

Leverage Divergence between the State-owned Sector and the Private Sector in China

Zona Zhang

April 3, 2018

Abstract

This thesis discusses the issue of the asymmetrical development of leverage between China’s state-owned sector and the private sector starting in 2010. By looking at the trends of company performance and the cost of debt among state-owned enterprises (SOEs) and private firms (non-SOE) over the period between 2007-17, this study presents strong evidence that the increase in credit supply and the deterioration in company efficiency after 2010 led to the divergence in SOE and non-SOE leverage. This study also finds that the stimulus policies introduced in 2009, as well as continued supply of low-cost credit, enhanced the SOEs’ advantage to capture more debt and hence prolonged the leverage gap between the two sectors.

1 Introduction

According to the Bank for International Settlements (BIS), over the decade after the Global Financial Crisis (GFC), China’s total debt to the non-financial sector has increased from around 140 percent of GDP in 2008 to a stunning 252.7 percent as of September, 2018 (see Figure 1). The BIS also reports that the bulk of the debt is concentrated in the corporate sector, which has a debt-to-GDP ratio of 152.9 percent as of September 2018. This ranks China’s corporate-sector debt as the highest among major economies, way ahead of the 73.9 percent in the US and the 89.2 percent among all developed countries (see Figure 2).

What makes the study of China’s corporate leverage crucial is that over the past decade, China’s GDP growth has been increasingly reliant on debt-financing, while the efficiency of debt — the amount of debt required to generate a unit of incremental output — has deteriorated (see Chen et al., 2018). As shown in Figure 3, China’s credit gap, which measures the deviation of debt intensity from its longer-term trend, peaked at 21 percent in 2015 and 2016. This number far exceeds the 10-percent threshold recommended by the BIS for maximum countercyclical buffer.

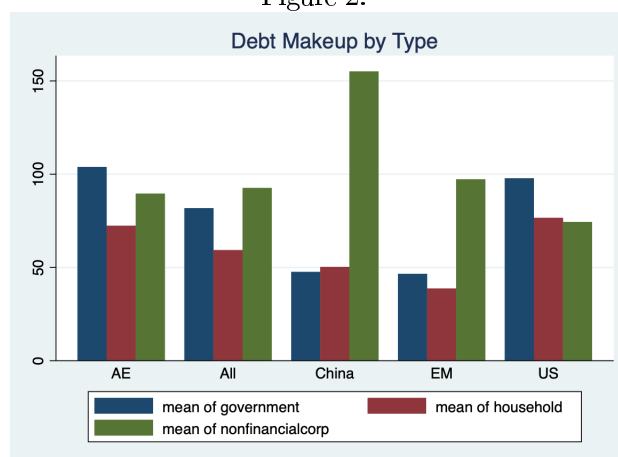
Corporate leverage became such an important policy concern that in May 2016, a famous interview with an “authoritative figure” appeared on the front-page of the People’s Daily, warning that China’s mounting indebtedness could

Figure 1:



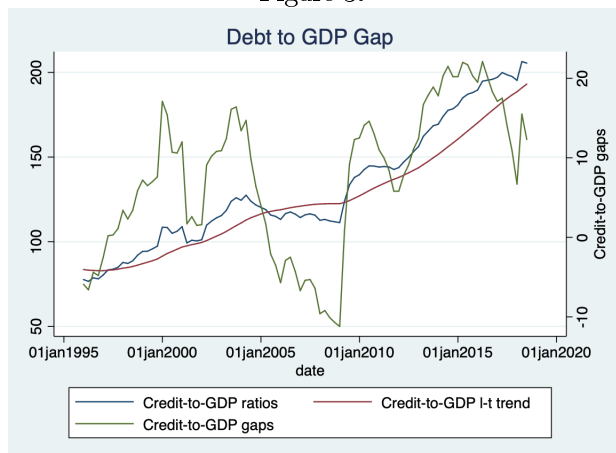
source: BIS database

Figure 2:



source: BIS database

Figure 3:



source: BIS database

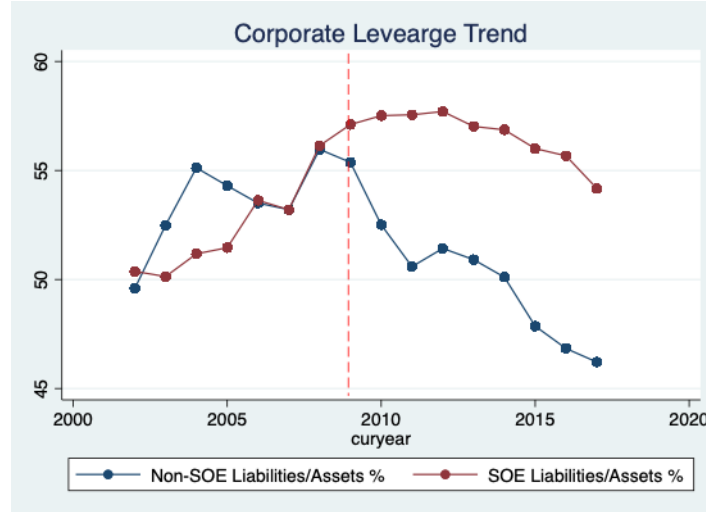
lead to severe financial risks on a par with those long experienced in Japan.¹ Specifically, a disproportionate amount of growth in China's corporate debt has been driven by state-owned enterprises (SOEs), which are companies owned by central or local governments that have strategic purposes such as export or infrastructure building (See Lardy, 2018). These companies usually belong to industrial sectors such as coal, steel, and construction and are often lower in productivity compared to non-SOEs. According to IMF (Schipke et al., 2018), the debt-to-GDP ratio for China's 150,000 SOEs stood at 117% and 121% in 2016 and 2017 respectively.

Recent literature has reached a consensus that the accumulation of corporate leverage in the state-owned sector was driven importantly by the government's RMB 4-trillion (\$586 billion) stimulus plan in 2009 and 2010 to facilitate economic recovery from the GFC (see Maliszewski et al. 2016; Cong et al. 2018; Liu et al. 2018). From Figure 1, we see that total corporate debt-to-GDP ratio surged over 20 percent in 2009 and continued to grow in the following years. In the same year, credit-to-GDP gap sky-rocketed from around -10 to above 10 percent (Figure 3). Using firm-level financial data from China's publicly-traded companies, this study corroborates the trend on the disproportionate credit allocation to the state-owned sector after the stimulus plan. Figure 4 below shows that among all publicly-traded non-financial firms in China, the SOE leverage ratio began to diverge from the non-SOE leverage ratio after the stimulus plan in 2009 and 2010, and the gap continued to widen until the last period of our observation in 2017.² Built on the consensus from previous studies, I intend to

¹Read the original interview at <http://politics.people.com.cn/n1/2016/0509/c1001-28335977.html>

²Note that my firm-level dataset only contains 714 SOEs that are publicly-traded in China's A shares markets, but the entire SOE population is made up of 150,000 SOEs. The method-

Figure 4:



Source: Capital IQ

explain the asymmetrical trends in SOE and non-SOE leverage structure under and after the stimulus plan. This divergence matters because it lies at the bottom of China's overleveraged economy. Uncontrollable debt accumulation in inefficient firms has the potential to lead to systemic risks and financial crises in the future.

It is unquestionable that Chinese policymakers are aware of the risks of high corporate debt and the low efficiency in the state-owned sector. As early as China's Third Plenum in 2013, the government has indicated its goal to increase the role of markets in the economy. In 2015 and 2016, China rolled out a subsequent series of supply-side reform projects that forced coal and steel companies to reduce their overcapacity and improve efficiency. The year after, a holistic package was announced by the State regulators to contain credit risk in the banking sector, kicking off the deleveraging campaign across the nation.³ Yet we see that China's corporate debt remained high and the gap between SOE and non-SOE leverage ratios persisted. According to the latest data from China's National Development and Reform Commission (NDRC), average debt-over-assets ratio among all SOEs stood at 64.9 percent in June 2018 versus the 66.3percent peak in 2016, while the non-SOE leverage remains around 10 percentage points lower.

It is thus crucial to understand what caused the substantial gap in sector leverages and why it failed to close under clear deleveraging policies. Using

ology of data selection and compilation is detailed in the next section.

³China Securities Regulatory Commission, China Banking Regulatory Commission, and China Insurance Regulatory Commission as well as the State Council all rolled out regulations concerning risk control in China's financial sector. See govt.cn for details of historical policies.

firm-level financial data from the past decade (2008-2017), this study finds significant evidence that the stimulus plan introduced a meaningful divergence between SOE and non-SOE leverage ratios. More importantly, my empirical analysis shows that the stimulus plan structurally changed the mechanisms through which the credit market allocates debt to both sectors. On the one hand, SOE leverage was driven mainly by the excess supply of low-cost debt-financing during and after the stimulus plan. On the other hand, non-SOEs gradually became inefficient borrowers as their productivity deteriorated from the lack of low-cost financing. Empirical data also finds that these distortions persist under the deleveraging policies in 2017.

The next section provides a literature review on the risks of high corporate leverage, credit misallocation, and zombie companies. Section III and IV report data source and summarizes findings. Section V discusses model methodology and results. In section VI, I conclude on today’s policy dilemmas as well on the economic ramifications of the stimulus policies.

2 Literature Review

There is a rich literature on credit booms and busts and their implications for economic growth. Mendoza and Terrones (2012) find that credit booms are often followed by steep contractions in the downswings for both advanced and emerging market economies. More studies find that credit boom is a predictor of financial crises (for example, see Borio and Lowe 2002; Geanakoplos 2010). Specifically, larger and longer booms – like the decade-long credit binge we see in China – are more likely to end in crises (see Aikman et al. 2015; Dell’Ariccia et al. 2016).

In particular, studies find that excess corporate debt prolongs recessions after the credit cycle busts. Richard Koo (2011) shows how corporate balance-sheet recessions led to protracted recessions as seen in Japan’s “lost decade” and the Great Depression. Using firm-level data, Cecchetti et al. (2011) estimate the threshold for corporate debt at about 90 percent of GDP for OECD countries. In comparison, China’s non-financial corporate debt reached 164 percent of GDP in 2018 (BIS data). Beltran et al. (2017) compared emerging market economies’ (EMEs) risky corporate debt level to that of East Asian economies right before the Asian Financial crisis and report that China is the only country among 15 emerging economies that has a higher percentage of risky debt compared to the Asian crisis level.

From a structural perspective, not all debts are equal. Biased allocation of credits worsens the risks involving high corporate leverage and drag down productivity in the long run. Hsieh and Klenow (2009) published their seminal paper on misallocation and total factor productivity (TFP) in manufacturing in China and India. They show counterfactually that TFP would have increased by 40-60% in the two countries were labor and capital allocated as efficiently as in the US. Many related studies have been conducted on Japan’s “zombies” – companies that became insolvent after Japan’s recession in the 1990s and

relied on the so-called “evergreening loans” to remain in operation. Peek and Rosengren (2005) detail banks’ incentives to provide unprofitable companies with evergreening loans, and several impactful papers published by authors including Caballero et al. (2008) and Fukuda and Nakamura (2011) show that zombie-dominated industries experienced more productivity pressure than normal industries, and that non-zombie firms are more adversely impacted than zombie firms.

Focused understandably on the lessons from Japan, economists have closely followed China’s SOE debt problem and conducted similar research on China’s zombie firms. Many studies find that China’s highly-leveraged SOEs have the particular characteristics of zombie firms as they received low-cost debt and crowd out private financing (see Tan et al. 2016; Lam et al. 2017). Focused on the supply side of credits, Firth et al. (2008) and Cong et al. (2017) find that China’s low-quality debt resulted from broad-stroke policy stimulus as well as the perverse lending preferences of China’s state-owned banks. Lam et al. (2017) also estimate counterfactually that solving the zombie problems in China could increase long-term growth by 0.7-1.2 percent.

While most past studies have confirmed that starting in 2008, policies have distorted banks’ incentives to lend to the private sector, few of them explain why this distortion persists even though the economic and policy cycles have shifted. This study intends to complement the literature by suggesting the potential mechanisms that caused asymmetrical reactions towards debt financing policies among different groups of companies – SOEs vs. non-SOEs, and productive vs. unproductive firms.

3 Data

3.1 Data Source

This paper uses panel data from 3446 non-financial companies in China that are publicly traded on domestic A-share markets - Shanghai Stock Exchange and Shenzhen Stock Exchange. The financial information is retrieved from Capital IQ, a subsidiary of S&P Global, which provides company financial information and analysis worldwide. The finalized dataset contains panel data on company-level operational data, balance sheet items and financial ratios from 2007 to 2017. I choose the 10-year period because the long timespan gives me an opportunity to look at how corporate leverage changes under different policy guidelines during and after the GFC.

To compare apples to apples, income statement and balance sheet information are pulled from firms’ annual financials and are matched with their latest fiscal year. The dataset includes annual financial data from fiscal year 2008 to 2017 for all 3446 firms, and fiscal year 2007 for 3335 firms due to the unusual fiscal year ending dates of 111 companies. The minor difference in the 2007 company number is not likely to have statistically significant impact on my results. All of the debt-related financial ratios – leverage ratios and return on

assets ratios -- are also annual data, according to Capital IQ.

3.2 State-owned Enterprises

The Capital IQ dataset is complemented by company ownership data from a report published by eastmonet.com – a major Chinese financial and stock information website provider – that identifies 1095 listed SOEs on the A-share markets. This number is slightly above the 1020 SOEs identified by Wind Economic Database (a major professional tool for access to financial data in China) in April, 2018.⁴ After incorporating the information available from eastmonet.com, I successfully identify 941 SOEs in my Capital IQ dataset. As a result, the final dataset identifies 941 SOEs for the purpose of this study.⁵

3.3 Outliers

This study takes two steps to exclude potential outliers and inaccurate financial metrics. First, I exclude the companies with the largest and the smallest one percent asset sizes in the dataset to avoid potential biases caused by extreme values. Second, I delete companies with financials that appear to be accounting errors. For example, observations such as larger-than-100-percent profit margins and companies with larger-than-100-percent liabilities-over-assets ratios are deleted from the. Because the outliers appear in different companies and different variables each year, the number of companies and observations in the dataset vary each year after the outlier deletion. The number of companies incorporated in the final dataset ranges from 1305 to 2230 from year to year, which still provides the study with enough data dimension to conduct related analyses.

3.4 Potential Biases

Several potential biases need to be addressed regarding the dataset. First, because I only include publicly-traded companies, their financial data is likely to be positively biased compared to a larger population of companies. The number of the SOE sample included in this data set is 941 (around 700 after dropping outliers), which includes most of the publicly-listed SOEs in China, whereas the entire population of SOEs across the nation is 150,000. Because the sample is not randomly selected, my analysis on the available information is not intended to represent a full picture of the leverage trends between all SOEs and all non-SOEs.

⁴See report by Lihua Wu on Economic Information Daily: http://dz.jjckb.cn/www/pages/webpage2009/html/2018-04/03/content_42279.htm.

⁵The list of SOEs in the final database is also cross-checked against a third database – Orbis (a database under Bureau van Dijk, a major publisher of business information), which suffers from incomplete information on company ownership. Not surprisingly, the Orbis dataset only identifies 42 SOEs that are all included in the eastmonet.com list, which confirms the accuracy and superiority of my alternative sources.

Instead, the scope of the study is strictly limited to testing the diverging leverage trends between listed SOEs and listed non-SOEs. As long as I compare public SOEs with public non-SOEs, the relative analyses should reflect meaningful results. Moreover, publicly-listed companies have more complete and accurate financial data as they are required to file quarterly reports publicly. Hence, using the subset of publicly-listed companies helps me avoid problems such as self-report bias and low-quality dataset in general.

The second potential problem is that my dataset does not differentiate SOEs by their percentage of state ownership. By definition, publicly-listed SOEs are all “mixed-ownership” companies because they allow the participation of outside shareholders. However, due to the lack of detailed ownership information from Capital IQ, this dataset does not tell us how many companies have a majority state ownership and how many do not. In turn, my dataset as an SOE as long as the state remains the controlling shareholder without differentiating the level of state ownership.

For example, China Unicom – one of China’s largest telecommunication companies – went through a mixed-ownership reform in 2017, which reduced its state ownership from 62.7 percent to 36.7 percent. The post-reform 13-member board of China Unicom includes 5 independent directors as well as 4 strategic investors from the private sector. As the state still remains as the largest shareholder within the company, I treat China Unicom as an SOE in the dataset. Understanding that the firm is dominated by private investment, some quality of China Unicom might resemble that of private companies. This should only negatively skew the average leverage ratio among SOEs. If the gap between SOE and non-SOE leverage trends are still significant when I include the more efficient firms in the SOE group, the results should be more robust compared to excluding them.

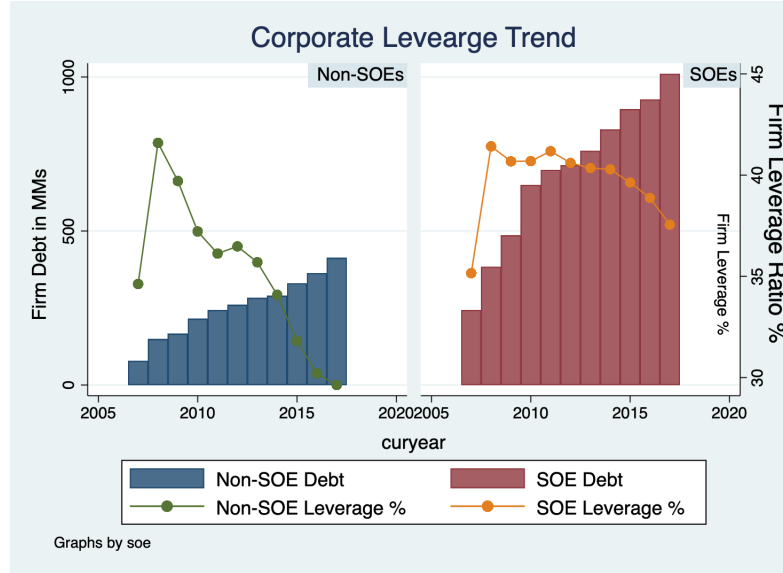
4 Summary Data

4.1 The High Leverage and Low performance in the State-owned sector

Comparing the leverage trends in both sectors gives us a big picture of how indebted each sector was over the past decade. Figure 5 and Figure 6 show that credits were given disproportionately to SOEs from 2007 to 2017 even though the private sector saw higher profitability and return on assets. As shown in Figure 5, average debt per company is much higher among SOEs than non-SOEs for all the periods observed, accompanied by a faster rate of increase in average debt during the stimulus policy in 2009 and 2010. The gap between SOE and non-SOE leverage ratios widened over the period of observation. While SOE leverage ratio stayed relatively stable, non-SOE leverage ratio shrank tremendously (shown in lines, left chart below).

This study calculates leverage ratio by dividing the total liabilities of a company by its total assets. The numerator of this ratio includes a company’s

Figure 5:



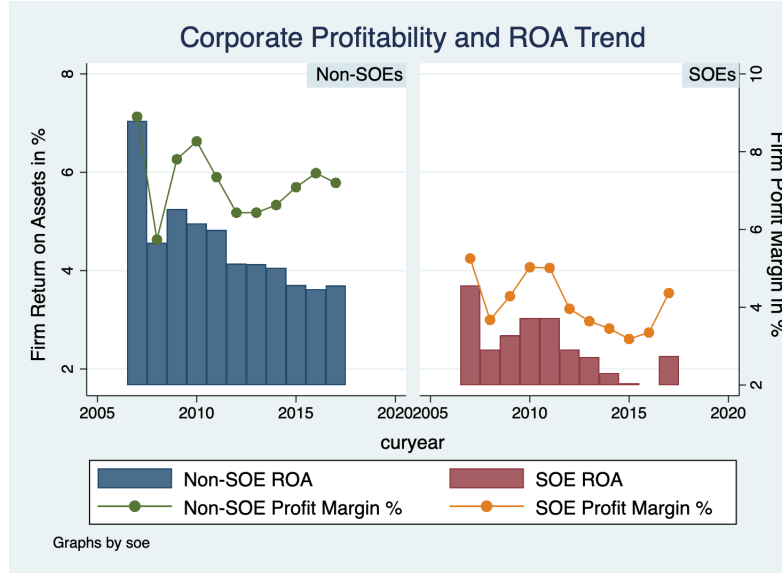
Source: Capital IQ

total debt and current liabilities – usually a source of cash during operations. Accordingly, the total assets in the denominator includes a company’s current assets, which reduces the amount of cash available during operations. Compared to a traditional debt-to-assets leverage ratio, the liabilities-to-assets ratio is less susceptible to financial engineering as companies cannot reduce leverage by moving their debt obligation to working liabilities. The materially lower average liabilities-to-assets ratio among non-SOEs suggest that the private sector had lower debt balances as well as higher net working capital compared to SOEs over the past decade.

The lower leverage ratio among non-SOEs is likely due to both external and internal reasons. Externally, a lack of financing sources from the banks checked the increase of debt among non-SOEs. Internally, leverage is driven down by higher efficiency of capital as the non-SOEs do not need a high percentage of debt to support their operations. Nevertheless, we still observe steady and slow growth in non-SOE total credit. This is likely due to development of shadow banking – non-bank loan financial products by banks or other financial institutions – as an alternative source of financing for non-SOEs when bank loans were disproportionately allocated to the state-owned sector.

Figure 6 provides us with a glimpse of the disparity in capital efficiency and profitability between the two sectors. Over the past decade, non-SOEs consistently outperformed SOEs in both metrics. In terms of profitability, non-SOE median net income margin has remained above 5 percent (except for the year 2008) and only declined in 2011 and 2012. By contrast, SOE median

Figure 6:



Source: Capital IQ

profitability remained below 5 percent ever since 2010 and only started to rise in 2017. In terms of capital efficiency, average return on assets (ROA) of non-SOEs more than doubled that of SOEs in every period of our observations. Although SOE performance improved in the last period of our observation, it was largely driven by cyclical increase in commodity price and not structural reforms, as Chinese upstream companies such as oil and gas contribute a large percentage of SOE total income (see Lardy, 2018).

The disproportionate allocation of debt to the state-owned sector based on their relative performance suggests a potential dichotomy in their lending mechanisms. This finding echoes Prime Minister Li Keqiang's public criticism on the "hidden line" between SOEs' and non-SOEs' access to bank loans. It has been well studied that the TFP of an economy increases as resources move from companies with low productivity to those with high productivity (see Hsieh and Klenow, 2009), and Chinese policymakers are certainly aware of that. Under this context, the rest of this study explores non-market reasons that attribute to the borrowing dichotomy between the state and the private sectors. One potential explanation is that unproductive companies received more leverage to compensate for their underperformance. Because SOEs were less productive than non-SOEs on average, most of the debt went to the state-owned sector. Another potential reason is that the increase in supply of cheap credits was unavailable to non-SOEs and thus were disproportionately allocated to SOEs regardless of their relative performance. I examine these alternative hypotheses in more detail below.

4.2 Change in Credit Supply Drove Leverage Divergence

Due to the lack of data from the banking sector, we do not directly observe the change of credit supply to each firm from 2007 to 2017. Instead, this paper constructs a new variable that indicates the credit availability to each firm that is irrelevant to its performance. This “credit availability index” (CAI) is calculated by taking the reciprocal of the annual average interest paid by all similar firms within a specific province and sector except for the firm of interest. The rationale for this construction is that the lower average interest rates a firm’s peers pay on their debt, the more credits are generally available to the firm. I take the reciprocal because the elasticity of company leverage ratio in regard to the change in interest rate is expected to change at different points. Empirically, this measure also gives us a more significant result compared to directly using the average interest rate calculated for a firm’s peers.

To separate the CAI from company idiosyncratic characters such as size, profits, and state ownership, I exclude the company of interest when calculating the average interest rate of the sector and province. The equation for CAI is illustrated below:

$$CAI = \frac{1}{\frac{\sum_{s,l,t} (InterestRate) - InterestRate_{i,t}}{(N_{s,l,t} - 1)}}$$

The CAI can be used to test the change of credit availability to SOEs and non-SOEs over time. The summary data in Table 1 below shows that total CAI increased sharply in 2009 and 2010, and again in 2015. The first two increases are likely to be associated with the stimulus plan. The third increase is likely related to the sharp destruction of SOE values in 2015 due to global commodity price shocks, followed by a renewed round of monetary easing announced in the same year.⁶ When comparing CAI by state ownership, we see that SOEs consistently received more credit supply relative to non-SOEs. More importantly, the difference between SOE CAI and non-SOE CAI increased significantly in 2010 and in 2015, when total credit supply also peaked. In the empirical analyses below, I further examine how the increase in credit supplies drove the divergence in leverage ratios between the two groups after the stimulus plan.

4.3 Differential in Productivity and the “Compensation” Mechanism Drove Leverage Divergence

To test the demand for credit between SOEs and non-SOEs, I follow the methodology of Cong et al. (2018) and construct a new variable – average product of

⁶See more details in the Financial Times article: <https://www.ft.com/content/0ec71cee-99d4-3693-88a9-29d565888798>.

Table 1: SOE vs. non-SOE CAI 2007-2017

Year	Non-SOEs	SOEs	Total	Diff
2007	0.16	0.18	0.17	0.02
# of firms	886	657	1543	
2008	0.16	0.18	0.17	0.02
# of firms	635	580	1215	
2009	0.21	0.22	0.22	0.01
# of firms	678	602	1280	
2010	0.23	0.29	0.26	0.06
# of firms	710	608	1318	
2011	0.2	0.23	0.21	0.03
# of firms	909	655	1564	
2012	0.17	0.19	0.18	0.02
# of firms	1065	683	1748	
2013	0.19	0.21	0.2	0.02
# of firms	1187	694	1881	
2014	0.18	0.21	0.19	0.03
# of firms	1327	700	2027	
2015	0.2	0.32	0.24	0.12
# of firms	1374	687	2061	
2016	0.22	0.22	0.22	0.01
# of firms	1377	672	2049	
2017	0.23	0.23	0.23	0.00
# of firms	1486	684	2170	
Total	0.2	0.24	0.22	0.04
# of firms	11647	7478	19125	

capital (APK) – as a proxy for a company’s capital efficiency and hence its demand for capital. Cong et al. argue that in an efficient market, there is a positive correlation between a firm’s APK and its outstanding loan balance, indicating that firms receive more credits as they improve their performance. However, the relationship between credit demand and productivity is usually non-monotonic. Berger and Bonaccorsi di Patti (2006) test two possible hypotheses for the mechanism through which companies change their capital structures – the “efficiency-risk hypothesis” or the “franchise-value hypothesis” – depending on their profit efficiency.⁷ The former hypothesis – true among high-proficiency companies – predicts that companies increase their leverage ratio as their efficiency improve; the latter hypothesis – true among low-proficiency companies – predicts that companies reduce leverage ratio as their efficiency improve. I consider both potential mechanisms in interpreting the results below.

APK is calculated as the sum of a company’s earnings before tax plus its SG&A (selling, general, and administrative) expenses, divided by its total assets. The equation for APK is illustrated below:

$$APK = \frac{EBT_{i,t} + SG\&A_{i,t}}{TotalAssets_{i,t}} \%$$

Note that APK is a more accurate reflection of capital efficiency compared to ROA for Chinese companies because it removes the differential standards of tax and employment applied by SOEs and non-SOEs. The determination of these expenses varies significantly between the two groups due to the social function of the SOEs. For example, a strategic purpose of SOEs is to contribute to local (or national) employment as well as local (or central) government income and hence might be subject to higher tax payments⁸ and more employee-related expenses. More importantly, adding back payments to employees gives us a clearer picture of companies’ productivity on capital.

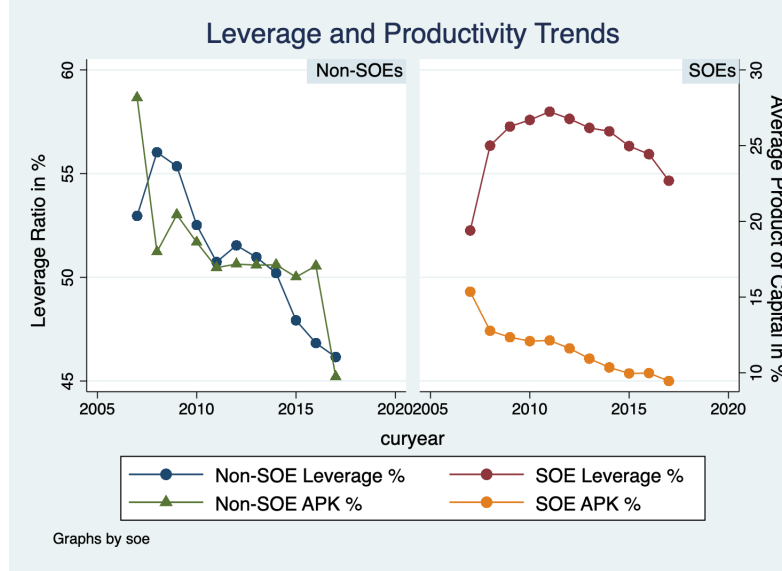
Figure 7 looks at the relative trends between company productivity (APK) and leverage ratio. Using average productivity and average leverage across all firms within each group in each year, we observe that the correlation between the two variables are very different between the SOEs and the non-SOEs.

In the non-SOE group, leverage ratio moved in the same direction as APK in every period observed except for 2008 and 2016. In particular, leverage ratio declines with APK deterioration for the majority of the observations. This suggest that over the past decade, non-SOEs were able to reduce leverage ratio as their expectation of future returns deteriorate. Simultaneously, because of negative external credit environment and internal performance, non-SOEs were forced to use their capital more economically.

⁷The profit efficiency is a relative measurement of a firm’s performance against its optimal profitability, measured the ratio of the predicted actual profits to the predicted profits of a best-practice firm facing the conditions as firm i.

⁸This is not true in all circumstances, but is given as a reason for why I exclude expenses from tax and employment. Overall, Chinese non-SOEs are subject to a much higher effective tax rate than SOEs due to a long list of indirect taxes. The World Bank estimates China’s effective tax rate at around 64.9%. Because it is hard to compare the exact tax rate between the two sectors, I eliminate the tax factor in my calculation of capital efficiency.

Figure 7:



Source: Capital IQ

By contrast, in the SOE group, there is less of a coherent trend between leverage ratio and APK. The leverage ratio increased dramatically in 2008 (likely due to direct fiscal stimulus right after the start of the GFC, which was introduced before the comprehensive stimulus plan) while APK dropped moderately compared to the pre-crisis level. The disproportional increase in leverage suggests that the SOEs received much more countercyclical support compared to non-SOEs. As SOEs' APK continued to decline after the GFC, the leverage ratio remained above the pre-crisis level. Hence, there seems to be a “compensation mechanism” where SOEs tapped the debt market for more capital to compensate for their low productivity. As this compensation mechanism turned from an emergency resource to a routine for SOE lending, the divergence in SOE and non-SOE leverage persisted.

5 Empirical Analysis

This part of the study considers how the stimulus plan in 2009 and 2010 led to asymmetrical trends in SOE and non-SOE leverage ratios through both supply-side and demand-side mechanisms. In the analyses below, I first use the 10 years of data to test the significance of the supply and demand factors (CAI and APK, constructed in the previous section) on company leverage ratio. Next, I test the effects of those factors on company leverage ratios before, during and after the period of stimulus policies (2009-10) respectively to see if there is a material difference among different time periods. Finally, using dummy variables to

represent different time periods before, during, and after the stimulus policies, I attempt to explain how specific policy regimes shift the impacts of various factors on company leverage ratios.

5.1 Testing Drivers of Leverage Ratio

This section intends to test how APK and CAI drive leverage change in Chinese firms over the entire ten-year period from 2007 to 2017 using the regression model specified below:

$$\frac{Liabilities}{Assets}\% = \alpha_t + \alpha_l + \alpha_s + \beta_0 X_{i,t} + \beta_1 SOE_{i,t} + \beta_2 APK_{i,t} + \beta_3 CAI_{i,t} + \varepsilon_{i,t} \quad (1)$$

Equation (1) tests the effects of CAI and APK on leverage ratios among SOEs and non-SOEs. The regression controls for time (t), location (l), and sector (s) as well as an “X” factor – a range of idiosyncratic company traits including total assets – a proxy for company size, PPE (plant, property, and equipment) – a proxy for a company’s fixed assets, EBITDA (earnings before interest, taxes, depreciation and amortization) – a proxy for a company’s cash flow, net income margin, and revenue growth. The coefficients of interest in the first three regressions are β_1 , β_2 and β_3 .

Results from four regressions with different levels of robustness are presented in Table 2 below. The first regression is a shortened version of equation (1), which excludes the “X” factor. This regression is meant to give us a basic idea of what impact the three variables have on all firms regardless of their financial performance in the entire 10-year-period of our observation. Output in column 1 suggests that on average, an SOE had a leverage ratio around 3.8 percentage points higher than a non-SOE on average. The positive β_2 and β_3 in the second and third row suggest that average product of capital had a negative effect on leverage ratio, whereas general supply of credits to a certain sector had a slightly positive effect. These results align with our expectation that inefficient firms in China are compensated with more leverage, and that firm leverage is also driven by the decline in credit cost in the market. Building from the first regression, the second regression incorporates factor “X”, which contains company-specific financial results that are usually correlated with leverage as well. In column 2, β_2 and β_3 remain significant after accounting for company asset size, real property, and profitability.

The third and the fourth regressions examine the autocorrelation of leverage ratio by including a lagged variable that represents company leverage ratio in the previous year. This allows us to split the drivers of incremental leverage from a company’s historical leverage, which is usually highly correlated with current leverage. In addition, these regressions add revenue growth to the “X” factor to control for companies’ demand for leverage to support growth rather than to compensate for their low productivity. The rationale is that if a high-leverage firm has a low productivity but fast growth, the debt is not misallocated because the company is expected to have high productivity in the future.

However, this assumption needs to be taken with a grain of salt because SOEs in China achieved tremendous growth in the past decades through merg-

ers without necessarily improving productivity.⁹ In addition, including lagged variables and growth statistics reduces the time span of our sample from 11 years to 10 years. This construction can introduce additional biases in the regression by making 2008 the first year of observation, which contains unrepresentative financials due to the GFC. Hence, we use the last two regressions as a robust check and observe that our variables of interest $-\beta_1$, β_2 and β_3 – all remain highly significant. Within the “X” factors, company total assets and net income also remain significant although the magnitude of their coefficients is substantially reduced by the inclusion of the lagged leverage variable. PPE, EBITDA, and growth are no longer significant.

Lastly, the only difference between regression 3 and 4 is that the latter clusters error by firm and the former does not. Assuming that all the common drivers of leverage are captured by the equation, I cluster error by firm to account for other firm-specific reasons that make errors different across observations. In this case, the coefficients from column 3 and 4 are exactly the same. Clustering error by firms does not impact the significance of our variables of interest.

5.2 Leverage Incentives over Four Periods

Having shown that the CAI and APK have significant impact on company leverage ratios over the entire ten-year period, 2007-17, I turn to explore how these channels generated asymmetrical leverage changes under different policy regimes during subsets of the ten-year period. In this set of regression, I include an interaction term between the SOE dummy and the variables of interests (CAI and APK) as well as the “X” factor. Shown in equation (2) below, the interaction terms (β_5 , β_6 , and β_7) allow SOEs to take on different coefficients than SOEs for all the variables we study or control for. This provides us with more information on how the “dichotomy” of lending between SOEs and non-SOEs take place through these mechanisms. Besides, I exclude revenue growth as a control variable because it lacks consistent significance and distorts the timespan of the sample.

$$\frac{Liabilities}{Assets}\% = \alpha_t + \alpha_l + \alpha_s + \beta_0 X_{i,t} + \beta_1 SOE_{i,t} + \beta_2 APK_{i,t} + \beta_3 CAI_{i,t} + \beta_4 SOE_{i,t} * APK_{i,t} + \beta_5 SOE_{i,t} * CAI_{i,t} + \beta_6 SOE_{i,t} * X_{i,t} + \varepsilon_{i,t} \quad (2)$$

Table 3 shows the results from running regression model (2) separately on the entire ten-year period as well as four sub-periods of time: pre-stimulus (2007-08), stimulus (2009-10), post-stimulus (2011-16), and deleveraging (2017). Note that the first two regressions (column 1 and 2) are not detrended in order to include observations from 2007.

Findings & Discussion:

We first look at the effect of the SOE dummy (β_1) throughout time. As we control for all the possible drivers – CAI, APK, as well as the “X” factor –

⁹See Lardy (2018): 168 central SOEs controlled by the SASAC increased their asset value by over RMB 40 trillion from 2005 to 2017 – the equivalence of four times of the net income earned over the same period. Meanwhile, the return on assets plummeted from around 6 percent to 2.6 percent according to the author.

Table 2: The Effect of SOE, CAI, APK, and the “X” Factor on Company Leverage

	(1) Liabilities to Assets Ratio	(2) Liabilities to Assets Ratio	(3) Assets Ratio (+ detrend)	(4) Assets Ratio (+ cluster)
soe	3.838*** -8.73	2.642*** -11.88	1.277*** -7.1	1.277*** -6.08
apk	-0.138*** (-10.41)	-0.0495*** (-4.05)	-0.0728*** (-7.95)	-0.0728*** (-7.49)
cai	0.0124*** -20.97	0.0167*** -22.87	0.0161*** -7.66	0.0161*** -7.66
total assets		0.000659*** -11.26	0.000190*** -8.81	0.000190*** -4.63
ppe		-0.0214* (-2.44)	0.00991 -1.53	0.00991 -1.42
ebitda		-0.0786*** (-3.46)	-0.0344 (-1.77)	-0.0344 (-1.72)
net income		-0.467*** (-9.99)	-0.177*** (-6.95)	-0.177*** (-6.88)
revenue growth			0.0488 -0.58	0.0488 -0.58
lagged leverage			0.778*** -134.82	0.778*** -120.48
constant	48.03*** -33.96	54.44*** -35.39	11.31*** -11.65	11.31*** -10.88
N	15200	15200	12928	12928
Sector FE	Y	Y	Y	Y
Location FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Firm Cluster	N	N	N	Y
Autocorrelation	N	N	Y	Y

Table 3: The Effect of APK and CAI on Company Leverage over Four Subperiods

	(1)	(2)	(3)	(4)	(5)
	Liabilities to Assets Ratio (All years)	Liabilities to Assets Ratio (2007&2008)	Liabilities to Assets Ratio (2009&2010)	Liabilities to Assets Ratio (2011-2016)	Liabilities to Assets Ratio (2017)
soe	10.25*** -7.3	2.905 -1.33	2.910* -2.47	2.069** -2.79	1.32 -0.75
apk	0.00877 -0.43	0.028 -0.91	-0.00596 (-0.27)	-0.0341** (-2.98)	-0.194*** (-6.09)
cai	0.0171*** -13.85	2.949** -2.83	0.0146*** -7.13	0.0175*** -37.32	1.079 -0.63
apk*soe	-0.245*** (-5.84)	-0.0823 (-1.65)	-0.134*** (-3.80)	-0.0844*** (-3.80)	0.0489 -1.07
cai*soe	-0.809 (-1.69)	-3.382* (-2.19)	3.868** -3.04	9.369*** -4.37	-2.084 (-0.32)
lagged leverage			0.765*** -53.57	0.770*** -95.16	0.785*** -49.46
constant	52.87*** -19.4	56.14*** -13.87	9.470*** -3.65	8.865*** -6.86	9.371*** -3.93
N	15200	2395	2136	8276	1572
Sector FE	Y	Y	Y	Y	Y
Location FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
Firm Cluster	Y	Y	Y	Y	Y
Autocorrelation	N	N	Y	Y	Y

throughout all the periods, the positive and significant β_1 suggests that lenders were giving SOEs money exactly because they are SOEs. The 10-percent β_1 in column 1 is likely due to the elimination of the lagged variable in the regression, but it is hard to tell what drove the disproportionate leverage across the entire ten-year data. Split across years, the following columns show that β_1 is only significant during the stimulus period and the period after. This aligns with our observation in the summary data that these periods saw the dramatic divergence between SOE and non-SOE leverage. According to the literature, the extra leverage caused by the SOE dummy and not captured by any other common financial factors are generally understood as the implicit guarantee by the government against SOE default (for example, see Allen et al. 2017). Hence during the period of sharp divergence in SOE and non-SOE leverage, the market had a stronger perception of the government’s commitment to prevent SOE defaults, which increased lenders’ willingness to lend more to the state-owned sector. Meanwhile, because the largest commercial banks in China – known as the “Big Four” – are all owned by the state, β_1 can also suggest that the government pressured banks to lend to the SOEs during those periods.

Looking at APK for non-SOEs, columns 1 to 3 show that APK had no significant effects on company leverage among non-SOEs before and during the stimulus plan. However, after the stimulus plan, APK had an increasingly significant and negative effect on leverage ratio among non-SOEs. Especially during the deleveraging period, a one-percentage-point decrease in non-SOE APK can lead to a 0.2-percentage point increase in leverage ratio. Recall the mechanism through which inefficient companies increase leverage to compensate for low productivity. This compensation mechanism was repressed among non-SOEs under the stimulus plan but began to appear in the last period of our observation. One way to interpret this is that external debt became relatively more available for non-SOEs during the deleveraging period. We know this is unlikely because China tightened credits from shadow banks significantly in 2017, cutting the major funding source for the private sector. Alternatively, this study sees the negative APK among non-SOEs as a sign of financial deterioration, where leverage ratio goes up because of equity reduction related to asset destruction.¹⁰

In comparison, the interaction coefficient between SOE and APK (β_5) is significant and negative under the stimulus and post-stimulus era and muted during the deleveraging era. For example, under the stimulus policy, an SOE’s leverage was on average 0.13 percentage point higher than a non-SOE at the same APK level. This contrast suggests that the divergence in leverage ratio was partially driven by SOEs’ demand for higher leverage to compensate for underperformance, which disappeared under the deleveraging policy.

The reversal of significance in APK between the SOE group and the non-SOE group suggests a potential reversal in efficiency trend as well. As mentioned

¹⁰Recent reports from China has shown that non-SOE performance deteriorated relative to SOEs after 2017 largely due to the clampdown of non-SOE financing sources. Lower profitability and destruction of equity led to increase in non-SOE leverage ratio. For more details, see Caixin report: <http://opinion.caixin.com/2018-09-22/101329371.html>.

in the section above, if the “efficiency-risk hypothesis” and the “franchise-value hypothesis” are true, gaining a negative correlation between APK and leverage ratio means reduced profit efficiencies among non-SOEs. In comparison, the disappearance of this correlation among SOEs in 2017 coincided the improved sector performance in the same period. However, based on Lardy (2018)’s point on the cyclical nature of SOE financial improvement, this might not be enough evidence to predict the closing of leverage gap between SOEs and non-SOEs. In this set of regression, it is unclear whether the stimulus plan had a significant impact on company’s leverage as a function of their productivity, but we observe a gradual trend of companies changing their lending behaviors throughout the periods of observation.

Next, we look at the effect of CAI on leverage during the four sub-periods. β_3 is positive and significant during the pre-stimulus period, which suggests that non-SOE leverage was boosted by the increase in low-cost debt in 2007-08. However, the level of β_3 declined substantially under the stimulus period and after, which means that non-SOE leverage was much less sensitive to the decline in borrowing cost after 2008. I hypothesize that it is because the increased supply of cheap credit under the stimulus plan was not really available to non-SOEs.

By contrast, CAI’s impact on SOEs changed exactly in the opposite direction. β_6 was significant and negative before the stimulus but became increasingly positive in the second and third period of our observation. During the post-stimulus period, the same level of increase in credit availability boosts SOE leverage by 9.4 percentage points while supporting non-SOE leverage by barely 0.01 percentage points. Similar to our takeaway with the APK mechanism, the flipping signs of β_3 and β_6 is strong evidence that the stimulus policies revert the ways SOE and non-SOE incur debt regarding the cost of credit in the market. Because the CAI is constructed to avoid correlation with the specific performance and characteristics of the company under observation, we can draw the conclusion that SOEs’ leverage increase was largely driven by the general decline in credit costs regardless of relative company performance and other idiosyncratic characteristics of the firm.

To sum up the discussion above, coefficients for SOE and non-SOE leverage drivers moved in opposite directions as policy regimes transitioned from pre-stimulus period to the post-stimulus period. The findings enhance my hypothesis that the dichotomy in lending behaviors between the two groups was initially introduced by the stimulus plan.

5.3 Testing Stimulus Dummies

In the last regression, I integrate three dummies for different periods of time to test how each policy regime shifted the impact of CAI and APK on company leverage ratio. The “stimulus”, “post”, and “delev” dummies represent respectively the stimulus period (2009-10), the six years after (2011-16), and the deleveraging period (2017). The pre-stimulus dummy (2007-08) is omitted in the regression. For the purpose of succinct notation, all policy dummies are

presented as “*PolicyD*” in Equation (3) and the results are presented in Table 4 below.

$$\frac{\text{Liabilities}}{\text{Assets}}\% = \alpha_t + \alpha_l + \alpha_s + \beta_0 X_{i,t} + \beta_1 SOE_{i,t} + \beta_2 APK_{i,t} + \beta_3 PolicyD + \beta_4 PolicyD * SOE_{i,t} + \beta_5 APK_{i,t} * SOE_{i,t} + \beta_6 CAI_{i,t} * SOE_{i,t} + \beta_7 APK_{i,t} * PolicyD + \beta_8 CAI_{i,t} * PolicyD + \beta_9 APK_{i,t} * PolicyD * SOE_{i,t} + \beta_{10} CAI_{i,t} * PolicyD * SOE_{i,t} + \varepsilon_{i,t}$$

(3)

Findings & Discussion:

Controlling for idiosyncratic firm characteristics and operational metrics under the “X” factor, this regression examines the effect of policy dummies on company leverage and their second-order impact on the causal relationship of APK, CAI, and SOE on leverage. The first two regressions simply test the significance of β_3 and β_4 without considering the second-order coefficients of policy regimes. Regression 2 accounts for the autocorrelation issue and includes lagged leverage variable to detrend the data.

In column 1 and 2, we see that β_3 is significant and negative in the two periods after stimulus, while β_4 is significant and positive in the stimulus period and the post-stimulus period. Hence the post-stimulus periods added a downward pressure on non-SOE leverage while providing an upward pressure on SOE leverage, inducing sustained lending divergence in the two groups. More importantly, the increasing differentials between the negative β_3 and the positive β_4 —quadrupled from 3 percentage points to 12 percentage points from the stimulus period to the post-stimulus period—suggest that the stimulus plan had long-term effects on the dichotomy in China’s lending market.

In the next two regressions, I test the secondary effects of each policy regime through both the APK and CAI mechanisms on both groups. The fourth regression includes a lagged leverage variable for the purpose of a robustness check. Interestingly, the only two terms that remain consistently significant in both regressions are β_9 and β_{10} for the post-stimulus period. In other words, only the post-stimulus period had a significant impact on how SOEs increased their leverage through the mechanisms of APK and CAI.

Specifically, the coefficient for “*APK * POST * SOE*” remains negative in both columns, meaning that the compensation mechanism was significant for SOE leverage under the influence of the post-stimulus policy regime. Ceteris paribus, the post-stimulus period allows SOEs to incur a leverage ratio that is 0.05 to 0.16 percentage point higher than non-SOEs with the same level of productivity. There is no significant difference in compensation effects between the two groups under other policy regimes.

The coefficient for “*CAI * POST * SOE*” is also significant and positive throughout both tests, suggesting that the post-stimulus period significantly magnified the leverage differential between the two groups through the CAI mechanism. The post-stimulus policy regime boosted SOEs’ ability to capture much more available credits on the market compared to non-SOEs. While non-SOEs leverage was insensitive to the increasing credit supply during and after the stimulus

Table 4: The Effect of Policy Regimes on Corporate Leverage and the APK/CAI Mechanisms

	(1)	(2)		(3)	(4)
	Liabilities to Assets Ratio	Liabilities to Assets Ratio (detrended)		Liabilities to Assets Ratio	Liabilities to Assets Ratio (detrended)
stimulus	-0.525 (-0.79)	-2.662*** (-5.73)	apk	0.0263 -1.18	-0.0946*** (-3.34)
post	-5.956*** (-9.38)	-3.159*** (-8.63)	cai	-0.391 (-0.36)	-2.438*** (-5.28)
delev	-7.300*** (-11.16)	-1.443*** (-3.67)	apk_stimulus	-0.100*** (-3.77)	0.021 -0.66
stimulus_soe	3.118*** -3.66	2.798*** -7.06	cai_stimulus	0.408 -0.38	2.448*** -5.3
post_soe	6.021*** -7.86	1.787*** -7.77	apk_post	-0.0857** (-2.63)	0.0513 -1.65
delev_soe	6.701*** -7.66	-0.147 (-0.36)	cai_post	0.407 -0.38	2.455*** -5.31
			apk_delev	-0.171*** (-3.96)	-0.0755 (-1.88)
			cai_delev	0.229 -0.06	5.310** -3.13
			apk*stimulus*soe	-0.0434 (-1.02)	-0.0233 (-0.77)
			cai*stimulus*soe	-0.19 (-0.20)	7.269** -2.83
			apk*post*soe	-0.155*** (-3.48)	-0.0522** (-3.00)
			cai*post*soe	23.50*** -6.63	9.480*** -7.22
			apk*delev*soe	-0.0954 (-1.26)	0.0127 -0.3
			cai*delev*soe	24.55*** -5.22	-0.282 (-0.12)
N	17376	14917	N	15200	12928
Sector FE	Y	Y		Y	Y
Location FE	Y	Y		Y	Y
Time FE	Y	Y		Y	Y
Firm Cluster	Y	Y		Y	Y
Autocorrelation	N	Y		N	Y

plan, SOEs relied immensely on cheap financing from banks. Finally, considering column 4 alone, the magnitude of β_{10} increased by 2.2 percentage points, implying a stronger CAI mechanism compared to the stimulus period. This shows that the divergence in leverage ratios was further enhanced by continued favorable loans extended to SOEs during the period.

5.4 Leverage Mechanism

From the analyses above, we see that deterioration in firm productivity, increased supply of low-cost credit, and implied government guarantees against SOE default all played significant roles in contributing to the divergence in leverage ratios between SOEs and non-SOEs after the stimulus plan. The CAI mechanism driven by excess credit supply had a more instant effect on SOEs' high leverage ratio compared to the APK mechanism driven by company productivity. This is expected because the stimulus plan was designed to inject debt to companies in the short-term to combat the GFC, while structural changes in the APK mechanism takes longer to develop.

There are two rationalization for the CAI mechanism. First, it is consistent with the central-directed nature of the stimulus policies, where the excess supply of credits came from state-owned banks and were directed to state-owned enterprises.¹¹ As the 4-trillion stimulus plan was at first deemed as a success in salvaging economic growth from the GFC, the general directive of encouraging credits from the government to the SOEs remained in place even though the crisis was over. This period of extreme asymmetry in credit absorption between SOEs and non-SOEs coincides with the ramp-up of China's overall expansion of corporate debt.

The second explanation is consistent with the rise of shadow banking as a major source of funding for non-SOEs during the same period. High-performance non-SOEs sought for alternative sources of credits as it became increasingly difficult for them to secure low-interest loans from banks. As a result, decreasing interest rates (shown as increasing CAIs) had little impact on non-SOE leverage trends. The dual forces of government policy and shadow banking formed and maintained the dichotomy in China's lending market.

By tracking the relationship between APK and leverage, this study also confirms that the stimulus policies had a long-term effect on companies' preference of capital structure regarding their productivity. Within the SOE group, while leverage increase was highly correlated with low productivity under the stimulus period, this correlation became weaker after 2010 and disappeared in 2017. This transition is consistent with increasing realization of the "zombie-SOE problem" among Chinese policymakers. In a 2017 State Council meeting, Prime Minister Li Keqiang emphasized that SOE deleveraging and "de-zombification" would remain at the center of China's economic reform. However, less than a year before, China had just doubled down on its support to SOEs as Xi Jinping advocated for "making SOEs larger and stronger than ever" in an SOE reform meeting in

¹¹The lending from state-owned banks to SOEs is detailed in Tan et al. (2016).

Beijing (Xinhua Net News, 2016). The dual objectives of central policies during the post-stimulus era explained why SOE leverage remained much higher relative to non-SOE leverage.

Finally, the correlation between productivity and leverage ratio for non-SOEs saw a significant change during the deleveraging period, as non-SOEs with declining productivity started to see increasing leverage ratios. This suggests that non-SOE efficiency might have deteriorated. Before 2017, non-SOEs were still able to receive credits from shadow banks at a relatively higher interest rate compared to SOEs. However, as China started to clamp down shadow banks in 2017, the private sector suffered from a severe tightening in credits. According to Bloomberg, China's shadow banking credit as a percentage of GDP decreased from 87 percent to 79 percent.¹² This process was likely to have incurred liquidity problems and hence led to worse performance among non-SOEs. Recall that Figure 7 exhibits a sharp decline in non-SOE APK in 2017, accompanied by a slower leverage decline in median leverage ratio compared to previous years. The negative correlation between non-SOE APK and leverage was largely due to value destruction in company assets, which reduced the denominator of leverage ratio.

6 Conclusion

In conclusion, the stimulus policies appear to have led to asymmetric reactions in leverage ratios between SOEs and non-SOEs, largely through excessive supply of low-cost debt to the SOE sector. Moreover, the stimulus policies of 2008-09 had long-term effects that distorted the lending incentives within the lending market. This is shown in the continued disproportionate capture of low-cost credits by the SOEs and over-reliance on shadow-banking by the non-SOEs during the post-stimulus period. Although deleveraging efforts helped reduce overall corporate leverage, they did not correct these structural distortions within the lending markets. On the contrary, with a focus on the clampdown of shadow banks in 2017, the deleveraging campaigns hurt non-SOEs even more than before by taking away their major source of lending.

Underscoring the asymmetrical problem between SOE and non-SOE lending is the more pronounced asymmetry between credit stimulus and deleveraging. While the stimulus policies led to sharply increased debt and negative productivity impacts on the broader economy, the subsequent deleveraging campaign depressed private sector vitality even more by attacking the shadow banks. Going into 2019, the thorny policy issue becomes how to incentivize banks to lend to the private sector again as the debt market had already grown accustomed to the dichotomy in SOE and non-SOE lending mechanisms. In turn, this thesis reinforces the argument that sweeping top-down policies intended to control the economy usually have short-lasting effects and can introduce long-term inefficiencies. It is appropriate, under such circumstances, that policy makers

¹²See detailed report at: <https://www.bloomberg.com/markets/fixed-income>.

consider more nuanced and market-driven strategies to reinvigorate the private sector.

Acknowledgement

I would like to thank my advisor, Professor Stephen S. Roach, for his continuous support and guidance throughout the process of writing this thesis. The idea of writing on this topic originated from two years ago when I took his seminar at Yale, “Lessons from Japan,” and it is my great honor to be able to complete this study with him. His extensive knowledge in the field provides great insight to my work.

References

- [1] Aikman, David, Andrew G. Haldane, and Benjamin D. Nelson. 2014. Curb-ing the credit cycle. *The Economic Journal*, 125(585): 1072-1109.
- [2] Allen, Franklin, Xian Gu, Jun Qian, and Yiming Qian. 2017. "Implicit guarantee and shadow banking: the case of trust products." *Work. Pap., Imp. Coll. London Google Scholar Article Location*.
- [3] Beltran, Daniel, Keshav Garud, and Aaron Rosenblum. 2017. Emerging Market Nonfinancial Corporate Debt: How Concerned Should We Be? *International Finance Discussion Paper Notes, June, Board of Governors of the Federal Reserve System, Washington, DC*.
- [4] Berger, Allen N., and Emilia Bonaccorsi Di Patti. 2006. Capital structure and firm performance: A new approach to testing agency theory and an application to the banking industry. *Journal of Banking & Finance*, 30(4): 1065-1102.
- [5] Borio, Claudio, and Philip Lowe. 2002. Assessing the risk of banking crises. *BIS Quarterly Review*, 7(1): 43-54.
- [6] Caballero, Ricardo J., Takeo Hoshi, and Anil K. Kashyap. 2008. Zombie lending and depressed restructuring in Japan. *American Economic Review* 98(5): 1943-77.
- [7] Cecchetti, M. Mohanty, and F. Zampolli. 2011. Achieving growth amid fiscal imbalances: the real effects of debt, Economic Symposium Conference Proceedings. *Federal Reserve Bank of Kansas City*: 145-196.
- [8] Chen, Sally, and Joong Shik Kang. 2018. *Credit Booms—Is China Different?*. International Monetary Fund.
- [9] Chivakul, M., & Lam, M. R. W. (2015). *Assessing China’s corporate sector vulnerabilities* (No. 15-72). International Monetary Fund.

- [10] Cong, Lin William, Haoyu Gao, Jacopo Ponticelli, and Xiaoguang Yang. 2018. Credit allocation under economic stimulus: Evidence from China. *Buffett Institute Global Poverty Research Lab Working Paper*: 17-108.
- [11] Davies, Gavyn. 2015, "Global economy survives the China and commodity shocks – so far," Financial Times (Sep 6). Accessed on April 3, 2019. <https://www.ft.com/content/0ec71cee-99d4-3693-88a9-29d565888798>.
- [12] Dell’Ariccia, Giovanni, Deniz Igan, Luc Laeven, Hui Tong, Bas Bakker, and Jerome Vandenbussche. 2012. Policies for macrofinancial stability: How to deal with credit booms. *IMF Staff discussion note*, 7.
- [13] Firth, Michael, Chen Lin, and Sonia ML Wong. 2008. Leverage and investment under a state-owned bank lending environment: Evidence from China. *Journal of Corporate Finance*, 14(5): 642-653.
- [14] Fukuda, Shin-ichi, and Jun-ichi Nakamura. 2011. Why did ‘zombie’firms recover in Japan?. *The world economy*, 34(7): 1124-1137.
- [15] Gao, Xu. 2018, "Risks of Using Stock as Collateral under Deleveraging," Caixin (Sep 22). Accessed April 03, 2019. <http://opinion.caixin.com/2018-09-22/101329371.html>
- [16] Geanakoplos, John. 2010. The leverage cycle. *NBER macroeconomics annual*, 24(1): 1-66.
- [17] Hsieh, Chang-Tai, and Peter J. Klenow. 2009. Misallocation and manufacturing TFP in China and India. *The Quarterly journal of economics*, 124(4): 1403-1448.
- [18] Huang, Cary. 2018, "Party's Third Plenum Pledges 'decisive Role' for Markets in China's Economy," South China Morning Post (July 20). Accessed April 03, 2019. <https://www.scmp.com/news/china/article/1354411/chinas-leadership-approves-key-reform-package-close-third-plenum>.
- [19] Huang, Rui. 2016, "Xi Jinping: Making State-owned Enterprises Stronger and Better and Bigger," Xinhua Net (July 04). Accessed April 03, 2019. http://www.xinhuanet.com//politics/2016-07/04/c_1119162333.htm
- [20] Koo, Richard. 2011. "The world in balance sheet recession: causes, cure, and politics." *Real-world economics review* 58.12: 19-37.
- [21] Lam, W. Raphael, Mr Alfred Schipke, Yuyan Tan, and Zhibo Tan. 2017. *Resolving China's Zombies: Tackling Debt and Raising Productivity*. International Monetary Fund.
- [22] Lardy, Nicholas R. 2019. *The State Strikes Back: The End of Economic Reform in China?*. Washington DC: Peterson Institute for International Economics.

- [23] Liu, Qigui, Gary Tian, and Xiaoming Wang. 2011. The effect of ownership structure on leverage decision: new evidence from Chinese listed firms. *Journal of the Asia Pacific Economy*, 16(2), 254-276.
- [24] Liu, Qigui, Xiaofei Pan, and Gary Gang Tian. 2018. To what extent did the economic stimulus package influence bank lending and corporate investment decisions? Evidence from China. *Journal of Banking & Finance*, 86, 177-193.
- [25] Maliszewski, Wojciech, et al. 2016. *Resolving China's corporate debt problem*. International Monetary Fund.
- [26] Mendoza, Enrique G., and Marco E. Terrones. 2012. *An anatomy of credit booms and their demise* (No. w18379). National Bureau of Economic Research.
- [27] Peek, Joe, and Eric S. Rosengren. 2005. Unnatural selection: Perverse incentives and the misallocation of credit in Japan. *American Economic Review*, 95(4), 1144-1166.
- [28] Schipke, Alfred, Longmei Zhang, and Yuanhong Chen. 2018. *Assessing SOE Reforms and Overcapacity Reduction*. *China 2018 Article IV Consultation Selected Issues*. International Monetary Fund
- [29] Tan, Yuyan, Yiping Huang, and Wing Thye Woo. 2016. Zombie firms and the crowding-out of private investment in China. *Asian Economic Papers*, 15(3), 32-55.
- [30] Wu, Lihua. 2018, "503 publicly-listed State-owned Enterprises Report 54% of Growth in Net Profit," Economic Information Daily (April 3). Accessed April 03, 2019. http://dz.jjckb.cn/www/pages/webpage2009/html/2018-04/03/content_42279.htm
- [31] 2018 "China \$10 Trillion Shadow Bank Crackdown Has Long Way to Go," Bloomberg News (May 28). Accessed April 3, 2019. <https://www.bloomberg.com/markets/fixed-income>