace period; 3, Debt restructuring or distressed exchange, in which a new security or package of securities is offered to debt holders, resulting in a diminished financial obligation (such as a conversion of debt to equity, debt with lower coupon or par value, debt with lower seniority, debt with longer maturity).
Measures of Firm Default Probability	

PD	Probability of Default in next 12 months. Duan, Sun and Wang (2012) proposed a forward intensity approach for the prediction of corporate defaults over different future periods. And the prediction is very accurate for short periods, with the accuracy ratios exceeding 90% for 1 and 3-month horizons and 80% for 6 and 12-month horizons using U.S. data. The accuracy deteriorates somewhat when the horizon is increased to two or three years, but its performance still remains reasonable. The data is available in the RMI database. The data from RMI database in this paper is retrieved in January of 2012.
DTD	Distance to Default. Based on Merton Distance to Default model, distance-to-default measures the distance between the current value of assets and the debt amount in terms of asset volatility. This data is available in the RMI database.
Z-score	Altman Z-score is calculated by the following equation: $$Z = \sum_{j=1}^{k} \beta_j X_{jt}$$ where β_j are the discriminant coefficients and X_{jt} are discriminant variables. Original Altman's variables include five accounting ratios: working capital to total assets (WC/TA), retained earnings to total assets (RE/TA), earnings before interest and taxes to total assets (EBIT/TA), market equity to total liabilities (ME/TL), and sales to total assets (SL/TA). In calculating Altman's Z-score for developing country(China in this paper), the variable SL/TA, is not used.
Other Variables	
Size	Calculated as *log(1+Total Assets).*
Market to Book	Calculated as *(Total Liabilities+Market Value of Equity)/Total Assets*.
Profit	Calculated as *Net Income/Revenue*.
ROA	Calculated as *Operating Income/Total Assets*.
Growth	Growth rate of *Sales*.
Leverage	Calculated as *Total Liabilities/Total Assets*.
Negative Industry Shock	A dummy variable equals 1 when the industry return is smaller than -10%. The industry return is defined as the mean of the firms' stock returns in the same industry in the whole RMI database (30 countries). The stock price and market capitalization have been changed to US dollar before return calculation. The industry is defined based on Bloomberg Industry Subgroup Classification.

Change_Post	A dummy variable equals 1 when the observation is after the negative change in state ownership.
HHI	*Herfindahl-Hirschman Index (HHI)* as a measure of industry competitiveness. *HHI* is defined as the sum of the squares of the market shares of the firms in the same industry. The industry is defined based on CSMAR Industry B Classification.
GovIntervention	Government Intervention. One component of Marketization Index from Fan and Wang (2011). The provincial level marketization index captures the regional market development of the following aspects: (1) relationship between government and market; (2) development of non-state business; (3) development of product market; (4) development of factor market; (5) development of market intermediaries and legal environment. The level of government intervention is indicated by enterprise surveys of more than 4,000 firms.
LegalEnviron	Legal environment. One component of Marketization Index from Fan and Wang (2011). The level of legal environment is indicated by more than 4,000 company leaders' judgments collected from enterprise surveys.
Bank_Loan	A dummy variable equals 1 when getting loans from banks.
StateBank_Loan	A dummy variable equals 1 when getting loans from state-owned banks. The state-owned banks are: China Construction Bank, Bank of China, Industrial and Commercial Bank of China, Agricultural Bank of China, Bank of Communications, China Development Bank, Export-Import Bank of China, Agricultural Development Bank.

Table 1.1 Summary Statistics

This table reports the summary statistics for the main variables used in our analysis. Variable definitions are presented in the Appendix 1.

Panel A: Number of SOEs

Year	Number of Companies	Number of SOEs	Percentage of SOEs	Number of Central SOEs	Percentage of Central SOEs
1994	28	16	0.571	2	0.071
1995	272	169	0.621	15	0.055
1996	309	189	0.612	17	0.055
1997	509	312	0.613	26	0.051
1998	715	468	0.655	31	0.043
1999	814	556	0.683	35	0.043
2000	913	616	0.675	40	0.044
2001	1022	693	0.678	45	0.044
2002	1082	746	0.689	47	0.043
2003	1155	800	0.693	56	0.048
2004	1192	832	0.698	84	0.070
2005	1292	858	0.664	95	0.074
2006	1292	836	0.647	90	0.070
2007	1312	834	0.636	94	0.072
2008	1356	831	0.613	106	0.078
2009	1494	666	0.446	107	0.072
2010	1608	697	0.433	128	0.080
2011	1959	734	0.375	135	0.069

Panel B: State Shares (The state share data before the split share reform is used)

Year	Number of Firms	Mean	Min	25th Percentile	Median	75th Percentile	Max	Number of Firms with state shares	Ratio of firms with state shares
1991	13	0.265	0.000	0.000	0.148	0.591	0.793	8	0.615
1992	58	0.300	0.000	0.000	0.258	0.593	0.939	35	0.603
1993	191	0.348	0.000	0.000	0.391	0.593	0.905	133	0.696
1994	301	0.338	0.000	0.000	0.374	0.577	0.886	214	0.711
1995	334	0.329	0.000	0.000	0.356	0.568	0.886	238	0.713
1996	543	0.328	0.000	0.000	0.359	0.542	0.886	392	0.722
1997	760	0.349	0.000	0.000	0.383	0.571	0.886	570	0.750
1998	867	0.346	0.000	0.000	0.378	0.578	0.886	648	0.747
1999	966	0.341	0.000	0.000	0.373	0.573	0.886	713	0.738
2000	1105	0.353	0.000	0.037	0.389	0.581	0.886	850	0.769
2001	1180	0.359	0.000	0.057	0.399	0.585	0.886	916	0.776
2002	1247	0.360	0.000	0.056	0.399	0.587	0.850	969	0.777
2003	1307	0.353	0.000	0.054	0.392	0.582	0.850	1057	0.809
2004	1403	0.350	0.000	0.059	0.389	0.577	0.850	1108	0.790
2005	1406	0.341	0.000	0.043	0.378	0.572	0.850	1108	0.788

Panel C: Controlling rights and state ownership

	SOEs (Based on Controlling Shareholder)	non-SOEs
Mean of State shares	0.432	0.184
Mean of State Shares By Year		
1991	0.347	0.198
1992	0.367	0.237
1993	0.415	0.250
1994	0.404	0.237
1995	0.399	0.235
1996	0.389	0.245
1997	0.414	0.246
1998	0.408	0.232
1999	0.412	0.203
2000	0.428	0.201
2001	0.441	0.193
2002	0.440	0.192
2003	0.444	0.156
2004	0.458	0.124
2005	0.450	0.112

Panel D: Distribution of state shares for SOE sample and non-SOE sample

Sample	Observations	Mean	Standard Deviation	25th Percentile	Median	75th Percentile
SOEs	7714	0.432	0.235	0.293	0.484	0.618
Non-SOEs	3403	0.184	0.236	0.000	0.042	0.348

Panel E: Summary statistics for main variables in the analysis.

Variable	Observations	Mean	Standard Deviation	25th Pctl	Median	75th Pctl
SOE	17738	0.612	0.487	0	1	1
SOE_Central	17738	0.065	0.247	0	0	0
State Shares	9691	0.351	0.261	0.036	0.387	0.582
Default	18325	0.020	0.139	0	0	0
PD	18325	0.024	0.027	0.009	0.018	0.031
Z Score	12325	7.577	8.464	2.141	4.740	9.454
DTD	16357	4.233	2.236	2.461	3.971	5.740
Size	16808	21.19	1.041	20.48	21.07	21.79
Market to Book	16749	2.400	1.391	1.412	1.997	2.965
Profit	16776	0.067	0.214	0.0.024	0.067	0.135
ROA	16806	0.042	0.065	0.015	0.043	0.073
Growth	15189	0.205	0.445	-0.018	0.140	0.334
Leverage	16808	0.469	0.194	0.331	0.469	0.602

Panel F: Default ratio of SOEs

	SOEs	Non-SOEs	Test Equality t-statistics SOEs vs. Non-SOEs
Default ratio	0.014	0.026	5.86***

Panel G: state shares and default ratio

The sample is divided into four quartiles based on state shares. Q1 means smallest state share quartile and Q4 means largest state share quartile. Significance at a 10% (*), 5% (**), or level 1%(***) is indicated.

	Low state shares Q1	Q2	Q3	High state shares Q4	Test Equality t-statistics Q1 vs. Q4
Mean of state shares	0.001	0.242	0.488	0.671	
Default ratio	0.036	0.034	0.021	0.01	5.95***

Panel H: SOE and default ratio by industry sectors.

The industry classification is based on the CSMAR Industry Name A. The Appendix 2 reports the results based on CSMAR Industry Name B.

Industry Name	Number of Companies	Percentage of SOEs	Percentage of Central SOEs	Default ratio
Conglomerates	343	0.521	0.058	0.025
Properties	131	0.527	0.048	0.041
Finance	29	0.536	0.027	0.017
Industrials	1274	0.622	0.072	0.016
Commerce	156	0.672	0.050	0.012
Public Utility	165	0.745	0.070	0.020

Table 1.2 Spearman rank correlation (p- value in parentheses)

	State	Default	PD	Z Score	DTD	Size	Market to Book	Profit	ROA	Growth	Leverage
State Shares	1										
Default	-0.061	1									
	(<.0001)										
PD	-0.090	0.158	1								
	(<.0001)	(<.0001)									
Z Score	0.025	-0.160	-0.570	1							
	0.1369)	(<.0001)	(<.0001)								
DTD	0.047	-0.071	-0.355	0.663	1						
	(<.0001)	(<.0001)	(<.0001)	(<.0001)							
Size	0.177	-0.018	-0.170	-0.290	-0.225	1					
	(<.0001)	(0.0927)	(<.0001)	(<.0001)	(<.0001)						
Market to Book	-0.038	-0.021	-0.125	0.526	0.485	-0.532	1				
	(.0004)	(0.0537)	(<.0001)	(<.0001)	(<.0001)	(<.0001)					
Profit	-0.047	-0.117	-0.373	0.475	0.281	-0.108	0.344	1			
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)				
ROA	0.016	-0.155	-0.464	0.474	0.292	-0.056	0.313	0.726	1		
	(0.1257)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)			
Growth	-0.004	-0.064	-0.116	-0.024	-0.066	0.123	-0.015	0.155	0.305	1	
	(0.6951)	(<.0001)	(<.0001)	(0.1848)	(<.0001)	(<.0001)	(0.1862)	(<.0001)	(<.0001)		
Leverage	-0.014	0.128	0.396	-0.818	-0.506	0.246	-0.309	-0.438	-0.443	0.063	1
	(0.1942)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<0.0001)	

Table 1.3 The default probability of SOEs

This table reports the evidence of the predicting power of state ownership on firm default events. Details of variable definitions are stated in the Appendix 1. All regressions include constant terms, year fixed effect and industry fixed effects. The sample period in this table is from 1990 to 2011. The standard errors are corrected for within-firm clustering. ***, ** and * indicate statistical significance at 1%, 5% and 10%level respectively. The table also reports z value in parentheses.

	(1) Default	(2) Default	(3) Default	(4) Default
SOE	-0.240***	-0.254***	-0.264***	-0.354***
	(-3.93)	(-3.55)	(-3.55)	(-4.55)
SOE_Central			0.088	
			(0.58)	
PD	9.113***	8.920***	8.933***	3.644*
	(9.30)	(8.22)	(8.20)	(1.83)
DTD		-0.046**	-0.046**	0.0195
		(-2.43)	(-2.41)	(0.65)
Z Score		0.000***	0.000***	-0.0716***
		(3.48)	(3.46)	(-3.52)
Size				-0.102
				(-1.58)
ROA				-1.097
				(-1.42)
Leverage				0.197
				(0.55)
Profit				-0.179
				(-0.96)
Market to Book				0.005
				(0.10)
Growth				-0.065
				(-0.59)
Constant	-4.424***	-2.376***	-2.378***	-0.293
	(-19.39)	(-10.25)	(-10.24)	(-0.19)
Industry Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Observations	15,562	9,652	9,652	8,649
Pseudo R2	0.117	0.136	0.137	0.181

Table 1.4 The effect of state ownership when firms are facing negative global industry shock.

This table reports the effect of state ownership on firm default events when firms face negative global industry shocks. Details of variable definitions are stated in the Appendix 1. The sample of Model (1) includes observations with a global industry return smaller than -10%. The observations with a global industry return greater than -10% are included in the sample of Model (2). Model (3) includes all the observations. All regressions include constant terms, year fixed effect and industry fixed effects. The sample period in this table is from 1990 to 2006. The standard errors are corrected for within-firm clustering. ***, ** and * indicate statistical significance at 1%, 5% and 10%level respectively. The table also reports z value in parentheses.

	(1) Default	(2) Default	(3) Default
State_Dummy	-0.503***	-0.099	-0.106
	(-2.72)	(-0.71)	(-0.77)
State_Dummy * Negative Industry Shock			-0.402*
			(-1.78)
Negative Industry Shock			0.581***
			(2.78)
Z Score	0.009	0.006***	0.007***
	(1.09)	(2.74)	(3.00)
DTD	-0.137***	-0.136***	-0.132***
	(-3.67)	(-3.10)	(-3.98)
PD	9.097***	5.607***	6.360***
	(4.03)	(3.93)	(5.34)
Constant	-2.268***	-1.966***	-2.107***
	(-5.21)	(-5.25)	(-6.32)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	906	2,733	3,640

Table 1.5 The firm characteristics before the reduction of state shares

	Size	MB	Leverage	Sales Growth	Profit Margin	ROA	Past Return
Reduction Sample	20.92	2.39	0.467	0.256	0.104	0.0609	0.135
Whole Sample	21.31	2.24	0.472	0.157	0.0648	0.0399	0.226
Reduction: PD up	20.85	2.59	0.446	0.246	0.112	0.0643	0.199
Reduction: PD down	20.98	2.37	0.469	0.286	0.108	0.0597	0.057
Difference: T test	-1.93*	2.31**	-2.07**	-1.21	0.33	1.26	3.9***

Table 1.6 The effect of state ownership under different industry competitiveness environments

This table reports the effect of state ownership on firm default events under different industry competitiveness environments. Details of variable definitions are stated in the Appendix 1. I use two definitions for competitive industries: 1. HHI is smaller than the median value; 2. HHI is smaller than 0.15. The industries are defined based on CSMAR Industry B classification. The Model (1) uses the competitive industry sample based on the definition 1. Model (2) uses the non-competitive industry sample based on definition 1. Based on definition 2, the competitive industry sample is used in Model (3) and the non-competitive industry sample is used in Model (4). All regressions include constant terms, year fixed effect. The sample period in this table is from 1990 to 2011. The standard errors are corrected for within-firm clustering. ***, ** and * indicate statistical significance at 1%, 5% and 10%level respectively. The table also reports z value in parentheses.

	(1) Default	(2) Default	(3) Default	(4) Default
SOE	-0.282***	-0.088	-0.284***	-0.213
	(-4.44)	(-0.40)	(-3.81)	(-1.62)
PD	9.070***	14.856***	8.929***	8.890***
	(9.22)	(4.11)	(8.85)	(3.96)
Constant	-4.426***	-2.425***	-5.007***	-1.963***
	(-19.52)	(-7.92)	(-25.15)	(-11.25)
Year Fixed Effects	YES	YES	YES	YES
Observations	14,413	840	10,794	2,694
Pseudo R2	0.112	0.130	0.0969	0.128

Table 1.7 The effect of state ownership under different market development environments

This table reports the effect of state ownership on firm default events under different market development environments. Details of variable definitions are stated in the Appendix 1. I use two components of the marketization index at provincial level from Fan and Wang (2011): Government Intervention and Legal Environment. All regressions include constant terms, year fixed effect, industry fixed. The sample period for Model (1) and (2) is from 1990 to 2011, and Model (3) and (4) use the sample period before the share split reform from 1990 to 2006. The standard errors are corrected for within-firm clustering. ***, ** and * indicate statistical significance at 1%, 5% and 10%level respectively. The table also reports z value in parentheses.

	(1) Default	(2) Default	(3) Default	(4) Default
SOE	-0.307***	-0.479***		
	(-3.31)	(-3.77)		
State Shares			-0.810***	-0.937***
			(-3.80)	(-3.79)
SOE*GovIntervention	0.098			
	(0.89)			
SOE*LegalEnviron		0.256*		
		(1.65)		
State*GovIntervention			0.512*	
			(1.88)	
State*LegalEnviron				0.650**
				(2.17)
GovIntervention	-0.148*		-0.224**	
	(-1.72)		(-2.11)	
LegalEnviron		-0.192*		-0.283**
		(-1.68)		(-2.43)
PD	8.952***	9.281***	9.660***	9.792***
	(9.29)	(8.26)	(8.51)	(8.71)
Constant	-2.352***	-2.254***	-2.417***	-2.427***
	(-13.81)	(-9.29)	(-10.52)	(-10.10)
Industry Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Observations	14,485	14,548	8,432	8,460
Pseudo R2	0.117	0.144	0.126	0.128

Table 1.8 The effect of state ownership on the probability of getting bank loans

This table reports the effect of state ownership on the probability of getting bank loans. Details of variable definitions are stated in the Appendix 1. All regressions include constant terms, year fixed effect, and industry fixed effect. The sample period in this table is from 2000 to 2006. The standard errors are corrected for within-firm clustering. ***, ** and * indicate statistical significance at 1%, 5% and 10%level respectively. The table also reports z value in parentheses.

	(1) Bank_Loan	(2) StateBank_loan
State Shares	0.037	0.212*
	(0.36)	(1.91)
Size	0.009	-0.038
	(0.22)	(-0.85)
Market to Book	0.066***	0.045**
	(3.19)	(2.28)
Cash	0.000	0.000
	(0.49)	(0.52)
Growth	0.344***	0.300***
	(5.76)	(5.36)
Profit	0.747**	1.173***
	(2.50)	(2.98)
Leverage	-0.099**	-0.062*
	(-2.25)	(-1.80)
ROA	-0.745*	-1.273***
	(-1.87)	(-2.96)
CashFlow_Operating	-0.000	-0.000**
	(-1.45)	(-2.05)
Constant	-2.007**	-1.360
	(-2.33)	(-1.47)
Year Fixed Effect	Yes	Yes
Industry Fixed Effect	Yes	Yes
Observations	7,534	7,534

Appendix 2: State ownership and default ratio across different industries. The industry classification is based on CSMAR Industry Name B.

Industry Name B	Industry Name A	Percentage of SOEs	Percentage of Central SOEs	Default Ratio	Number of Firms
Animal Ranching and Farming	Conglomerates	0.000	0.000	0.000	1
Poultry Hatcheries	Conglomerates	0.000	0.000	0.000	1
Support Services for Oil and Gas Extraction	Public Utility	0.000	0.000	0.000	1
Grain and Feedstuff Processing	Industrials	0.000	0.000	0.000	1
Animal Slaughtering, Meat and Egg Processing	Industrials	0.000	0.000	0.000	1
Other Food Manufacturing	Industrials	0.000	0.000	0.000	1
Hats Manufacturing	Industrials	0.000	0.000	0.000	2
Other Fabric Products Manufacturing	Industrials	0.000	0.000	0.091	1
Furs, Leather, Feather and Related Products Manufacturing	Industrials	0.000	0.000	0.000	2
Leather and Hide Tanning and Products	Industrials	0.000	0.000	0.000	1
Timber Processing and Bamboo,Rattan, Palm and Grass Products	Industrials	0.000	0.000	0.000	5
Furniture Manufacturing	Industrials	0.000	0.000	0.000	2
Culture and Education Goods, Sporting and Athletic Goods Manufacturing	Industrials	0.000	0.000	0.000	7
Coking	Industrials	0.000	0.000	0.000	1
Chemical Fertilizer Manufacturing	Industrials	0.000	0.000	0.154	1
Chemical Pesticide Manufacturing	Industrials	0.000	0.000	0.000	1
Synthetic Material Manufacturing	Industrials	0.000	0.000	0.000	1

Industry Name B	Industry Name A	Percentage of SOEs	Percentage of Central SOEs	Default Ratio	Number of Firms
Specialized Chemical Products Manufacturing	Industrials	0.000	0.000	0.000	3
Consumer Chemical Products Manufacturing	Industrials	0.000	0.000	0.067	2
Plastic Film Manufacturing	Industrials	0.000	0.000	0.000	1
Foamed Plastics, and Leatheroid and Synthesized Leather Manufacturing	Industrials	0.000	0.000	0.000	2
Cement and Asbestine Cement Products	Industrials	0.000	0.000	0.000	1
Metal Surface Treating and Heat Treating	Industrials	0.000	0.000	0.000	1
Metal Processing Machinery Manufacturing	Industrials	0.000	0.000	0.000	4
Petrochemicals and Related Industry Special Equipment Manufacturing	Industrials	0.000	0.000	0.167	1
Automobile Manufacturing	Industrials	0.000	0.000	0.118	2
Ship and Boat Building	Industrials	0.000	0.000	0.000	1
Electrical Machinery Manufacturing	Industrials	0.000	0.000	0.000	1
Power Transmission & Distribution Equipment and Controllers Manufacturing	Industrials	0.000	0.000	0.000	13
Chinese Medicines Manufacturing	Conglomerates	0.000	0.000	0.000	3
Pipeline Transportation	Conglomerates	0.000	0.000	0.000	1
Computer Software Development and Consultation	Conglomerates	0.000	0.000	0.000	2
Wholesale of Machine and Electric Equipment	Industrials	0.000	0.000	0.000	1
Other Wholesale	Conglomerates	0.000	0.000	0.000	1
Textile, Clothing, Shoes and Hats Retail	Commerce	0.000	0.000	0.000	3
Retail of Consumer Product	Commerce	0.000	0.000	0.000	2
Intermediary Services for Real Estate	Properties	0.000	0.000	0.000	1
Architectural, Engineering Consulting Services	Commerce	0.000	0.000	0.000	1

Industry Name B	Industry Name A	Percentage of SOEs	Percentage of Central SOEs	Default Ratio	Number of Firms
Health Care,Nursing Care Services	Conglomerates	0.000	0.000	0.000	2
Professional, Scientific Research Services	Commerce	0.161	0.129	0.000	9
Other Special Equipment Manufacturing	Industrials	0.167	0.167	0.000	4
Printing	Industrials	0.171	0.000	0.000	5
Decoration	Conglomerates	0.273	0.000	0.020	9
Synthetic Fibre Manufacturing	Industrials	0.308	0.000	0.000	2
Support Services for Farming, Forestry, Animal Husbandry, and Fishery	Conglomerates	0.333	0.000	0.000	3
Veneer and Plywood Manufacturing	Industrials	0.333	0.000	0.000	1
Medical Machinery Manufacturing	Industrials	0.333	0.000	0.000	4
Real Estate Management	Properties	0.333	0.000	0.000	2
Other Electronic Appliance Manufacturing	Industrials	0.342	0.178	0.000	21
Plastics Manufacturing	Industrials	0.374	0.000	0.018	24
Computer Application Service	Conglomerates	0.381	0.076	0.034	70
Biological Medicines Manufacturing	Industrials	0.385	0.051	0.046	10
Other Manufacturing	Industrials	0.396	0.000	0.079	22
Metal Products	Industrials	0.399	0.098	0.016	29
Communication Service	Public Utility	0.400	0.363	0.037	15
Garment and Other Fabric Products Manufacturing	Industrials	0.405	0.065	0.011	19
Wholesale of Medicine and Medical Appliance	Commerce	0.429	0.357	0.045	5
Other Communication and Cultural Industries	Conglomerates	0.432	0.135	0.000	5
Electrical Machinery and Equipment Manufacturing	Industrials	0.434	0.029	0.008	78
Hotels	Commerce	0.434	0.000	0.057	8

Industry Name B	Industry Name A	Percentage of SOEs	Percentage of Central SOEs	Default Ratio	Number of Firms
Banking	Finance	0.464	0.000	0.000	11
Other Public Services	Commerce	0.471	0.000	0.000	5
Medicine Manufacturing	Conglomerates	0.473	0.013	0.017	104
Food Processing	Industrials	0.474	0.036	0.015	30
Instruments and Appearances, Culture and Office Machinery Manufacturing	Industrials	0.475	0.091	0.010	14
Textile	Industrials	0.500	0.098	0.011	44
Metal Structure Manufacturing	Industrials	0.500	0.000	0.000	3
Graziery	Conglomerates	0.514	0.000	0.000	8
Gas Production and Supply	Public Utility	0.516	0.000	0.000	4
Support Services for Mining	Public Utility	0.526	0.316	0.000	5
Communications and Related Equipment Manufacturing	Industrials	0.526	0.137	0.029	47
Estate Development and Operation	Properties	0.531	0.049	0.042	128
Conglomerates	Conglomerates	0.537	0.070	0.030	59
Vegetable oil Processing	Industrials	0.538	0.000	0.000	1
Rubber Parts and Supplies Manufacturing	Industrials	0.538	0.000	0.000	1
Bearing and Valve Manufacturing	Industrials	0.538	0.000	0.000	1
Financial Trusts	Finance	0.548	0.000	0.032	2
Biological Products Manufacturing	Industrials	0.551	0.011	0.000	14
Rental and Leasing Services	Public Utility	0.556	0.000	0.037	4
Securities and Futures	Finance	0.560	0.060	0.034	13
Non-Ferrous Metal Smelting, Rolling, Drawing, And Extruding	Industrials	0.568	0.059	0.016	50
Fishing and Hunting	Conglomerates	0.569	0.123	0.062	8

Industry Name B	Industry Name A	Percentage of SOEs	Percentage of Central SOEs	Default Ratio	Number of Firms
Coal Mining	Public Utility	0.571	0.000	0.000	1
Forestry	Public Utility	0.574	0.000	0.043	4
Electronic Components and Appliance	Industrials	0.576	0.081	0.016	76
Food Manufacturing	Industrials	0.578	0.012	0.017	18
Chemical Fibre Manufacturing	Industrials	0.604	0.102	0.020	24
Non-metallic Mineral Products	Industrials	0.604	0.024	0.020	60
Consumer Electronics Manufacturing	Industrials	0.613	0.000	0.014	15
Petroleum Processing & Coking	Industrials	0.620	0.012	0.006	16
Publishing Industries	Public Utility	0.658	0.164	0.082	9
Agriculture	Conglomerates	0.662	0.156	0.044	20
Wholesale of Metals	Industrials	0.667	0.000	0.000	1
Information Services	Public Utility	0.667	0.000	0.036	11
Nonferrous Metal Mining	Industrials	0.672	0.066	0.024	16
Highway Transportation	Public Utility	0.673	0.000	0.000	8
Transportation Equipment Manufacturing	Industrials	0.686	0.147	0.017	80
Paper and Allied Products	Industrials	0.688	0.019	0.014	26
Retail Trade	Commerce	0.689	0.024	0.007	67
Computer and related Equipment Manufacturing	Industrials	0.694	0.194	0.000	11
General Equipment Manufacturing	Industrials	0.714	0.000	0.000	2
General Machinery Manufacturing	Industrials	0.715	0.034	0.018	56
Coal Mining and Quarrying	Public Utility	0.716	0.052	0.009	25
Water Generation and Supply	Public Utility	0.721	0.000	0.029	8

Industry Name B	Industry Name A	Percentage of SOEs	Percentage of Central SOEs	Default Ratio	Number of Firms
Raw Chemical Materials and Chemical Products	Industrials	0.729	0.054	0.010	138
Special Equipment Manufacturing	Industrials	0.737	0.089	0.019	90
Food and Beverage	Commerce	0.737	0.000	0.000	3
Tourism	Commerce	0.744	0.070	0.023	20
Beverages	Industrials	0.750	0.006	0.021	27
Wholesale of Energy,Material and Machine Electric Equipment	Industrials	0.750	0.063	0.050	9
Civil Engineering Construction	Conglomerates	0.756	0.116	0.022	35
Water Transportation	Public Utility	0.767	0.129	0.065	11
Rubber Manufacturing	Industrials	0.773	0.068	0.000	10
Other Transportation	Public Utility	0.781	0.000	0.000	2
Ferrous Metal Mining	Industrials	0.786	0.000	0.000	1
Trade Brokers and Agents	Commerce	0.787	0.058	0.003	24
Communications Equipment Manufacturing	Industrials	0.805	0.000	0.049	6
Wholesale of Food, Beverage, Tobacco and Home Products	Commerce	0.806	0.083	0.000	6
Air Transportation	Public Utility	0.810	0.086	0.000	6
Paper Manufacturing	Industrials	0.833	0.000	0.083	1
Electric Power,Steam and Hot Water Generation and Supply	Industrials	0.839	0.161	0.007	59
Public Facilities Services	Public Utility	0.851	0.000	0.000	11
Radio, Film and Television	Conglomerates	0.854	0.000	0.000	6
Warehousing	Conglomerates	0.867	0.000	0.000	4
Support Service for Transportation	Public Utility	0.874	0.007	0.003	31
Ferrous Metal Smelting and Extruding	Industrials	0.876	0.110	0.011	34

Industry Name B	Industry Name A	Percentage of SOEs	Percentage of Central SOEs	Default Ratio	Number of Firms
Other Retail	Commerce	0.895	0.632	0.000	2
Other Processing	Industrials	0.909	0.000	0.000	1
Electric Power Generating	Industrials	0.917	0.000	0.000	1
Oil and Gas Extraction	Industrials	1.000	0.000	0.000	3
Iron Ore Mining	Industrials	1.000	0.000	0.000	1
Heavy Non-ferrous metal Mining	Industrials	1.000	0.571	0.000	1
Alcohol and Alcohol Beverages Manufacturing	Industrials	1.000	0.000	0.000	1
Primary Chemical Materials Manufacturing	Industrials	1.000	0.000	0.000	1
Electronic Appliance Manufacturing	Industrials	1.000	0.214	0.000	1
Electronic Component Manufacturing	Industrials	1.000	0.000	0.000	1
Metallurgy, Mining, Machinery & Electric Industry Special Equipment Manufacturing	Industrials	1.000	1.000	0.000	1
Water Generation	Public Utility	1.000	0.000	0.000	1
Railroad Transportation	Public Utility	1.000	0.739	0.000	3
Coastal Transportation	Public Utility	1.000	0.000	0.000	1
Highway Supervision and Maintaining	Public Utility	1.000	0.000	0.000	1
Port	Public Utility	1.000	0.000	0.000	1
Computer related Equipment Manufacturing	Industrials	1.000	0.000	0.000	1
Other ComputerApplication Service	Conglomerates	1.000	0.333	0.000	1
Wholesale of Motor Vehicle and Motor Vehicle Parts and Supplies	Industrials	1.000	0.000	0.267	1
Integrated Secutities Firm	Finance	1.000	0.000	0.000	2
Other Public Facilities Services	Public utility	1.000	0.129	0.065	2
Advertising Services	Commerce	1.000	0.000	0.000	1

Chapter 2: Firm Default Risk and Currency Return: An International Study

2.1. Introduction

Default prediction is critical to risk management and macro policies. Since the 1960s, both accounting forecast models (e.g. Altman's (1968) Z-score and Ohlson's (1980) O-score) and market-based forecast models (e.g. the Black-Scholes-Merton option pricing model (Black and Scholes, 1973; Merton, 1974)) have been developed for predicting corporate default. However, most existing studies only use U.S. data. As the world economy becomes more and more integrated, the factors that incorporate the interactions across different countries should also be taken into account. Currency exchange rate is just one of these factors, and its effect on firm default risk has not been investigated in academia. The Credit Research Initiative database of the Risk Management Institute (RMI) of the National University of Singapore provides us with an international financial statement and market data (NUS-RMI, 2013). Therefore, in this paper, I can investigate the prediction power of currency return on firm default probability using the data for 30 countries.

In recent years, as capital markets have become increasingly integrated, there has been a dramatic increase in the usage of foreign currency debt when firms make financing decisions. The foreign currency debt used in United States firms increased from around $1 billion in 1983 to $62 billion in 1998 (Kedia and Mozumdar, 2003). Moreover, non-U.S. firms raise a larger proportion of debt in foreign currency. Using the data for East Asian countries in 1997-

1999, Allayannis, et al. (2003) find that foreign currency debt comprises about 33.2% of firms' total debt. In their entire sample of 327 firms, 61.8% use foreign debt in 1996 and the foreign debt usage rate reaches 100% for South Korea. Possible explanations for issuing foreign currency debt are: hedging the currency exposure (Kedia and Mozumdar (2003), for the U.S. case; Keloharju and Niskanen (2001), for Finland; Aabo (2006), for Denmark); imports and exports (Keloharju and Niskanen (2001), for Finland; Gelos (2003), for Mexico); tax arbitrage, interest rate arbitrage, and so on.

The wide usage of foreign currency debt provides us with a possible link between currency exchange rate and firms' performance, liquidity and operations. Some previous theoretical models have suggested that foreign currency debt might be partly responsible for the Asian currency crisis around 1997 (Chang and Velasco (1999), Krugman (1999)). Based on the model of Krugman (1999), foreign currency debt of any maturity should not be encouraged at any rate because borrowing in foreign currency could magnify the exchange rate impact. Therefore, through the channel of foreign currency debt, currency return could affect firms' operations and could have prediction power on firm default events.

When local currency depreciation exists, the sudden increase of foreign currency liabilities might take a firm into liquidity or operating difficulties. For example, the *Strait Times* reported in 1998 that "7 more Philippine firms seek government protection" and noted that "SEC officials said the firms traced their financial woes to the currency turmoil, which has seen the peso lose about 55 percent of its value against the US dollar since July…. According to the same sources, the falling peso has ballooned yearly

debt repayments of these firms, and swelled their total liabilities." This is not a special case, and we could expect that, through the channel of foreign currency debt, there is a positive association between currency exchange rate depreciation and firm default probability.

I first test the prediction power of currency return on firm default probability. The default ratio of the entire sample during currency depreciation periods is 0.53%, which is significantly higher than the default ratio (0.41%) during currency appreciation periods. When we control for several widely used default probability measures (Z-score, Distance-to-Default, Probability of Default of Duan, et al. (2012)), multivariate regression results still provide strong evidence that currency return is positively related to firm default probability. Currency return is defined as the return on the local currency exchange rate, which takes the form of Local Currency / U.S. Dollar. Positive currency return is associated with the depreciation of local currency.

Moreover, I examine the effects of local currency depreciation and appreciation separately. Through the channel of corporate foreign currency debt, large currency depreciation should be the major factor to affect default risk. I find that when the local currency depreciates by more than 55%, the default ratio increases to 3.6%, while the default ratio for the entire sample is only about 0.6%. Our multivariate regression results also suggest that large currency depreciation (larger than 10% for the last 12 months) could increase the firm's default probability significantly, while the effect of currency appreciation is not significant.

Since firm-level foreign currency debt data are very difficult to obtain, I use country-level international trade data as proxy for the likelihood of using foreign currency debt. If a country's economy more relies on exports and imports, the firms in this country are more likely to issue foreign currency debt. I find empirical evidence that the effect of currency return on firm default risk is more significant for countries that more rely on international trade. This is supporting evidence for the channel of foreign currency debt.

There is a popular argument that local currency depreciation is good for exports while appreciation is good for imports. However, due to foreign currency debt, large currency depreciation will increase firms' liabilities and lead to higher default risk, and this effect does not depend on the exports or imports business. If the two arguments both work, it is possible that, large currency depreciation could lead to higher default risk, but small depreciation will be good for the exports business. I use the subsample of small depreciation (currency return is in the normal range (-20%, 20%)), and find evidence that the exchange rate changes have different effects on the exports business and imports business. The small local currency depreciation leads to lower firm default risk for countries in trade surplus (exports are larger than the imports), and small local currency appreciation could reduce the default risk for countries in trade deficit.

Furthermore, I examine the effect of currency return interacting with the country's exchange rate policy. I find that the currency depreciation has less effect on default risk for countries with restrictions on the exchange rate. And the moderating effect of an exchange rate control policy mainly works for currency returns in the normal range. That is, when there are large currency

depreciations, the exchange rate control policy could not moderate the effect of the depreciation on a firm's default risk.

In addition, I also investigate the effect of currency return interacting with a country's financial market development. Firms in countries with better financial market development might have more access to exchange rate hedging instruments and might have more financing channels when facing currency depreciation. I find supporting evidence that currency depreciation has fewer effects on firm default risk for countries with better financial market development.

This paper makes several contributions to firm default forecast models. First of all, I find strong evidence for the prediction power of currency return. Sudden large currency depreciation could directly affect firms' operations, and lead to default in the worst case. This provides some implications for government monetary and fiscal policy when facing currency depreciations. Secondly, using the data from 30 economies, this study tests some widely used default probability measures, and provides some insights on default forecasting for non-U.S. companies, especially for developing countries. As the world economy becomes increasingly integrated, factors, such as currency return, which capture the interactions across different countries, should be paid more attention when developing credit risk models. Moreover, this paper examines the effects of macro-level factors on the micro-level firm default risk, and could provide some policy implications on the exchange rate and financial market development.

The remainder of the paper is organized as follows. Section 2 describes the data and the main variables. The summary statistics for the main variables are

presented in Section 3. Section 4 performs and discusses empirical analyses. Section 5 concludes.

2.2. Data and Main Variables

I employ the Credit Research Initiative database of the Risk Management Institute (RMI) of the National University of Singapore, which provides comprehensive information on both market and financial statement data on about 60,000 exchange-listed firms of 106 economies around the world. I retrieved the data used in this paper from the RMI database in January 2012. The sample includes 30 economies from Asia, Europe and America whose data were available on the RMI database in January 2012: Australia, China, Hong Kong, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, United States, Canada, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom. The time period in our sample is from 1990 to 2011. The starting time for different economies in the sample is different. The final sample includes around 410,000 firm-year observations for the main regression analysis.

a. Currency return

I calculate the currency return for the last 12 months:

$$Crncy\ \mathrm{Re}\,t = \frac{ExchangeRa\ te_t - ExchangeRa\ te_{t-1}}{ExchangeRa\ te_t}$$

The base currency for the exchange rate is the U.S. dollar. The exchange rate is presented as local currency per U.S. dollar. Thus, for a country, a positive currency return is associated with the local currency depreciation. I also

construct several indicators: Large Positive Return, an indicator for the large depreciation of local currency (the currency return is larger than 10%); Large Negative Return, an indicator for the large appreciation of local currency (the currency return is less than -10%); Normal Range Return, an indicator for currency returns in (-20%, 20%).

b. Default events

The dependent variable in the main regressions is Default, a dummy variable indicating the happening of default events. The default events are extracted from the RMI database. These events are collected from many resources, including Bloomberg, Wind Financial database, Compustat, The Center for Research in Security Prices (CRSP), Moody's reports, Taiwan Economic Journal (TEJ), exchange web sites and news sources. A challenging problem is that the definition of default might vary across different data sources. RMI applies a default definition consistently across different economies. Based on the RMI technical report (2013), the default events can be classified under one of the following events:

1. Legal impasse to the timely settlement of interest or principal payments, such as bankruptcy filing, receivership, administration, liquidation;
2. Missed or delayed payments of interest or principal, not including delayed payments made within a grace period;
3. Debt restructuring or distressed exchange, in which a new security or package of securities is offered to debt holders, resulting in a diminished financial obligation (such as a conversion of debt to

equity, debt with lower coupon or par value, debt with lower seniority, debt with longer maturity).

Moreover, the definition also incorporates some default actions that are specific to some economies, such as Declared Sick (for India only), Rehabilitation (Thailand) and so on.

c. Measures of Default Probability

The main control variables used in our analysis are several popular default risk measures from previous default risk models:

Probability of Default (PD): Duan, et al. (2012) propose a forward intensity approach for the prediction of corporate defaults over different future periods. And the prediction is very accurate for short periods, with the accuracy ratios exceeding 90% for 1- and 3-month horizons and 80% for 6- and 12-month horizons using U.S. data. The accuracy ratio decreases when the horizon is increased to two or three years, but its performance remains reasonable. This measure incorporates the profit, liquidity and market information of the firm. The data are available on the RMI database. The PD for a 1-year horizon is used in this paper.

Distance-to-Default (DTD): Based on Merton's (1974) Distance-to-Default model, distance-to-default measures the distance between the current value of assets and the debt amount in terms of asset volatility. It can be calculated as the following:

$$DTD = -\frac{\ln(V_t / L) + (\mu - (\sigma_V^2 / 2))(T - t)}{\sigma_V (T - t)}$$

where V_t denotes the current value of assets, L denotes the liabilities, and σ_V is the asset volatility. These data are available in the RMI database. Duan and Wang (2012) discuss the estimation methods for DTD calculation. For financial and properties firms, which typically have higher leverage, the KMV Corporation's estimation seems ill-suited. Thus, a transformed-data maximum likelihood estimation (MLE) approach is applied to the DTD calculation in the RMI database.

Z-Score: Altman's Z-Score is calculated by the following equation:

$$Z = \sum_{j=1}^{k} \beta_j X_{jt}$$

where β_j are the discriminant coefficients and X_{jt} are discriminant variables. Altman's variables include five accounting ratios: working capital to total assets (WC/TA), retained earnings to total assets (RE/TA), earnings before interest and taxes to total assets (EBIT/TA), market equity to total liabilities (ME/TL), and sales to total assets (SL/TA). In calculating Altman's Z-score for a developing country, the variable SL/TA, is not used.

2.3. Summary Statistics

Table 2.1 reports the summary statistics of the main variables for the analysis. The mean of currency return is -0. 2%, which is very close to 0, and the median value is 0. 9.6% of total observations having currency returns larger than 10%, with 12.7% having currency returns of less than -10%. 92% of the currency returns are in the normal range (-20%, 20%). This table also presents the summary for some country characteristics. 15.1% of the total observations

are in countries with restrictions on the exchange rate. The countries, whose international trade (sum of exports and imports, % of gross domestic product (GDP)) is larger than the median value of the 30 economies, account for 22.9% of the sample observations. 52% of total observations are in countries with a trade surplus (the exports are greater than the imports by at least 3% of GDP).

[Insert Table 2.1 Here]

From Table 2.1, the default ratio for the whole sample is 0.60%. The default ratio of some subsamples under different exchange rate changing scenarios are reported in Figure 2.1, Table 2.2 and Table 2.3, which also provide us with the univariate test results for currency return and default risk. The default ratio for the currency depreciation sample is 0.53%, which is significantly larger than the ratio for the non-depreciation sample (0.46%). When the local currency depreciates for more than 10%, the default ratio will increase to 0.61%. Thus, the comparisons suggest that higher currency return is associated with a higher default ratio.

[Insert Table 2.2 Here]

Table 2.3 provides default ratio comparisons for each economy. For most of the economies in our sample, the default ratio during currency depreciation periods is larger, compared to the ratio during non-depreciation periods. For China (2.45% vs. 1.85%), Indonesia (1.54% vs. 0.38%), South Korea (1.07% vs. 0.20%) and Thailand (2.47% vs. 0.63%), the difference between two ratios is much more significant. Firms in developing countries might not have good hedging ability and are more likely to be affected by the exchange rate depreciation. Moreover, countries like South Korea (Allayannis, et al., 2003), which have a high usage rate of foreign currency debt, are affected more by

the currency depreciation. Although the difference between the two ratios is also significant for Euro Zone countries (0.58% vs. 0.30%) and the United Kingdom (0.32% vs. 0.10%), East Asian countries are more likely to be affected by exchange rate depreciation.

[Insert Table 2.3 Here]

In Figure 2.1, I divide the entire sample into ten subsamples based on the currency return. Then for each subsample, I obtain the default ratio, which is calculated as the number of default events divided by the total firm-year observations in the subsample. When the local currency depreciates by more than 60%, the default ratio reaches 3.6%, which is six times more than the default ratio when the exchange rate does not change. The default ratio is nearly 2.4% when the currency depreciates by 50%. Thus, we could expect that the large currency depreciation is associated with higher firm default probability. For the case of local currency appreciation (negative currency return), the default ratio increases as the currency appreciation increases, but the change of default ratio seems insignificant.

[Insert Figure 2.1 Here]

2.4. Empirical Models and Results

First, I examine the prediction power of currency returns and large positive currency returns on firm default events. I use the country-level international trade data to proxy for the likelihood of using foreign currency debt, and then I test the channel that drives the association between currency return and default risk. Moreover, I examine the asymmetric effects of currency return on default

risk when the countries are in trade surplus or trade deficit. I also test the effect of currency return interacting with the country's exchange rate policy and interacting with the country's financial market development.

2.4.1. The prediction power of currency returns on firm default events

Using probit regressions, I test the prediction power of currency return on a corporate default event. I employ the following yearly regression model:

$$Default = \alpha_0 + \beta_0 Currency\,\mathrm{Re}t + ControlVariables + \varepsilon_0$$

The regression results are reported in Table 2.4. I include different control variables in five columns. The coefficients on *Currency Return* are positive and significant at the 1% level in all five regressions, providing strong evidence for the prediction power of currency return. The positive coefficients suggest that local currency depreciation could increase the firm default probability. In column (1), the coefficient on *Currency Return* is 0.409 and z-statistics is 7.71. In column (2), I include the default probability measure (*PD)* of Duan, et al. (2012). This measure incorporates financial and market information and has a high default forecasting accuracy. The coefficient on *Currency Return* is positive and significant. In addition, I also include other control variables in columns (3)-(5): accounting-based default risk measure *Z-Score*, market data-based default risk measure *DTD*, firm size, country stock market return, global industry return and the global market return. As expected, the coefficient on *PD* is positive and significant and the coefficient on *DTD* is negative. After controlling for *PD*, the *Z-Score* is not significant, probably because the financial statement information has been incorporated in

PD. For all regressions, I include country fixed effects, year fixed effects and industry fixed effects. Since the *Currency Return* is a macro variable and the dependent variable is firm-specific, standard errors in all the regressions in my analysis are clustered by firm. From column (5), the coefficients on firm size, industry return, and global market return are not significant after controlling for the traditional default risk measures, and thus I take column (2) as the base regression for the following analysis. Overall, after controlling for firm-specific accounting information, market information and the industry information, we still can observe the prediction power of currency return on firm default probability. The currency return could be taken into account when developing new default forecasting models.

[Insert Table 2.4 Here]

Previous summary statistics (Figure 2.1) for the default ratio suggest that large currency depreciation (large positive currency return) mainly drives the positive association between currency return and firm default risk. As discussed in Section 2.1, through the channel of corporate foreign currency debt, large currency depreciation could lead to a jump in firms' liabilities and increase the default risk significantly. I conduct probit regressions to examine the prediction power of large currency depreciation and appreciation on firm default events separately using two dummy variables, *Large Positive Currency Return* and *Large Negative Currency Return*. *Large Positive Currency Return* equals 1 if the local currency depreciates by more than 10%. A similar definition is applied to *Large Negative Currency Return*. Table 2.5 reports the regression results. The coefficients on *Large Positive Currency Return* both are positive and significant at the 1% level in columns (1) and (2), suggesting

that large currency depreciation could lead to higher firm default probability. This is consistent with our discussion about corporate foreign currency debt, which connects the currency exchange rate and firms' operations. In column (2), I include the variable *Large Negative Currency Return* and do not find a significant coefficient, suggesting that large currency appreciation might not affect the default probability significantly. The regression results provide evidence that currency depreciation is the major reason for the default risk, and the results are consistent with the summary statistics for default ratio presented in Figure 2.1.

[Insert Table 2.5 Here]

2.4.2. The effect of currency return and a country's international trade

I argue that corporate foreign currency debt is the channel that accounts for the positive association between currency depreciation and default risk. Unfortunately, firm-level foreign currency debt data are very difficult to obtain. Many previous studies use surveys to collect relevant data and the data quality might not be guaranteed. In this paper, I use country-level international trade data as proxy for the likelihood of using foreign currency debt. Firms in countries whose economy more relies on international trade are more likely to use foreign currency debt, and thus are more likely to be affected by the exchange rate change. Therefore, it could be expected that the effect of currency return is more significant for countries that more rely on international trade.

Table 2.6 reports the regression results. I include the interaction term *Currency Return* * *Trade* to examine the effect of international trade. *Trade* is

a dummy variable equal to 1 if the sum of the country's exports (% of GDP) and imports (% of GDP) is greater than the median value of the 30 economies in the sample. If *Trade* is able to capture the likelihood of using foreign currency debt, the coefficient on the interaction term is expected to be positive. In column (1), the coefficient on *Currency Return* * *Trade* is 0.206 and significant (z-statistics = 1.90), suggesting that the currency return has more effects on firm default risk for countries that more rely on international trade. I divide the entire sample into two subsamples based on *Trade*. In column (2), using the observations of countries that heavily depend on international trade, I find the positive and significant coefficient on *Currency Return* (0.299, z = 4.07). But in column (3), using the observations of countries that less rely on international trade, the coefficient on *Currency Return* becomes insignificant. Since the international trade data could be taken as proxy for the likelihood of using foreign currency debt, the regression results provide evidence that foreign currency debt is the channel that connects the currency return and firm default risk. This is consistent with the previous discussions.

[Insert Table 2.6 Here]

2.4.3. The asymmetric effects of currency return

It is widely accepted that currency depreciation is good for companies doing export business and currency appreciation is good for imports. Thus, it is possible that the currency return has the opposite effect on firms doing export business and firms doing import business. However, as discussed in previous sections, through the channel of foreign currency debt, currency depreciation,

especially large currency depreciation, could lead to a large increase in firm liabilities and lead to significantly higher default risk. If both arguments work for the effect of currency return, it is possible that, large currency depreciation will lead to higher default risk due to the foreign currency debt, but small depreciations might be good for firms doing export business.

Again unfortunately, company-level export and import data are very private and very difficult to find. In this paper, I use country-level data to empirically test the asymmetric effects of currency return for firms doing business in exports or imports. Trade surplus is defined as when a country's exports are larger than its imports by at least 3% of the total GDP. The regression results are presented in Table 2.7. I construct a subsample that only includes the observations with currency returns in the normal range (-20%, 20%). The subsample is used for Table 2.7. That is, the effect of a small currency return is examined. In column (1), the coefficient on *Currency Return* is negative and significant (-0.603, z-statistics = -2.17), suggesting that when the currency return is in the normal range, currency depreciation leads to lower default risk for countries in trade surplus. This provides evidence that small currency depreciation is good for exports. However, in column (2), the coefficient on *Currency Return* is positive and significant (0.666, z = 2.16), suggesting that small currency appreciation is good for countries in trade deficit. Combining the two regressions, the table provides evidence that when the exchange rate change is in the normal range, currency depreciation is good for exports and appreciation is good for imports.

[Insert Table 2.7 Here]

2.4.4. The effect of currency return and a country's exchange rate policy

Some countries place restrictions on the exchange rate change and might enforce an exchange rate control policy. Under this policy, the changes in the exchange rate are smoothed and the volatility of currency returns is smaller. Thus, the currency return might have less effect on default risk for countries with an exchange rate control policy. The empirical results are reported in Table 2.8.

The country's exchange rate arrangement classification is based on Ilzetzki, et al. (2008) and Reinhart and Rogoff (2004). The country is classified as an exchange rate control country if the exchange rate arrangements occur with: 1) no separate legal tender; 2) pre-announced peg or currency board arrangement; 3) pre-announced horizontal band that is narrower than or equal to +/-2%; 4) de facto peg; 5) pre-announced crawling peg; 6) pre-announced crawling band that is narrower than or equal to +/-2%; 7) de facto crawling peg; or 8) de facto crawling band that is narrower than or equal to +/-2%. I include the interaction term *Currency Return*ExchgControl* in regressions and *ExchgControl* is an indicator for an exchange rate control policy. Using the entire sample, the coefficient on *Currency Return*ExchgControl* is -0.608 and significant at the 1% level in column (1), suggesting that currency depreciation has less effect on default risk for countries with an exchange rate control policy. Furthermore, I examine under what scenarios the exchange rate policy could moderate the effect of currency return on default risk. I conduct the same regressions in two subsamples based on the currency return. In column (2), using observations with currency returns in the normal range, the

coefficient on *Currency Return*ExchgControl* is still negative and significant. However, when I use observations with large currency returns in column (3), the coefficient on the interaction term becomes insignificant. Combining the findings in columns (2) and (3), it seems that the exchange rate policy only has a significant moderate effect when the exchange rate changes are in the normal range. When there are large currency depreciations or appreciations, the exchange rate control policy does not work.

[Insert Table 2.8 Here]

2.4.5. The effect of currency return and financial market development

For firms in countries with a high level of financial market development, there might be more hedging instruments for the exchange rate risk, as well as more financing channels when facing large currency depreciation. Thus, the effect of currency return on firm default risk should be less for countries with a higher level of financial market development. Cihak, et al. (2012) construct country-level indexes for financial system development. The index includes indicators for the depth of financial institutions, depth of financial market, efficiency of financial institutions and financial market, stability of financial institutions and financial market, and so on. The data are available on the World Bank Global Financial Development Database. Table 2.9 reports the regression results. I include the five interaction terms of currency return and financial market development indicators: *Currency Return*FinInstDepth, Currency Return*FinMktDepth, Currency Return*FinInstEfficiency, CurrencyReturn*FinMktEfficiency, Currency Return*FinInstStability.* The coefficients on these interaction terms are all negative and significant,

suggesting that currency depreciation has a less significant effect on firm default risk for countries with larger depth of financial institutions and financial market, higher efficiency of financial institutions and financial market, and more stable financial institutions. In general, the results provide strong evidence that firm default risk is less affected by exchange rate changes for countries with better financial market development.

[Insert Table 2.9 Here]

2.5. Conclusions

In this paper, I find strong evidence for the prediction power of currency return on firm default risk. I investigate currency depreciation and appreciation separately, and find that large local currency deprecation is a major reason for the positive association between currency return and default risk. Since firm-level foreign currency debt data are very difficult to obtain, I use country-level international trade data (the sum of exports and imports) as proxy for the likelihood of using foreign currency debt. I find that the currency return has more effects for countries that more rely on internal trade, providing supporting evidence for the channel of foreign currency debt that connects the exchange rate and firm default risk. Moreover, I find that while large currency depreciation could lead to higher default risk, small depreciation is good for countries with trade surplus (exports are larger than imports) and small appreciation is good for countries with a trade deficit. During the small exchange rate changing period, the currency return has different effects for the exports business and imports business. In addition, the

effect of currency return is less significant for countries with restrictions on the exchange rate and for countries with better financial market development. Overall, factors such as currency return, which incorporate the interactions across different countries, should be taken into account when developing new default forecasting models.

Bibliography 2

Aabo, T., 2006. "The Importance of Corporate Foreign Debt in Managing Exchange Rate Exposures in Non-Financial Companies." *European Financial Management*, 12: 633-649.

Allayannis, G., G. W. Brown, and L. F. Klapper, 2003. "Capital Structure and Financial Risk: Evidence from Foreign Debt Use in East Asia." *The Journal of Finance* 58: 2667-2709.

Altman, E, 1968. "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy." *The Journal of Finance* 23: 589-609.

Bacchetta, P., 2000. "Monetary Policy with Foreign Currency Debt." Working paper.

Black, F., and M. Scholes, 1973. "The Pricing of Options and Corporate Liabilities." *Journal of Political Economy*, 81 (3): 638-654.

Chang, R., and A. Velasco, 1999. "The Asian Liquidity Crisis." *NBER Working Paper*.

Cihak, M., A. Demirguc-Kunt, E. Feyen, and R. Levine, 2012. "Benchmarking Financial Systems around the World." *The World Bank Policy Research Working Paper*.

Duan, J., J. Sun, and T. Wang, 2012. "Multiperiod Corporate Default Prediction – A Forward Intensity Approach." *Journal of Econometrics*, 170 (1): 191-209.

Duan, J., and T. Wang, 2012. "Measuring Distance-to-Default for Financial and Non-Financial Firms." *Global Credit Review*, 02 (1): 191-209.

Gelos, R. G., 2003. "Foreign Currency Debt in Emerging Markets: Firm-Level Evidence from Mexico." *Economics Letters* 78: 323-327.

Ilzetzki, E. O., C. M. Reinhart, and K.S. Rogoff, 2008. "Exchange Rate Arrangements into the 21st Century: Will the Anchor Currency Hold?" Working paper.

Kawai, M., H. J. Hahm, and G. Iarossi, 1999. "Corporate Foreign Debt in East Asia: Too Much or Too Little?" Working paper.

Kedia, S., and A. Mozumdar, 2003. "Foreign Currency-Denominated Debt: An Empirical Examination." *Journal of Business*, 76: 521-546.

Keloharju, M., and M. Niskanen, 2001. "Why Do Firms Raise Foreign Currency Denominated Debt? Evidence from Finland." *European Financial Management* 7: 481-496.

Krugman, P., 1999, “Balance Sheets, the Transfer Problem, and Financial Crises.” In: *International Finance and Finance Crises* (Essays in Honor of Robert P. Flood).

Merton, R., 1974. “On the Pricing of Corporate Debt: The Risk Structure of Interest Rates.” *The Journal of Finance* 29 (2): 449-470.

NUS-RMI Credit Research Initiative Technical Report – Version: 2013
Update 1. *Global Credit Review* 03 (1): 77-129.

Ohlson, J.A., 1980, “Financial Ratios and the Probabilistic Prediction of Bankruptcy.” *Journal of Accounting Research* 18: 109-131.

Reinhart, C. M., and K. S. Rogoff, 2004. “The Modern History of Exchange Rate Arrangements: A Reinterpretation.” *Quarterly Journal of Economics*, 119 (1): 1-48.

Appendix 3: Variable Definition

Variable Name	Definition
Currency Return	
CrncyRet	In each month, we calculate the currency return in the last 12 months. $Crncy\,\mathrm{Re}t = \frac{ExchangeRate_t - ExchangeRate_{t-1}}{ExchangeRate_t}$ The base currency for exchange rate is US dollar. The exchange rate is in the form of Local Currency /US dollar. Therefore, the positive currency return means the depreciation of local currency, and the negative currency return means the appreciation of local currency.
Large Positive Return	A dummy variable equals 1 when the currency return is greater than 10%. This is an indicator of large depreciation of the local currency.
Large Negative Return	A dummy variable equals 1 when the currency return is smaller than -10%. This is an indicator of large appreciation of the local currency.
Normal Range	The currency return is in (-20%, 20%).
Default Events	
Default	Indicator of default events happening at year t. The default events are extracted from the RMI database. These events are collected from many resources, including Bloomberg, Wind Financial Database, Compustat, CRSP, Moody's reports, TEJ, exchange web sites and news sources. The default events can be classified under one of the following events: 1, Legal impasse to the timely settlement of interest or principal payments, such as bankruptcy filing, receivership, administration, liquidation; 2, Missed or delayed payments of interest or principal, not including delayed payments made within a grace period; 3, Debt restructuring or distressed exchange, in which a new security or package of securities is offered to debt holders, resulting in a diminished financial obligation (such as a conversion of debt to equity, debt with lower coupon or par value, debt with lower seniority, debt with longer maturity).
Measures of Firm Default Probability	
PD	Probability of Default in next 12 months. Duan, Sun and Wang (2012) proposed a forward intensity approach for the prediction of corporate defaults over different future periods. And the prediction is very accurate for short periods, with the accuracy ratios exceeding 90% for 1 and 3-month horizons and 80% for 6 and 12-month horizons. The accuracy deteriorates somewhat when the horizon is increased to two or three years, but its performance still remains reasonable. The data is available in the RMI database. The data from RMI database in this paper is retrieved in January of 2012.

DTD	Distance to Default. Based on Merton Distance to Default model, distance-to-default measures the distance between the current value of assets and the debt amount in terms of asset volatility. This data is available in the RMI database.
Z-score	Altman Z-score is calculated by the following equation: $$Z = \sum_{j=1}^{k} \beta_j X_{jt}$$ where β_j are the discriminant coefficients and X_{jt} are discriminant variables. Original Altman's variables include five accounting ratios: working capital to total assets (WC/TA), retained earnings to total assets (RE/TA), earnings before interest and taxes to total assets (EBIT/TA), market equity to total liabilities (ME/TL), and sales to total assets (SL/TA). In calculating Altman's Z-score for developing country, the variable SL/TA, is not used.
Country Characteristics	
Trade	Equals 1 if the sum of exports (good and service, % of the GDP) and imports (good and service, % of the GDP) for the country is larger than the median of all the 30 economies at year t. The exports and imports data is available on World Bank Data.
Trade Surplus	Equals 1 if the country is in trade surplus and equals 0 if the country is in trade deficit. The trade surplus means that exports is larger than imports by at least 3% of the total GDP. The threshold value for trade deficit is also 3% of the GDP.
ExchgControl	Equals 1 if the country is classified as a country with exchange rate control policy. Exchange rate control policy refers to the exchange rate arrangements with: 1) no separate legal tender; 2) pre announced peg or currency board arrangement; 3) pre announced horizontal band that is narrower than or equal to +/-2%; 4) de facto peg; 5) pre announced crawling peg; 6) pre announced crawling band that is narrower than or equal to +/-2%; 7) de facto crawling peg; or 8) de facto crawling band that is narrower than or equal to +/-2%. The classification of exchange rate arrangements is based on Ilzetzki, Reinhart and Rogoff (2008) and Reinhart and Rogoff (2004). The data is available on Carmen Reinhart's website. In their classification, Euro Zone countries cannot decide the policy of Euros individually, and are classified into category 1). Since Euro is the currency used for Euro Zone countries in the sample, I do not classify these countries as exchange rate control country. Finally, the exchange rate control economies are: China, Hong Kong, Malaysia, Denmark, India, Philippines.
FinInstDepth	The country-level index for depth of the financial institutions. Cihak, Demirguc-Kunt, Feyen and Levine (2012) construct country-level indexes for financial system development. One

	of the indicators is the depth of financial institutions. The data is available on World Bank Global Financial Development Database.
FinMktDepth	The country-level index for depth of the financial market.
FinInstEfficiency	The country-level index for efficiency of the financial institutions.
FinMktEfficiency	The country-level index for efficiency of the financial market.
FinInstStability	The country-level index for stability of the financial institutions.
Euro Zone countries	Include Austria, Belgium, Finland, France, Germany, Greece, Italy, Netherlands, Portugal and Spain.
Other Variables	
Size	Calculated as *log(1+Total Assets).*
Market Return	Stock market return in past 12 months for each economy.
Industry Return	Value weighted industry stock return. The value weighted average of the stock returns of all firms from 30 economies in the same industry. The stock price and market capitalization have been changed to US dollar before return calculation. The industry is defined based on GICS sectors.
Global Return	Value weighted global stock return. The value weighted average of the stock returns of all firms from 30 economies in the sample. The stock price and market capitalization have been changed to US dollar before return calculation.

Figure 1 Default ratio and currency return

This figure reports firm default ratio under different ranges of currency returns. The default ratio is calculated as the number of the default events divided by total firm-year observations.

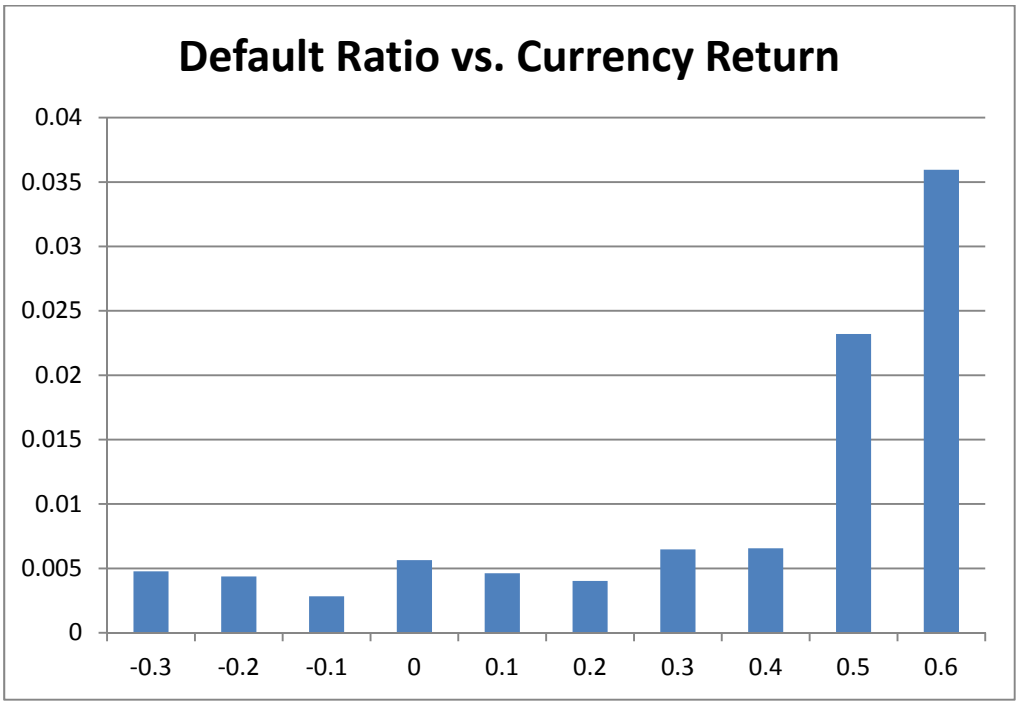


Table 2.1 Summary Statistics

Variable	Observations	Mean	Standard Deviation	25th pctl.	Median	75th pctl.
Currency Returns						
Currency Return	414,514	-0.002	0.106	-0.052	0.000	0.007
Large Positive Currency Return	429,401	0.096	0.294	0.000	0.000	0.000
Large Negative Currency Return	429,401	0.127	0.333	0.000	0.000	0.000
Normal Range Currency Return	429,401	0.920	0.271	1.000	1.000	1.000
Default	429,401	0.006	0.078	0.000	0.000	0.000
PD	429,401	0.007	0.020	0.001	0.002	0.005
Country Characteristics						
ExchgControl	429,401	0.151	0.358	0.000	0.000	0.000
Trade	413,862	0.229	0.420	0.000	0.000	0.000
Trade Surplus	177,286	0.518	0.500	0.000	1.000	1.000
FinInstDepth	379,549	91.301	44.185	51.341	92.793	113.138
FinMktDepth	387,057	105.598	71.567	64.611	94.748	129.954
FinInstEfficiency	383,816	1.644	1.150	0.873	1.437	2.721
FinMktEfficiency	387,057	111.710	75.507	58.173	94.084	142.482
FinInstStability	323,945	21.762	10.109	13.848	21.386	27.758

Table 2.2 Default Ratio Distribution

This table reports firm default ratio under different exchange rate changing scenarios. The default ratio is calculated as the number of the default events divided by total firm-year observations.

	Depreciation	Non-depreciation	Appreciation	Large Depreciation (>10%)
Number of Defaults	654	1417	784	251
Default Ratio	0.53%	0.46%	0.41%	0.61%

Table 2.3 Default ratio summary for each economy (United States excluded)

This table reports firm default ratio for each economy under different exchange rate changing scenarios. The default ratio is calculated as the number of the default events divided by total firm-year observations.

Country	No. of observations (depreciation)	No. of observations (non-depreciation)	No. of defaults (depreciation)	No. of defaults (non-depreciation)	Default Ratio (depreciation)	Default Ratio (non-depreciation)
Australia	6727	15050	59	48	0.88%	0.32%
China	4204	14190	103	263	2.45%	1.85%
Hong Kong	9244	6141	24	22	0.26%	0.36%
India	13876	12659	19	15	0.14%	0.12%
Indonesia	2596	1588	40	6	1.54%	0.38%
Japan	24358	34373	46	111	0.19%	0.32%
Malaysia	4539	9411	36	47	0.79%	0.50%
Philippines	1356	1407	12	10	0.88%	0.71%
Singapore	2497	6056	15	17	0.60%	0.28%
South Korea	6066	13566	65	27	1.07%	0.20%
Taiwan	7566	7905	12	13	0.16%	0.16%
Thailand	2182	4423	54	28	2.47%	0.63%
Canada	6825	7003	36	31	0.53%	0.44%
Euro Zone	11427	35952	66	107	0.58%	0.30%
Denmark	1632	1801	8	5	0.49%	0.28%
Iceland	181	191	0	3	0.00%	1.57%

Norway	1429	1966	6	7	0.42%	0.36%
Sweden	2283	3708	9	16	0.39%	0.43%
Switzerland	1737	2408	1	3	0.06%	0.12%
United Kingdom	13454	16590	43	16	0.32%	0.10%
Mean Ratio					0.71%	0.47%
Total Observations	124179	196388	654	795		

Table 2.4 The prediction power of currency return on firm default event

This table reports the prediction power of currency return on corporate default event. The dependent variable *Default* is a dummy variable indicating the corporate default event in year t+1. The main independent variable is the currency return in year t. All regressions include constant terms, country fixed effect, industry fixed effect and year fixed effects. The industry is defined based on GICS sectors. Details of variable definitions are stated in the Appendix 3. The sample period in this table is from 1990 to 2011. The standard errors are corrected for within-firm clustering. ***, ** and * indicate statistically significant at 1%, 5% and 10%level respectively. The table also reports z-statistics in brackets.

	(1) Default	(2) Default	(3) Default	(4) Default	(5) Default
Currency Return	0.409***	0.306***	0.906***	0.736***	0.862***
	(7.71)	(5.43)	(5.53)	(4.15)	(4.75)
PD		6.889***	8.566***	5.598***	5.579***
		(31.60)	(17.00)	(11.94)	(11.77)
Z-score			-0.000	-0.000	0.000
			(-0.75)	(-0.08)	(0.15)
DTD				-0.159***	-0.163***
				(-14.63)	(-14.44)
Market Return					0.162***
					(2.84)
Size					0.004
					(0.47)
Industry Return					0.009
					(0.42)
Global Return					0.050
					(0.95)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	410,508	410,508	175,813	158,824	156,155
Pseudo R2	0.0812	0.166	0.157	0.199	0.199

Table 2.5 The prediction power of large currency depreciation on corporate default event

This table reports the prediction power of large currency depreciation on corporate default event. The dependent variable *Default* is a dummy variable indicating the corporate default event in year t+1. The main independent variable is the currency return in year t. All regressions include constant terms, country fixed effect, industry fixed effect and year fixed effects. The industry is defined based on GICS sectors. Details of variable definitions are stated in the Appendix 3. The sample period in this table is from 1990 to 2011. The standard errors are corrected for within-firm clustering. ***, ** and * indicate statistically significant at 1%, 5% and 10%level respectively. The table also reports z-statistics in brackets.

	(1) Default	(2) Default
Large Positive Currency Return	0.108***	0.105***
	(3.73)	(3.51)
Large Negative Currency Return		-0.012
		(-0.36)
PD	6.915***	6.916***
	(31.63)	(31.63)
Country Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Observations	423,843	423,843
Pseudo R2	0.166	0.166

Table 2.6 The effect of currency return and the international trade

This table reports the effect of currency return on default risk when firms are in countries which more relies on international trade. The dependent variable *Default* is a dummy variable indicating the corporate default event in year t+1. The main independent variable is the currency return in year t. *Trade* is a dummy variable which equals 1 if the sum of the country's Exports (% of GDP) and Imports (% of GDP) is greater than the median value of the 30 economies in the sample. All regressions include constant terms, industry fixed effect and year fixed effects. The industry is defined based on GICS sectors. Details of variable definitions are stated in the Appendix 3. The sample period in this table is from 1990 to 2011. The standard errors are corrected for within-firm clustering. ***, ** and * indicate statistically significant at 1%, 5% and 10%level respectively. The table also reports z-statistics in brackets.

	(1) **Default**	**(2)** **Default** **Trade=1**	**(3)** **Default** **Trade=0**
Currency Return	0.113	0.299***	0.156
	(1.15)	(4.07)	(1.53)
Currency Return*Trade	0.206*		
	(1.90)		
Trade	-0.037*		
	(-1.92)		
PD	7.417***	8.055***	7.343***
	(32.16)	(9.98)	(30.44)
Year Fixed Effects	YES	YES	YES
Industry Fixed Effects	YES	YES	YES
Observations	398,690	89,573	306,314
Pseudo R2	0.142	0.118	0.149

Table 2.7 The different effects of currency return when countries are in trade surplus or deficit

This table reports the different effects of currency return when countries are in trade surplus or trade deficit. The dependent variable *Default* is a dummy variable indicating the corporate default event in year t+1. The main independent variable is the currency return in year t. The sample used in this table only includes observations with currency returns in normal range (-20%, 20%). All regressions include constant terms, industry fixed effect and year fixed effects. The industry is defined based on GICS sectors. Details of variable definitions are stated in the Appendix 3. The sample period in this table is from 1990 to 2011. The standard errors are corrected for within-firm clustering. ***, ** and * indicate statistically significant at 1%, 5% and 10%level respectively. The table also reports z-statistics in brackets.

	(1) **Default** **Surplus Sample**	**(2)** **Default** **Deficit Sample**
Currency Return	-0.603**	0.666**
	(-2.17)	(2.16)
PD	8.894***	6.058***
	(13.99)	(20.46)
Year Fixed Effects	YES	YES
Industry Fixed Effects	YES	YES
Observations	80,127	82,978

Table 2.8 The effect of currency return and country exchange rate policy

This table reports the effect of currency return when firms are in countries with exchange rate control policy. The dependent variable *Default* is a dummy variable indicating the corporate default event in year t+1. The main independent variable is the currency return in year t. *ExchgControl* is a dummy variable which equals 1 when the country has restrictions on exchange rate. The exchange rate arrangements classification is based on Ilzetzki, Reinhart and Rogoff (2008) and Reinhart and Rogoff (2004). The column (2) uses the normal range sample including observations with currency returns in normal range. And the column (3) uses the non-normal range sample including observations with large currency depreciation or appreciation. All regressions include constant terms, industry fixed effect and year fixed effects. The industry is defined based on GICS sectors. Details of variable definitions are stated in the Appendix 3. The sample period in this table is from 1990 to 2011. The standard errors are corrected for within-firm clustering. ***, ** and * indicate statistically significant at 1%, 5% and 10%level respectively. The table also reports z-statistics in brackets.

	(1) **Default**	**(2)** **Default** **Normal Range Sample**	**(3)** **Default** **Non-normal Range Sample**
Currency Return	0.295***	0.932***	0.381***
	(5.30)	(3.69)	(5.43)
Currency Return*ExchgControl	-0.608***	-1.282***	0.223
	(-3.69)	(-3.37)	(0.78)
ExchgControl	0.228***	0.251***	-0.092
	(9.85)	(9.88)	(-1.19)
PD	7.428***	7.261***	8.571***
	(32.39)	(31.05)	(8.87)
Year Fixed Effects	YES	YES	YES
Industry Fixed Effects	YES	YES	YES
Observations	414,115	333,471	71,472
Pseudo R2	0.146	0.155	0.107

Table 2.9 The effect of currency return and financial market development

This table reports the effect of currency return on firm default risk under different financial market development environments. The dependent variable *Default* is a dummy variable indicating the corporate default event in year t+1. The main independent variable is the currency return in year t. The indicators for financial market development *FinInstDepth*, *FinMktDepth*, *FinInstEffiency*, *FinMktEfficiency*, *FinInstStability* are from World Bank Global Financial Development Database. All regressions include constant terms, industry fixed effect and year fixed effects. The industry is defined based on GICS sectors. Details of variable definitions are stated in the Appendix 3. The sample period in this table is from 1990 to 2011. The standard errors are corrected for within-firm clustering. ***, ** and * indicate statistically significant at 1%, 5% and 10%level respectively. The table also reports z-statistics in brackets.

	(1) Default	(2) Default	(3) Default	(4) Default	(5) Default
Currency Return	0.408***	0.293***	0.183**	0.357***	0.347***
	(4.38)	(3.90)	(2.56)	(4.83)	(6.18)
Currency Return*FinInstDepth	-0.002**				
	(-2.06)				
FinInstDepth	-0.000				
	(-1.46)				
Currency Return*FinMktDepth		-0.002*			
		(-1.75)			
FinMktDepth		-0.001***			
		(-5.59)			
Currency Return*FinInstEffiency			-0.035***		
			(-3.10)		
FinInstEffiency			0.029***		
			(3.80)		

Currency Return*FinMktEfficiency				-0.002*	
				(-1.91)	
FinMktEfficiency				0.000***	
				(2.82)	
Currency Return*FinInstStability					-0.012**
					(-2.56)
FinInstStability					0.000
					(0.45)
PD	7.413***	7.417***	7.348***	7.360***	7.368***
	(31.31)	(31.92)	(31.56)	(31.49)	(31.03)
Year Fixed Effects	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES
Observations	367,627	371,885	368,222	371,885	316,850
Pseudo R2	0.140	0.141	0.140	0.140	0.133