Bank Incentives, Credit Market Discipline and Firm Performance in China

Robert M. Bushman
Kenan-Flagler Business School
University of North Carolina-Chapel Hill

Qi Chen
Fuqua School of Business
Duke University

Kun Wang
School of Economics and Management
Tsinghua University

Xing Xiao
School of Economics and Management
Tsinghua University

This Draft: July 2013

Preliminary and comments welcome. The authors acknowledge financial support from Kenan-Flagler Business School, University of North Carolina at Chapel Hill (for Bushman), Fuqua School of Business of Duke University (for Chen), and School of Economics and Management at Tsinghua University (for Wang and Xiao). Part of the project is completed during Chen's visit at Tsinghua University.

Bank Incentives, Credit Market Discipline and Firm Performance in China

Abstract

We exploit data on the differential development of the banking sector across China's provinces to investigate how banks' incentives impact performance of Chinese listed firms. We posit that profit seeking banks have stronger incentives to screen and monitor borrowers than do politically driven lenders. We predict that in provinces with higher concentrations of commercially oriented banks, lending decisions will more closely link to borrower quality, firms will invest in more promising projects, and overall firm performance will be higher. We also conjecture that more rigorous credit discipline will impact SOEs more than Non-SOEs. We rank provincial banking sectors yearly on the basis of their commercial lending orientation as measured by the market share of bank deposits held by Big Four relative to Non-Big Four banks, and the proportion of total loans to Non-SOEs within a province. Consistent with our predictions, we find that in more commercially oriented provincial banking sectors (1) lending decisions are more sensitive to borrowers' past performance and loans have shorter maturity; (2) firms' investment decisions are more sensitive to past performance; and (3) firms exhibit higher profitability, profit margins, and asset turnover, and lower incidence of related party transactions. Further, these effects are concentrated in SOE firms, consistent with stronger bank incentives to screen and monitor borrowers having a more dramatic impact on SOEs than private-listed firms. This suggests that SOEs are more likely than private firms to be shielded from credit market discipline by access to politically driven loans than will private firms, and so stand to be impacted more from commercialization of the banking sector.

1. Introduction

Building on the seminal work of Goldsmith (1969) and King and Levine (1993), a substantial body of empirical research focuses on understanding the channels through which a well-developed financial sector promotes economic growth. In this paper, we contribute to this literature by exploiting data on the differential development of the Chinese banking sector across China's provinces to investigate the economic impact of banking sector development on the performance of Chinese listed firms. We consider two key channels through which banking sector development influences firm performance: the incentives of banks to screen projects ex ante and allocate capital to promising projects, and the intensity of monitoring and corporate governance exerted over these projects after investments are made.[1] The premise of our analysis is that, relative to politically driven, policy based lenders, profit seeking banks have stronger incentives to screen and monitor borrowers which in turn leads to better lending decisions by banks, and better within firm investment decisions and performance.

We predict that in provinces characterized by more commercially oriented banking sectors, lending decisions will be more closely linked to the quality of borrowing firms, firms will direct their investments to more profitable investment opportunities, and overall firm performance will be higher. Further, we conjecture that the effects of more rigorous credit market discipline by banks will be stronger for State-owned Enterprises (SOEs) than for private listed firms (non-SOEs). The idea is that in less commercially oriented banking sectors, SOEs are more likely to be shielded from credit market discipline by their access to politically driven loans than will private firms, and so the benefits of bank development will have a relatively more dramatic impact on SOEs than for private firms. We provide evidence consistent with these predictions.

Several features make our setting particularly conducive to examining firm-level effects of bank market development. First, while China's banking system has gradually evolved from a centralized, government owned and controlled provider of loans into an increasingly competitive market, this evolution has not been consistent across provinces within China (e.g., Fan, Wang, and Zhu 2011). This allows us to focus on

[1] See Levine (2005) for a survey of the literature on the finance-growth nexus. Levine (2005) posits five broad functions provided by the financial system: (1) producing information ex ante about possible investments and allocating capital; (2) monitoring investments and exerting corporate governance after providing finance; (3) facilitating the trading, diversification, and management of risk; (4) mobilizing and pooling savings; and (5) easing the exchange of goods and services.

variation in banking development across provinces in a given year while holding constant country-specific factors. Second, bank financing is a primary source of external financing for Chinese firms. China lacks a well-developed corporate bond market and raising equity capital is highly regulated and inaccessible to many firms.[2] Third, China's banking market is highly localized within each province.[3] China has no national syndicated loan market and all major banks are organized and managed by province (i.e., Shanghai Branch of Bank of China operates independently of Bank of China's Beijing Branch). Lastly, we have a large panel of detailed firm-level financial data from 1998-2010 which enables us to control for firm- and time-fixed effects.

A crucial aspect of our analysis is our ability to rank provincial banking sectors yearly on the degree to which they have a commercial lending orientation. Many prior cross-country studies measure financial development by the size of the bank market at the country level which does not necessarily capture differences in the efficiency with which banks deliver financial services (Levine 2005). Prior China banking research has also measured the financial development of a given province by the size of the banking market.[4] In contrast, we control for the size of the provincial banking sector (i.e., total deposits to GDP and total bank loans to GDP) and focus on the *composition* of banking operations within a province. We use two indices of the composition of banking activities designed to capture the extent to which a banking sector reflects a commercial lending orientation versus a political lending orientation.

Our first index splits the banking sector in a province into two mutually exclusive groups: Big Four and Non-Big Four banks. The Big Four banks are the Agricultural Bank of China, the Bank of China, China Construction Bank, and the Industrial and Commercial Bank of China.[5] The Non-Big Four banks are

---

[2] The equity markets in China have largely served as a vehicle for privatization by the government rather than a market for equity financing by firms with growth opportunities (Wang, Xu, and Zhu 2004). In our sample of listed firms, external equity financing accounts for less than 20% of total external financing (excluding IPO financing).The corporate bond market in China is constrained by heavy government regulation, and a lack of institutional investors and credit rating agencies to help price the debt (Ayyagari, Demirguc-Kunt, and Maksimovic 2010). Other channels of formal financial institutions such as factoring and leasing are relatively under developed in China (Gregory and Tenev 2001; Klapper 2006).

[3] This is not unique in China. Prior research has documented that banks in general are reluctant to lend to geographically remote clients (e.g., Peterson and Rajan 1994, and Mian 2006).

[4] For example, Cheng and Degryse (2006) measure provincial level financial development using the ratio of the savings in the banking system to local GDP, and the credit extended by banks to local enterprises over local GDP.

[5] We do not consider China's three policy banks: Bank of Communications, China Development Bank, and the Export

comprised of a number of joint stock commercial banks and a variety of local banks (e.g., city commercial banks) with provincial or municipal governments as major stockholders (Martin 2012). This first index focuses on the liability side of the balance sheet and measures the fraction of total bank deposits in a province held by Non-Big Four banks. Motivated by prior research, we interpret this *deposit market share* index as capturing the profit seeking orientation of the banking sector within a given province. For example, Berger, Hasan and Zhou (2009) show that over the period 1994-2003 the Big Four exhibit significantly lower profit efficiency than the non-Big Four.[6] In a related paper, Lin and Zhang (2009) find that during the period 1997-2004 Big Four banks are less profitable, less efficient, and have worse asset quality than Non-Big Four banks (see also LaPorta et al. 2002 on government ownership of banks).

Focusing on the asset side of the balance sheet, our second index reflects the percentage of total bank loans in a province to non-SOEs (as opposed to SOEs). The idea underlying this index is that banking sectors that allocate more credit to private firms are more likely to have incentives to engage in researching and exerting corporate control over firms than are banks that act on behalf of the government to funnel credit to SOEs (Levine 2005). To create an overall province-year measure of banking sector development we average the two indices just described.

Our empirical analysis begins by first examining the extent to which profit seeking incentives manifest in more rigorous credit market discipline that leads to better lending decisions by banks.[7] We attack this issue in two ways. First, we examine whether the sensitivity of bank loans to firms' past performance varies with our province-level index of bank development. We posit that higher loan-to-performance sensitivity is a reflection of more rigorous screening process that results in the allocation of bank loans to more promising firms.[8] Second, we examine the impact of bank incentives on the maturity structure of firms' bank loans, measured as the ratio of long-term bank loans to total bank loan. We interpret a lower proportion of long-term loans as a reflection of credit market discipline whereby rigorous bank lending

---

Import Bank of China.

[6] Profit efficiency measures how close to the maximum profit a bank is, where the maximum profit is determined by the best performers in the sample. For a general description and examples of bank efficiency estimation, see Berger and Mester (1997).

[7] Note that all analyses include firm fixed effects and, to distinguish the impact of the incentives of profit seeking banks from the general financial performance of a province, we control for provincial GDP growth, and ratios of total bank deposits to GDP and total bank loans to GDP at the province-year level.

[8] On this assertion, see also Podpiera (2006) and Firth et al. (2009).

standards lead to shorter loan maturities for weaker borrowers.[9] We find that firms in provinces with better developed banking sectors exhibit higher loan-to-performance sensitivity and shorter loan maturity. However, these effects are concentrated in SOE firms suggesting that the benefits of bank development have a relatively greater impact on SOEs than for private firms.

We next examine whether banks in more commercially oriented provinces discipline firms to direct their investments to more promising investment opportunities, and whether this results in higher overall firm performance. We provide evidence that for SOEs, but not for private firms, investment-to-performance sensitivity is higher in more developed banking sectors, consistent with firms in these provinces allocating capital to more profitable projects and thereby enhancing investment efficiency. In terms of performance, we find that bank market development is associated with higher profitability, profit margins and asset turnover, and lower incidence of tunneling activities in the form of related party transactions (Jiang, et al. 2010). The effect is again primarily driven by SOEs. While SOEs generally underperform non-SOEs (validating our premise that SOEs are in general operated less efficiently than non-SOEs), the gap between SOE and non-SOE performance is smaller in provinces with higher bank development.

Finally, we investigate how bank development influences the degree to which firms are constrained from investing in growth opportunities.[10] Following Demirgüç-Kunt and Maksimovic (1998), we create a benchmark growth rate for each firm equal to the estimated sustainable growth rate achievable by the firm if it were reliant exclusively on internal funds. We measure the accessibility of external finance in a given province by computing the proportion of its firms that achieved growth rates in excess of their benchmark rate. We find that in low bank development provinces, SOEs have significantly more access to external finance than do non-SOEs, consistent with SOEs being favored by politically driven banks. However, the difference in access is significantly reduced in high bank development provinces, consistent with the lending decisions of banks in these provinces being weighted more heavily towards formal credit standards than towards political considerations and disproportionately impacting SOEs.

Our paper makes several substantive contributions. A large literature documents that financial

[9] See Demirguc-Kunt, and Maksimovic (1999) for a cross-country study of debt maturity and Li, Hue and Zhao (2009) who examine determinants of capital structure for a sample of unlisted manufacturing firms in China.

[10] Firth et al. (2009) examine access by private non-listed firms to finance across provinces in China. They find that banks tend to allocate loans to private non-listed firms with higher profitability, more experienced and incentive compatible CEOs, and more independent corporate boards.

development is associated with faster growth and improved efficiency of capital allocation.[11] We contribute to this literature in several ways. Levine (2005) notes that while many studies proxy for financial development by the size of banking sector, such measures do not cleanly capture differences in the efficiency with which banks deliver financial services. We extend the literature by measuring provincial banking sector development using the extent of its commercial lending orientation, and linking this orientation directly to banks' incentives to screen, monitor and discipline borrowers. We show that in provinces with more profit oriented banks, bank loans are allocated to better performing SOEs, SOEs direct their investments to more profitable projects, and overall SOE performance is higher, after controlling for the size of the provincial banking sector (i.e., total deposits to GDP and total bank loans to GDP). Further, much of the prior literature focuses on the relation between financial development and measured growth (country, industry, firms). However, growth per se does not necessarily imply economic efficiency and wealth creation. We make a significant contribution by directly examining the impact of bank development on the quality of *within* firm investment decisions, and on the overall performance and efficiency of firms.

China's transition from a centrally-planned socialist economy to a vibrant and expanding commercially oriented economy is well documented in the literature.[12] We contribute to this literature by investigating how the profit seeking orientation of China's banks influence their lending behavior, and the investment behavior and performance of individual firms. A main contribution of our paper is the result that bank development has its most significant effects on SOEs. This result shows that the development of China's financial sector is contributing to the process of weaning SOE's off of their addiction to politically favored loans through the force of credit market discipline.

The rest of the paper is organized as follows. Section 2 provides institutional background on the Chinese Banking System. Section 3 describes our data and sample characteristics. In section 4 we present our results concerning the effects of bank market development on the lending decisions of banks, while Section 5

[11] This includes cross-country studies (King and Levine 1993; Levine and Zervos 1998; Levine, Loayza,and Beck 2000); individual country case studies (Jayaratne and Strahan 1996 in the U.S.; Guiso, Sapienza, and Zingales 2004 in Italy and Bertrand, Schoar, and Thesmar 2007 in France), industry-level studies (Rajan and Zingales 1998; Wurgler 2000; Beck et al. 2008), and firm level-studies (Dermuguc-Kunt and Maksimovic 1998; Love 2003; Beck, Dermuguc-Kunt, and Maksimovic 2005).

[12] Influential papers include, Allen, Qian, and Qian (2005) and Ayyagari, Dermuguc-Kunt, and Makisomovic (2010) (formal versus informal finance), Cull and Xu (2005) (determinants of profit reinvestment), Berger, Hasan, and Zhou (2009) (bank ownership and bank efficiency), among many others.

discusses our results on the effects of bank market development on firms' investment behavior and performance. Section 6 offers a summary and conclusions.

2. Institutional Background on the Chinese Banking System

China's banking sector is characterized by dominant state ownership of banks, allowing for government involvement in the decision making of those banks. Up to the mid-1990s, the Chinese banking sector served primarily as a conduit for channeling low-cost loans to SOEs. The banks were a tool for implementation of government policy through the SOEs, as SOEs assumed the task of employment and social welfare provision. This policy lending role resulted in China's banks being saddled with huge portfolios of non-performing loans (e.g., Lardy, 1998). The cleanup of this non-performing loan problem has imposed a heavy financial burden as the government injected public funds to clean up the banks' balance sheets (see Okazaki 2007 for a detailed discussion of this balance sheet clean up).

Following China's entry into the WTO in 2001, many new rules took effect and existing regulations and laws were revised to be aligned with the WTO agreement. The China Banking Regulatory Commission (CBRC) was created in 2003 to oversee reforms and regulations. New systems of external and internal monitoring of asset quality were also implemented. To further transform the banks from being policy tools into commercially oriented businesses, CBRC updated guidelines in 2003 to encourage foreign share purchases, allowing foreigners to own up to 25% of any domestic bank, with the ownership from any one investor allowed between 5% and 20% (subject to regulatory approval). Since then, the partial privatization of China's banks has impacted the Big Four and many Non-Big Four Banks.

Further, in a dramatic change, the government encouraged banks to list on stock exchanges to enhance external monitoring. For example, in October 2006 the Industrial and Commercial Bank of China issued its IPOs at both Shanghai and Hong Kong, raising about US $21.9 billion (U.S. $16.0 billion in Hong Kong and U.S. $5.9 billion in Shanghai), making it to date the world's biggest IPO.[13]

Our sample covers the period 1997-2010, a time period that spans China's entry into the WTO as well as many changes designed to make the banking sector more commercially oriented. These changes played out over the entire period and so it is the case that banks continued to evolve over the entire time period. It

[13] For further details on the evolution of China's banking system see Martin (2012), Berger, Hasan and Zhou (2009), and Okazaki (2007), among many others.

is thus important that we are able to measure provincial-level bank development each year in our sample, allowing us to accommodate the possibility that these dramatic changes impacted banks differentially across provinces over this time period.

3. Data and Sample

3.1 Measure of bank market development

We proxy for the degree of bank market development, denoted *Bank*, as the average of two indices, each measured at the province-year level: (1) percentage of bank deposits held by non-Big 4 banks; and (2) percentage of bank loans to non-state-owned companies. The *% deposit in non-Big 4 banks* measure captures a key component of a bank's ability to attract savers, and the *% loans to private firms* captures the extent to which the bank's decisions about capital allocation are tied to profitability considerations not governmental-political considerations. We obtain these measures from the National Economic Research Institute (NERI) Index of Marketization of China's provinces constructed by Fan, Wang, and Zhu (2011), based on information from National and provincial Bureaus of Statistics. Based on the value of each index in province p in year t (V_{pt}), Fan, et al. assign a relative score to that province-year, calculated as $10*(V_{pt} - V_{min,T}\})/|V_{max,T} - V_{min,T}|$ where $V_{max,T}$ and $V_{min,T}$ are respectively the maximum and minimum values of V among all provinces in the base year T (2001). In the base year, both index values are bounded between 0 and 10. The values can be negative or greater than 10 in years other than the base year. The index preserves the cross-province variation for a given year. At the same time, the comparison to a common base year level enables it to capture both the over-time variations on average as well as cross-sectional variations in overtime changes.[14] Data are available from 1997 to 2009.

We interpret higher values of *Bank* as suggesting that on average banks in the local market are more motivated by profit-maximization and less by political considerations. As such, they are more likely to supply credit market discipline by exerting effort to collect information about potential borrowers, by lending to only borrowers with positively NPV projects, and by monitoring borrowers after the loans are granted. This interpretation of the *Bank* index builds on prior research that indicates that the Big 4

[14] In untabulated results, we regress each region's bank index on a trend line and find significant cross-region variations in the coefficient estimates, indicating that different regions' bank markets develop at different speed. The large time-series and contemporaneous differences across regions help increase the power of our analyses.

state-owned banks are more likely to base loan decisions on political considerations than the non-Big 4 banks in China (e.g., Berger, Hasan, and Zhou (2009)), and that loans to private enterprises are made more for profit-driven than political-driven reasons as private enterprises on average perform better than the SOE firms (e.g., Allen, Qian, and Qian (2005)).

Figure 1 plots the average *Bank* index and its components overtime. Consistent with the discussion earlier about the various reform policies implemented by the Chinese government, it shows that the indexes have gradually increased over time. The pace of the increase is uneven: the *Bank* index increased by about 1.36 in the first five years of our sample (1997-2001); this is the period before China joined the WTO. The Bank index increased by 3.03 in the last five years (2005-2009) when foreign investors were allowed to invest in Chinese commercial banks. Figure 1 also shows that the percentage of loans to private firms increase more than that in the percentage of deposits in non-Big 4 banks, suggesting that Big-4 banks are increasingly lending to private sectors.

Table 1, Panel A summarizes the *Bank* index and its components by region. It shows the over-time average value of each variable for each province; that is, the data are not weighted by the number of sample firms in each province. There is considerable across-province variation in the *Bank* index and its two components; Zhejiang has the highest value of the *Bank* index (but not the highest value of each of its two components), followed by Shanghai and Jiangshu. The province with the least developed bank market is Tibet, followed by Qinghai and Heilongjiang. The mean value of *Bank* across regions is 6.02 and the range is 3.1 (Tibet) to 9.58 (Zhejiang). Similar patterns are observed for the two components of the index.

Table 1, Panel A also lists the across time averages of two measures of bank market size in each province: total deposits scaled by GDP and total loans scaled by GDP. It suggests that the *Bank* index captures a distinctly different aspect from measures of bank market size. For example, Beijing has the highest ratio of total deposits to GDP while its *Bank* index is about the sample median/average. Further, as shown in Panel B of Table 1, whereas total deposits to GDP shows positive correlations of about 19-20% with both components of the *Bank* index, total loans to GDP is not significantly correlated with *Bank*. In fact, it is significantly negative correlated with the % loan to private sectors. Panel B also shows that GDP growth is negatively correlated with total loans, but positively (although insignificantly) correlated with total deposits. In contrast, GDP growth is highly positively correlated with both components of the bank index, especially with the % of loan to private sector (at 0.39). The significant positive correlation between GDP

growth and the *Bank* index is supportive of Levine (2005)'s argument that it is the structure, not the size of, the financial markets that matter for growth.

3.2 Sample description

Our sample consists of all non-financial firms listed on the Shanghai and Shenzhen stock exchanges from 1998 to 2010. We start in 1998 because we use the one-year lagged *Bank* index in our analyses and 1997 is the first year the index data are available. Our final sample consists of 12,905 firm-year observations. Column 1 of Table 1 shows the distribution of the sample firms by region. All regions/provinces are represented, with concentration in Guangdong (1,424 observations) and Shanghai (1,340 observations).

Our analyses employ a variety of measures of firms' profitability, productivity, investment, and financing activities. We retrieve these firm-level variables from CSMAR (China Stock Market and Accounting Research Database; also available from WRDS). All continuous variables are winzorized at 1% and 99% to minimize influence of outliers. Table 2 tabulates summary statistics for all variables used in the analysis. Detailed variable definitions are in Appendix I.

Table 2 shows the importance of bank financing for our sample companies. On average bank loans finance 16.3% of firms' total assets, and account for about 47% of total liabilities. The mean (median) changes in loan balance (our proxy for net bank financing) are 1.79% (0.45%). To get a sense of this magnitude, Table 2 also shows the summary statistics for the amount raised by new equity issuance. The average equity issuance accounts for 2.11% of total assets, higher than the average bank loans. However, the new equity finance is highly skewed: the median amount raised is 0.17%, lower than the median level of financing from bank loans. About three quarters of banks loans are short-term loans, consistent with the view that banks are reluctant to extend long term credits in economies with weak property right and contract enforcement protections (e.g., La Porta, et al. (1998), Qian and Strahan (2007)).

Table 2 reveals that a majority of our sample observations are state-owned enterprises (SOEs). We define a firm as an SOE if the largest shareholder of the firm is either a government agency or an entity controlled by the government. Prior to 2003, various government agencies can be the shareholders. Starting from 2003, all state-owned shares in corporations (including both those whose shares are listed and traded on the stock exchanges and those not listed) are consolidated to be owned and managed by the State-owned Assets Supervision and Administration Commission (SASAC) (by the Order of the State Council of the

People's Republic of China No. 378, issued in May 2003). SASAC's role is similar to a holding company that manages various state-owned enterprises on behalf of the Chinese government. An important channel for SASAC to exert control is by appointing and evaluating the top management of the companies they control. The central government's SASAC directly manages over 100 large enterprises in strategic industries (defense, natural resources, energy, communication, transportation, etc.) that are deemed of national importance (e.g., Sinopec, PetroChina, China Mobile) (Naughton (2007)). Provincial-level SASACs manage and monitor provincial level state-owned enterprises.[15] Our analyses exclude SOEs that are directly managed by the central government's SASAC as these firms' operations tend to be more national and global, and are less confined to their local provinces. In (untabulated) sensitivity checks, we find that including these SOEs does not qualitatively change our main results.

4. Effects of Bank Market Development on Loan Characteristics

4.1 Relation between bank market development and loan to performance sensitivity

Profit-seeking banks have incentives to exert effort to collect information about borrowers and lend to high quality borrowers. From banks' perspective, high quality borrowers are those with efficient operations and profitable investments that can ensure the safety and profitability of the loans. To the extent that past performance is indicative of borrower quality, this implies a positive relation between the bank loans and the borrower's performance when loans are made for profit considerations. We hypothesize that in more developed bank markets, loans are more likely to be based on profitability considerations as opposed to political considerations. Empirically, this implies a positive coefficient estimate for λ_2 from the following regression:

$$BankLoan_{i,p,t} = \alpha_i + \delta_t + \lambda_1 ROA_{i,p,t-1} + \lambda_2 Bank_{p,t-1} * ROA_{i,p,t-1} + \lambda_3 Bank_{p,t-1} + \gamma Control_{i,p,t-1} + \varepsilon_{i,p,t} \quad (1)$$

The dependent variable in equation (1) is the net amount of bank borrowing by firm *i* in province *p* in year *t*, measured as the changes in firm *i*'s bank loan balance during year *t*. We measure firm performance with return on assets ($ROA_{i,p,t-1}$), calculated as the ratio of after-tax operating income to book value of total assets. $Bank_{p,t-1}$ is the index for bank market development in province *p*, as discussed earlier. We include firm-fixed effects (α_i) to control for unobservable time-invariant firm characteristics and include year

[15] See www.sasac.gov.cn for details.

dummies (δ_t) to control for unobservable year-fixed effects. In addition, we also control for *Firm Size* (measured as the logarithm of total book value of assets) and *Firm Age* (measured as the logarithm of the number of years since the firm's IPO year). In all estimations, standard errors are clustered at the firm level to allow for any arbitrary correlation at the firm level. In sensitivity checks (untabulated), we also cluster standard errors by region and by industry. We find that clustering at the firm level provides the most conservative estimates for the standard errors. To facilitate interpretation of the coefficient on the interactive term, we estimate (1) with *ROA* entered as the deviation from sample mean. Thus, the coefficient for *ROA* estimates the loan-to-performance sensitivity for an average firm in the least developed bank market.

A key assumption in our empirical strategy of using cross-province variations to identify the effects of bank market development is that firms located in a province can only access banks located in the province.[16] The *Bank* index measures the average degree of commercially-oriented operations of all banks in a given province-year. Alternatively, one can view each province-year as a hypothetical province-year level bank, and view each firm-year observation in our sample as a data point on the loan decision made by the province-year level bank. The coefficient λ_2 estimates the relation between the average tendency of the province-year bank to condition loans on borrower performance and the degree to which the bank weights profit seeking versus political consideration in its lending decision (as measured by the *Bank* index).

One advantage of our setting is that panel data on the borrowers enables us to use firm-fixed effects to minimize the impact of borrower specific preference for bank financing and helps identify the effect of bank market development. Note that in the presence of firm-fixed effects, province- or industry-fixed effects are not identified. However, in (untabulated) sensitivity tests, we find that our main results remain qualitatively the same when we replace the firm-fixed effects with province- and industry- specific effects, indicating that our results are not affected by any systematic differences at the province level in terms of the types of industry and the composition of firms.

Columns (1) to (3) of Table 3, Panel A, present results from estimating equation (1) for the entire sample and for subsamples of non-SOE and SOE firms. Column (1) shows that both the coefficients for *ROA* and for

[16] Based on our discussions with various Chinese bank managers and officials, we believe this is a reasonable assumption. Several managers indicate that an unwritten rule in their banks is that each bank branch is only permitted to lend to borrowers located in the branch's vicinity/city and is not allowed to lend to borrowers from other cities (of the same province) if the bank has branch operations in those cities. To the extent that firms can access banks in other provinces, it should bias against finding our results.

*Bank*ROA* are positive and significant at the 1% or better level, indicating that bank loans available to a firm are positively related to the firm's past performance, and this sensitivity is higher in provinces with more developed bank markets. The magnitudes of the coefficient estimates suggest that the effect of bank market development is not only statistically significant, but also economically significant. The average loan-to-performance sensitivity in the market with the average value of bank index (of 6.98) is about 0.23 (0.123+0.015*6.98), almost twice as high as that in the least developed market (0.123).

If lending inefficiencies are due to pressure on banks to provide loans to SOE firms for political reasons as opposed to commercial considerations, the effect of bank market development should be more concentrated in SOE firms. To examine this implication, we estimate equation (1) separately on the subsamples of non-SOE firms and SOE firms. Results shown in Columns (2) and (3) are consistent with our conjecture. For non-SOE firms, Column (2) shows that the coefficient estimate for *ROA* is positive at 0.189 (t-statistic=3.35) while that for *Bank*ROA* is not significantly different from zero, indicating that the availability of loans to non-SOE firms is highly contingent on their past performance regardless of their provincial location. In contrast, Column (3) shows that the loan-to-performance sensitivity of SOE firms depends on the level of bank market development. Loans to SOE firms are only marginally related to their prior performance in the least developed bank market (the coefficient on *ROA* is 0.077, t-statistic = 1.64), whereas the coefficient estimate for *Bank*ROA* is 0.026 and significantly different from zero at less than 1% level, indicating that loans to SOEs are more contingent on prior performance in provinces with higher measures of bank development.

As discussed earlier, the *Bank* index is meant to capture the structure, and hence the collective incentive, of a given bank market, as opposed to the size of bank market. To provide further support that the *Bank* index captures the efficiency/incentive effect of bank development, Columns (4) to (6) of Table 3 estimate equation (1) after adding several additional province-year specific measures to control for overall size of the banking market as well as province-year growth. Specifically, we include the annual growth rate of GDP, the ratio of total loans to GDP, and the ratio of total deposits to GDP in the regression. We include these control variables both as main effects and interacted with *ROA*. Results in columns (4) to (6) show that these controls do not affect loan-to-performance sensitivity, further validating our measure of bank market development. For parsimony we do not include these controls in subsequent analyses although all results are qualitatively unaffected if they are included.

4.2 Cross-sectional variation in the relation between bank market development and loan-to-performance sensitivity

Results from Panel A indicate that loan-to-performance sensitivity is higher in more developed bank markets, consistent with the idea that bank loans are more motivated by commercial/profit considerations and less by political considerations in these markets. To the extent that bank development is more likely to impose discipline on inefficient firms, we should expect a stronger effect for the subsamples of SOEs that are more likely to enjoy political protection and lower credit market discipline in less developed bank markets. To shed light on this conjecture, we separately estimate equation (1) on the subsamples of SOEs partitioned by size, industry membership, and the level of government interference. The idea is that larger SOEs, SOEs in certain protected industries, and SOEs with stronger government interference are more likely to be disciplined in better developed bank markets.

Columns (1) and (2) of Table 3, Panel B report results from estimating equation (1) on the subsamples of SOEs partitioned by their book value of total assets. They show that the effects of bank market development on loan-to-performance sensitivity are mostly driven by the subsample of SOEs with larger than the sample median size: the coefficient for *ROA* is negative whereas that for *Bank*ROA* is positive and significant at less than 1% level. In contrast, for small SOEs with below median size, the coefficient for *ROA* is positive and significant but does not vary with the level of bank development. To the extent that larger SOEs tend to be more politically favored because they provide more employment and their failure is perceived to be more politically costly, these results indicate that the effect of bank development operates precisely in the subsamples of firms where inefficiencies are likely to be prevalent.

Columns (3) and (4) estimate equation (1) on the subsamples of SOEs partitioned by their industry membership. Specifically, for each SOE firm, we calculate the percentage of firms in the same industry and province-year that are also SOE firms. If the percentage is higher than the sample median level, we consider the SOE firm politically protected. In other words, an SOE firm is classified as unprotected if it belongs to an industry consists primarily of non-SOE firms. This classification scheme reflects the common perception that the Chinese government controls key strategic industries. For example, SOE firms dominate the energy and natural resources-related industries (coal and black metal mining industries, petroleum, gas manufacturing and water manufacturing) as well as media-related industries (broadcast, movie and TV industries) in all

province-years. In contrast, the majority of firms in the information service industry are non-SOE firms in all province-years. Thus, an SOE in the information service industry is considered an SOE in an unprotected industry. Some industries are considered protected in some provinces but not in others. For example, SOE firms dominate the chemical products manufacturing industry in the provinces of Hubei and Heilongjiang, but not in Jiangshu province. This result is not unexpected, as Hubei and Heilongjiang are in-land provinces which hosted more industrial manufacturing under China's central planning economy prior to the reform, whereas Jiangshu traditionally specialized in consumer oriented industries (e.g. textile).

Results show that the disciplinary effects of bank market development operate primarily through SOEs in protected industries. Specifically, Column (3) shows that for SOEs in protected industries, bank loans are not sensitive to borrowers' performance in the least developed bank market (the coefficient for *ROA* is insignificantly different from zero). However, the coefficient estimate for *Bank*ROA* is significantly positive, and more than three times that for the SOEs in unprotected industries. These results suggest that in less developed bank markets, bank loans made to firms in protected industries are not contingent on performance; they become more sensitive to firm performance as the overall bank markets improves.

To measure government interference, we calculate for each SOE the number of ownership links or layers connecting the state-owned listed companies to the ultimate controlling agencies (*Layer*). That is, *Layer* is the number of intermediate enterprises/entities in the pyramid structure through which the controlling shareholder controls the listed company (i.e., the height of the pyramid in La Porta, et al. (1999)). Prior research suggests that firms with short layers are more subject to government interference and tend to be more inefficient (Fan, et al. (2005)). Columns (5) and (6) present results from estimating equation (1) on the subsamples of SOE firms partitioned by *Layer*. Short-layer firms are those with *Layer* less than or equal to the sample median level of 2. To the extent that firms with short layers have suboptimal governance mechanisms in place because they are more subject to government interference, we expect the effects of bank development to be stronger in these firms. Results are consistent with our prediction. The coefficient for *Bank*ROA* for the short-layer SOEs is significantly positive (at 0.031 with t-statistic of 3.89) whereas that for the long-layer SOEs is much lower at 0.016 and not statistically significant.

In summary, results from Table 3 indicate a strong positive correlation between our measure of bank development and loan-to-performance sensitivity, and more so for SOE firms than for non-SOE firms. Among the SOEs, the effects primarily operate through large SOEs, SOEs in protected industries and SOEs

with heavy governance influence. These results are consistent with the idea that in better developed bank markets, banks have stronger incentive to exert effort in screening potential borrowers. The fact that these results hold after controlling for the size of bank market and GDP growth rate at the province-year level further validate our *Bank* index as a meaningful measure of bank development that captures across-province differences in the incentives for banks to allocate loans to firms more efficiently.

4.3 Relation between bank market development and loan maturity

In addition to screening borrowers ex ante and lending to high quality borrowers by conditioning loans on borrowers' performance, banks can also exert monitoring via loan maturity. Compared to long-term loans, short-term loans allow banks more opportunity to monitor borrowers as borrowers are subjected to more frequent banks approval as they attempt to rollover short term loans (Diamond (1991, 1993)). In provinces where banks' incentives are more aligned with profit seeking, we expect to see shorter loan maturity, especially among SOEs.

Table 4 presents results on the relation between credit market development and loan maturity from estimating the following equation:

$$Maturity_{i,p,t} = \alpha_i + \delta_t + \lambda_1 Bank_{p,t-1} + \lambda_2 Bank_{p,t-1} * SOE_{i,p,t-1} + \lambda_3 SOE_{i,p,t-1} + \gamma Control + \varepsilon_{i,p,t} \qquad (2)$$

The dependent variable is the average loan maturity, proxied by the percentage of total loans that are long-term loans (e.g., Barclay and Smith (1995)). The control variables are similar to those in equation (1) with firm- and year-fixed effects included. We include both *Bank* and *Bank*SOE* to capture any differential effects that bank development may have on the loan maturity of non-SOEs and SOEs. Since monitoring is more beneficial for SOE firms which have suboptimal governance arrangement and more inefficient operations, we expect $\lambda_2 < 0$. We do not have predictions for λ_1, which measures the effect of bank development on non-SOEs' loan maturity. A priori, λ_1 can be negative if bank incentives to exert monitoring via loan maturity apply to non-SOE firms as well, or positive to the extent that non-SOE firms have better access to long-term loans in more developed bank markets where banks are less inclined to extent long-term loans to SOEs. In the presence of firm-fixed effects, the coefficient for SOE is identified from the subsample of firms where the identity of their controlling shareholders changed.

Column (1) shows that the coefficient for SOE is positive and significant at less than the 1% level. It indicates that in less developed market, SOEs have longer average loan maturity than non-SOEs, suggesting

less monitoring for SOE firms when banks are less likely to lend for profit consideration. However, consistent with the idea that banks exert more monitoring in developed markets, the coefficient for *Bank*SOE* is significantly negative, indicating that the difference between SOE and the non-SOEs is reduced as the bank market becomes more developed. Further, *Bank* has a positive coefficient, indicating that as bank market develops, non-SOE firms are more likely to obtain long-term loans.

Column (2)-(4) split the SOE dummy into two separate dummies, each representing the subsample of SOEs partitioned by size, membership in a protected industry, and the degree of government interference as measured by *Layer*. Column (2) shows that the coefficient for the SOE (Large) dummy is 0.123 and that for SOE (Small) is 0.083, indicating that both large and small SOEs have longer maturity than non-SOE firms. Large SOEs have longer maturity than small SOEs, although the difference is not statistically significant at conventional level. Bank market development reduces the average maturity of both large and small SOEs. Column (3) partitions the SOE dummy by whether the SOE is in a protected industry or not. Similar to Column (2), it finds that both types of SOEs have on average longer loan maturity than non-SOE firms. The coefficient estimates for SOE (Protected) and SOE (unprotected) are 0.105 (t-statistic=3.89) and 0.053 (t-statistic = 1.97), with the difference significant at less than 5% level. Both *Bank*SOE* (Protected) and *Bank*SOE* (unprotected) have significantly negative coefficients, suggesting that the monitoring effect is not concentrated in certain industries.

Lastly, Column (4) separately examines the effects on loan maturity for SOEs with short layers and for SOEs with long layers. It shows that maturity is significantly longer for SOEs with short layers than for SOEs with long layers in less developed bank markets. Bank market development reduces the loan maturity for both types of SOEs, although the effects appear to be stronger for SOEs with short layers. The coefficient for *Bank*SOE* (short layer) is -0.016 (t-statistic = - 4.34), almost twice as large as that for *Bank*SOE*(long layer) (at -0.008, with t-statistics of 2.03). To the extent that short layer indicates more government interference in firms' operating decisions and therefore more value to banks' monitoring role, this result shows that this role is more likely to be carried out when markets are more developed.

Overall, results from Table 4 are consistent with the idea that when banks are more incentivized to make loan decisions for profit considerations, they increase their monitoring by granting more short-term loans than long-term loans, especially for the SOE firms where monitoring is more valuable.

5. Effects of Bank Market Development on Firm Investment and Performance

In this section, we examine the effects of bank development on firm investment and performance. We hypothesize a spillover effect from bank market development to firms' investment in that firms' investment will be more sensitive to performance in more developed banking market. This follows from more developed bank markets allocating credit to better performing firms, reducing the availability of external finance to poorly performing firms and effectively curtailing these firms' investments. As a result, we are more likely to observe higher investment to performance sensitivity in better developed bank market.

We also hypothesize that bank development has a positive effect on firm performance in that firm performance will be higher in more developed bank markets. This effect follows either because higher bank monitoring efforts can directly help improve firm performance, or because in more developed bank markets credits are allocated more efficiently across firms, making it difficult for poorly performing firms to obtain external finance. This in turn provides firms incentives to improve performance in order to avail themselves to future external finance. Previewing the results, we find that as bank market becomes more developed, the sensitivity of investment to performance is higher and firm performance improves in SOE firms, consistent with the idea that better developed bank markets discipline SOEs to improve investment efficiency and performance.

5.1 Effects of Bank Market Development on Firm Investment Efficiency

Table 5 reports results from regressing firms' investment (measured as capital expenditures scaled by total assets, *CAPEX*) on prior performance, bank development and their interactive term, as follows:

$$Investment_{i,p,t} = \alpha_i + \delta_t + \lambda_1 ROA_{i,p,t-1} + \lambda_2 Bank_{p,t-1} * ROA_{i,j,t-1} + \lambda_3 Bank_{p,t-1} + \gamma Control + \varepsilon_{i,p,t} \quad (3)$$

Similar to Table 3, we include demeaned value of *ROA* in the regression. Thus, $\hat{\lambda}_1$ estimates the investment-to-performance sensitivity for an average firm in the least developed bank market and $\hat{\lambda}_2$ estimates how the sensitivity changes as the bank market improves. The control variables are similar to equation (1) with firm- and year-fixed effects included.

Column (1) of Table 5, Panel A reports results from estimating equation (3) for the entire sample. It finds that firm investments are highly sensitive to past performance and more so in provinces with better bank market development. However, Columns (2)-(3) show that these results differ between SOE and

non-SOE firms. Investments in non-SOEs are highly positively related to past performance, but the sensitivity is not affected by the level of bank market development. For example, the coefficient estimate for *ROA* in column 2 is 0.089 (t-statistic = 2.18) whereas the coefficient estimate for *Bank*ROA* is insignificantly different from zero at conventional levels. In contrast, Column (3) shows that the coefficient estimate for *Bank*ROA* is significantly positive at 0.016 (t-statistic = 3.45), indicating that investment-performance sensitivity in SOEs is increasing with the level of bank development. The effect is economically significant as well. The investment-to-performance sensitivity for an SOE firm with average *ROA* in the least developed region is 0.089, whereas the sensitivity more than doubles at 0.20 (0.089+0.016*6.98) for a similar firm in the province with average bank development index.

Panel B of Table 5 estimates the investment-to-performance sensitivity for subsamples of SOE firms partitioned by size, whether the firm belongs to a protected industry, and the level of government interference as measured by *Layer*. The results here reveal that the positive effect of bank development on investment-to-performance sensitivities is mostly driven by large firms, firms in the protected industry, and firms with low values of Layer. These are precisely the firms with suboptimal governance arrangements, and where profit-driven banks are more likely to screen lenders based on prior performance.

To the extent that investment-performance sensitivity is indicative of investment efficiency, results in Table 5 suggest that bank market development improves investment efficiency in SOEs by constraining the availability of external financing to poorly performing firms and by directing investments to firms with more promising investment opportunities.

5.2 Effects of Bank Development on Firm Performance

To examine the effects of bank market development on firm performance, we estimate equation (2) with the dependent variable as a measure of firm-year level performance. As before, firm- and year-fixed effects are included. The key variable of interest is λ_2 which estimates whether the effect of bank market development differs between SOEs and non-SOEs.

We examine two main measures of firm performance: return on assets (*ROA*) and sales per employee (*Sales/Employees*). *ROA* is a key metric for firm's overall operating efficiency, as well as a measure of

productivity in utilizing capital assets.[17] The ratio Sales per employee is a common measure for labor productivity (e.g., Dewenter and Malatesta (2001)).

Column 1 shows that the effect of market development on *ROA* is different for SOEs than for non-SOEs. Specifically, the coefficient estimate for *Bank* is no longer statistically significant at conventional levels, suggesting that bank market development has no distinguishable effect on non-SOEs' *ROA*. In contrast, the coefficient estimate for SOE is significantly negative at -2.871 (t-statistic = -2.25), suggesting that in regions with the low levels of bank market development, SOEs significantly underperform non-SOEs. However, the underperformance is less severe in regions with better bank development, as the coefficient estimate for *Bank*SOE* is 0.215 and significant at less than the 10% level. The estimates imply that a one standard deviation improvement of bank market development would improve the average SOE performance by 0.645%, representing 19% improvement over the average level of *ROA* in the sample.

Column (2) examines the effect of bank market development on sales per employee. Similar to the effect on *ROA*, it shows a significantly negative coefficient estimate for SOE (-0.40 and t-statistics = -3.85), indicating that the labor productivity is significantly lower in SOEs than in non-SOEs in regions with low level of bank market development. The coefficient estimate for *Bank*SOE* is positive at 0.032 and significant at less than 1% level, suggesting that as the bank market becomes more developed, the difference between SOE and non-SOE's productivity is reduced.

Columns (3)-(4) find similar results as those on *ROA* and Sales/Employee when we examine the effects of bank market development on two additional measures of performance, *ProfitMargin* and *AssetTurnover*, respectively. Both columns show that the bank market development is positively related to profit margin and asset turnovers for the SOE firms but not for the non-SOE firms. The coefficient estimates for Bank are indistinguishable from zero at conventional levels where those for *Bank*SOE* are positive and significant at less than 1% level.

We also provide evidence on the effect of bank market development on the extent of related party transactions between the controlling shareholders and the firm that enable controlling shareholders to tunnel resources out of the listed companies (Johnson, et al. (2000)). Among related party transactions, those related to selling products to or purchase products from controlling shareholders are recorded by either accounts

[17] A common, alternative measure of profitability is return on equity (*ROE*), which generates qualitatively similar results as *ROA*.

receivable from (and accounts payable to), or pre-paid accounts to (and from) controlling shareholders' group.[18] Transactions related to financing and lending behaviors between controlling shareholders and listed companies are recorded as other receivables from and other payables to controlling shareholders' group. We use the amount of other receivables to proxy for the degree of tunneling activities (*Tunneling*) based on evidence in Jiang, et al. (2010) showing that the presence and magnitude of other receivables is informative of tunneling by controlling shareholders in Chinese listed companies.

Column (5) of Table 6 finds that controlling shareholders tunnel more from the listed companies in SOEs than in non-SOE firms in regions with lower level of bank development. The difference is decreasing in the level of bank market development, as the coefficient on *Bank∗SOE* is negative and significant at better than the 1% level. The estimates indicate that SOEs' other receivables as a percentage of total assets is about 0.9% higher than that of private firms in the least developed bank market, whereas it is similar to that of private firms at regions with average market development index (0.04=0.897-0.116∗6.98). Among SOEs, a one-standard deviation increase in the bank market development index would decrease *Tunneling* by 0.35% (=-0.116∗3.01), about 30% lower than the sample average of 1.13%. To the extent that more tunneling activities as measured by other receivables are indicative of inefficiency in firms' operations, these results are consistent with the idea that better bank market development disciplines SOEs and improves their performance by reducing inefficient tunneling activities.

5.3 Effects of Bank Market Development on Firms Access to External Financing

Tables 3 and 6 establish the relations between bank development and loan characteristics and firm behaviors at the firm-level. In this subsection, we provide evidence on the relation between bank market development and the availability of external finance to firms on the macro- (province-) level. We adopt the methodology in Demirguc-Kunt and Maksimovic (1998). We first calculate several benchmark rates at which each firm can grow using (1) only its internal funds (denoted as IG, for internal growth), (2) only its internal funds and short-term borrowing (denoted as SFG), and (3) using long-term financing to maintain a sustainable growth rate (denoted as SG). We then compute the percentage of firms that grow at rates that exceed each of the benchmark rates. These percentages yield estimates of the proportion of firms in each

[18] Chinese listed companies are required to disclose all related party transactions, including those with the controlling shareholders and their affiliates (collectively referred to as controlling shareholders' group).

country relying on external financing to grow. Using a sample of 30 countries, Demirguc-Kunt and Maksimovic (1998) find a positive correlation between these proportions and the level of financial market development at the country level.

Following Demirguc-Kunt and Maksimovic (1998), we calculate for each firm three benchmark growth rates based on the textbook "percentage of sales" financial planning model. This model assumes that the ratio of sales to assets in place is constant and that the accounting depreciation rate is the same as the economic depreciation rate. Under these assumptions, the need for external financing for a firm growing at rate g_t in period t can be expressed as

$$EFN_t = g_t * Assets_t - (1 + g_t) * Earnings_t * b_t$$

where $Earnings_t$ is earnings after interest and taxes and b_t is the proportion of earnings retained for reinvestment and not paying out as dividend payouts. The first term $g_t * Assets_t$ on the right hand side of the equation denotes the required amount of investment for a firm growing at g_t percent and the second term measures the internally available funds for investment, taking the firm's dividend payout as given.

Setting EFN to zero and solving for g_t yields the first benchmark growth rate IG_t

$$IG_t = ROA_t * b_t/(1 - ROA_t * b_t).$$

IG_t is the maximum growth rate that can be obtained if the firm reinvests all its earnings and obtains no external financing. Similarly, a second benchmark rate can be calculated by replacing $Assets_t$ with long-term assets only, yielding

$$SFG_t = ROLTC_t * b_t/(1 - ROLTC_t * b_t)$$

where $ROLTC_t$ is the return on long term capital. SFG_t is the maximum growth rate that can be obtained if the firm has access to short-term financing to maintain a constant short-term debt to total asset ratio. It assumes that firms do not engage in long-term borrowing or sales of equity to finance growth.

The third benchmark replaces *ROA* in the IG calculation with firms' return on equity (ROE) as

$$SG_t = ROE_t/(1 - ROE_t).$$

Demirguc-Kunt and Maksimovic (1998) interpret SG as the maximum growth attainable if the firm does not pay dividends and obtain just enough short-term and long-term debt financing to maintain a constant debt-to-asset ratio. Thus, to achieve SG is to implicitly assume that the firm does not issue new equity or increase leverage beyond its realized level. As Demirguc-Kunt and Maksimovic (1998) cautioned, the financial planning model abstracts from technical advances that reduce the requirements for investment

capital. Thus it may overstate the cost of growth or underestimate the maximum growth rate attainable using unconstrained sources of finance.

For each province-year, we calculate the proportion of firms whose realized sales growth rates exceed their corresponding benchmark rates. To control for differences between non-SOEs and SOEs, we compute the proportions separately for SOEs and non-SOEs. For example, for the benchmark IG, we calculate both $\%IG_{soe,p,t}$ and $\%IG_{non\text{-}soe,p,t}$, denoting respectively the number of SOE (non-SOE) firms whose sales growth rates exceed their corresponding IG rates in province *p* and year *t*, scaled by the total number of listed firms in the province-year.[19]

Panel A of Table 7 reports the summary statistics of the proportion variables for the SOE firms (Columns (1)-(3)) and for non-SOE firms (Columns (4) to (6)). Column (1) shows that the mean of %IG for SOE firms is 20%. The average %IG indicates that external finance was required for 20% of SOE firms to achieve their realized growth rates. Similarly, the average of %SFG is 12%, indicating that external short-term financing was required for close to 12% of SOEs to achieve their sales growth. In other words, among the 20% SOE firms that require external finance to grow, 8% of them could finance their growth with just short-term financing, and an additional 0.9% could finance their growth by also borrowing enough to maintain their debt-equity ratios. The difference (8% vs. 0.8%) is consistent with the fact that short-term financing is the main source of financing for Chinese enterprises. Columns (4)-(6) reveal that the average percentages are much lower for non-SOE firms, consistent with the idea that non-SOE firms face more severe financial constraints. The difference between %IG and %SFG is 2.1%, higher than the difference between %SFG and %SG (0.4%), suggesting long-term financing plays an even less important role for non-SOEs than for SOEs.

Panel B of Table 7 reports the regression results from estimating the following equation:

$$\%Benchmark_{p,t} = \alpha_p + \delta_t + \lambda_1 Bank_{p,t-1} + \lambda_2 Bank_{p,t-1} * SOE + \lambda_3 SOE + \gamma Control_{p,t-1} + \varepsilon_{p,t}$$

where the dependent variable is the proportion of firms whose realized sales growth rate exceeds one of the three benchmarks in year *t* at province *p*. SOE is an indicator variable that equals 1 (0) if the dependent variable is for the subsample of SOE (non-SOE) firms. The control variables include both province- and

[19] Some province-years have none or few non-SOEs. Therefore, we scale by the total number of all listed firms to avoid having extreme values with small denominators. In the regression, we control for the distribution of SOE vs non-SOE listed firms by adding the proportion of SOE firms in each province-year as the control variable.

year-fixed effects (α_p and δ_t, respectively), GDP growth rate, and total loan and total deposits (both scaled by total GDP) in the province-year. In addition, we also include the proportion of listed firms that are SOE firms in the province-year. The coefficient estimate for *Bank* estimates the effect of bank development on the availability of external financing for non-SOE firms and that for *Bank*SOE* estimate the difference between the marginal effect of banks on non-SOEs and on SOEs.

Results from Panel B, Table 7 show that the coefficient estimates for SOE are positive and significant throughout all three columns, suggesting that SOEs are more likely to achieve external financing-assisted growth when bank market development is low, consistent with the univariate comparison from Panel A. Bank development has no detectable effects on non-SOE firms' access to external financing, as the coefficient estimate for Bank is insignificantly different from zero. However, the excess to external financing for SOE firms is severely reduced in more developed bank market. The coefficient estimates for *Bank*SOE* are all significantly negative throughout the three columns with significance level varying from 10% for %IG and less than 1% for %SG.

6. Summary and Conclusion

We provide evidence on the relation between bank market development and firm financing, investment and performance by exploiting both cross-sectional and overtime variations in bank market development among Chinese provinces from 1998-2010. We posit that profit seeking banks have stronger incentives to screen and monitor borrowers than do politically driven lenders. We predict that in provinces with higher concentrations of commercially oriented banks, lending decisions will more closely link to borrower quality, firms will invest in more promising projects, and overall firm performance will be higher. We also conjecture that more rigorous credit discipline will impact SOEs more than Non-SOEs. We rank provincial banking sectors yearly on the basis of their commercial lending orientation as measured by the market share of bank deposits held by Big Four relative to Non-Big Four banks, and the proportion of total loans to Non-SOEs within a province. Consistent with our predictions, we find that in more commercially oriented provincial banking sectors (1) lending decisions are more sensitive to borrowers' past performance and loans have shorter maturity; (2) firms' investment decisions are more sensitive to past performance; and (3) firms exhibit higher profitability, profit margins, and asset turnover, and lower incidence of related party

transactions. Further, these effects are concentrated in SOE firms, consistent with stronger bank incentives to screen and monitor borrowers having a more dramatic impact on SOEs than private-listed firms. This suggests that SOEs are more likely than private firms to be shielded from credit market discipline by access to politically driven loans than will private firms, and so stand to benefit more from development of the banking sector.

References

Allen, F., Qian, J., and Qian, M. 2005. Law, finance, and economic growth in China. *Journal of financial economics* 77: 57-116.

Ayyagari, Meghana, Asli Demirguc-Kunt, and Vojislav Maksimovic. 2010. Formal versus Informal Finance: Evidence from China. *Review of Financial Studies* 23 (8):3048-3097

Barclay, Michael J., and Clifford W. Smith. 1995. The maturity structure of corporate debt. *Journal of Finance* 50: 609-631.

Beck, Thorsten, A. S. L. I. DEMIRGÜÇ-KUNT, and Vojislav Maksimovic. 2005. Financial and legal constraints to growth: Does firm size matter?. *Journal of Finance* 60: 137-177.

Beck, T., A. Demirg¨uc¸-Kunt, L. Laeven, and R. Levine. 2008. Finance, Firm Size, and Growth. *Journal of Money, Credit, and Banking* 40:1379–405.

Berger, Allen, Iftekhar Hasan, and Mingming Zhou. 2009. Bank ownership and efficiency in China: What will happen in the world's largest nation? *Journal of Banking & Finance* 33 (2009) 113–130.

Bertrand, M., A. Schoar, and D. Thesmar. 2007. Banking Deregulation and Industry Structure: Evidence from the French Banking Reforms of 1985. *Journal of Finance* 62:597–628.

Berger, A.N., Mester, L.J., 1997. Inside the black box: What explains differences in the efficiency of financial institutions? *Journal of Banking and Finance* 21, 895–947.

Cheng, X., and H. Degryse. 2006. The Impact of Bank and Non-Bank Financial Institutions on Local Economic Growth in China. *Journal of Financial Services Research* (2010) 37:179–199

Cull, Robert, and Lixin Colin Xu. 2005. Institutions, ownership, and finance: the determinants of profit reinvestment among Chinese firms." *Journal of Financial Economics* 77: 117-146.

Demirgüç-Kunt, A., and V. Maksimovic. 1998. Law, finance, and firm growth. *The Journal of Finance 53:* 2107-2137.

Demirgüç-Kunt, A., and V. Maksimovic. 1999. Institutions, financial markets, and firm debt maturity. *Journal of financial economics 54*: 295-336.

Dewenter, K. L., and P. H. Malatesta, P. H. 2001. State-owned and privately owned firms: An empirical analysis of profitability, leverage, and labor intensity. *The American Economic Review 91:* 320-334.

Diamond, D. W. 1991. Debt maturity structure and liquidity risk. *The Quarterly Journal of Economics 106:* 709-737.

Diamond, Douglas W. 1993. Seniority and maturity of debt contracts. *Journal of Financial Economics* 33: 341-368.

Fan, G., Xiaolu Wang, and Hengpeng Zhu. 2011. *NERI Index of marketization of China's Provinces 2011 Report*. Economic Science Press, Beijing, China.

Fan, J.P.H., T.J. Wong and Tianyu Zhang. 2005. The emergence of corporate pyramids in China. Working paper, Chinese University of Hong Kong.

Firth, Michael, Lin, Chen, Sonia, Wong and Liu, Ping. 2009. Inside the Black Box: Bank Credit Allocation in China's Private Sector. *Journal of Banking & Finance* 33: 1144–1155.

Goldsmith, R. W. 1969. *Financial Structure and Development.* Yale University Press, New Haven, CT.

Gregory, N., and S. Tenev. 2001. The Financing of Private Enterprise in China. *Finance and Development* 38:14–17.

Guiso, L, P. Sapienza and L. Zingales. 2004. Does local financial development matter? *Quarterly Journal of Economics* 119: 929-969

Jayaratne, Jith, and Philip E. Strahan. 1996. The finance-growth nexus: Evidence from bank branch deregulation. *Quarterly Journal of Economics* 111: 639-670.

Jiang, G.H., C. M.C. Lee, and H. Yue, 2010. Tunneling through intercorporate loans: The China experience, *Journal of Financial Economics* 98: 1-20

Johnson, S., La Porta, R., Shleifer, A., Lopez-de-Silanes., F., 2000. Tunneling. *American Economic Review Papers and Proceedings* 90, 22–27.

King, R. G., and R. Levine. 1993. Finance and growth: Schumpeter might be right. *Quarterly Journal of*

Economics 108: 717-737.

Klapper, L. 2006. The Role of Factoring for Financing Small and Medium Enterprises. *Journal of Banking and Finance* 30:3111–30.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. W. Vishny. 1997, Legal Determinants of External Finance. *Journal of Finance* 52: 1131–1150.

La Porta, Rafael, Florencio Lopez-de-Silanes, and Andrei Shleifer. 2002. Government ownership of banks. *Journal of Finance* 57: 265-301.

Lardy, N., 1998. China's Unfinished Economic Revolution. Brookings Institution Press, Washington, DC.

Levine, R. 2005. Finance and growth: theory and evidence. *Handbook of economic growth, 1*, 865-934.

Levine, Ross, and Sara Zervos. 1998. Stock markets, banks, and economic growth. *American economic review*: 537-558.

Levine, R., N. Loayza, and T. Beck. 2000. Financial Intermediation and Growth: Causality and Causes. *Journal of Monetary Economics* 46:31–77

Li, Kai, Heng Yue, and Longkai Zhao. 2009. Ownership, institutions, and capital structure: Evidence from China. *Journal of Comparative Economics* Volume 37, Issue 3, September 2009, Pages 471–490.

Lin, Xiaochi and Yi Zhang. 2009. Bank ownership reform and bank performance in China. *Journal of Banking and Finance* Volume 33, Issue 1, January, Pages 20–29.

Love, I. 2003. Financial Development and Financing Constraint: International Evidence from the Structural Investment Model. *Review of Financial Studies* 16:765–91.

Martin, Michael F. 2012 China's Banking System: Issues for Congress. A CRS Report for Congress. Congressional Research Service. http://www.fas.org/sgp/crs/row/R42380.pdf

Mian, Atif. 2006. Distance constraints: The limits of foreign lending in poor economies. *The Journal of Finance* 61: 1465-1505.

Naughton, Barry. 2007. The Chinese economy: Transitions and growth. *MIT Press Books*, Cambridge, MA.

Okazaki, Kumiko. 2007. Banking System Reform in China: The Challenges of Moving Toward a Market-Oriented Economy. RAND Corporation occasional paper series. Published 2007 by the RAND Corporation.

Petersen, M. A., and R. G. Rajan. 1994. The benefits of lending relationships: Evidence from small business

data. *Journal of Finance 49:* 3-37

Podpiera, Richard. 2006. Progress in China's Banking Sector Reform: Has Bank Behavior Changed? IMF Working Paper WP/06/71, March 2006, Monetary and Financial Systems Department.

Qian, Jun, and Philip E. Strahan. 2007. How laws and institutions shape financial contracts: The case of bank loans. *Journal of Finance* 62: 2803-2834.

Rajan, Raghuram G., and Luigi Zingales. 1998. Financial Dependence and Growth. *American Economic Review* 88: 559-586.

Wang, X., L. C. Xu, and T. Zhu. 2004. State-Owned Enterprises Going Public: The Case of China. *Economics of Transition* 12:467–87.

Wurgler, J. 2000. Financial Market and the Allocation of Capital. *Journal of Financial Economics* 58:187–214.

Figure 1: Overtime Change in China's Bank Market Development

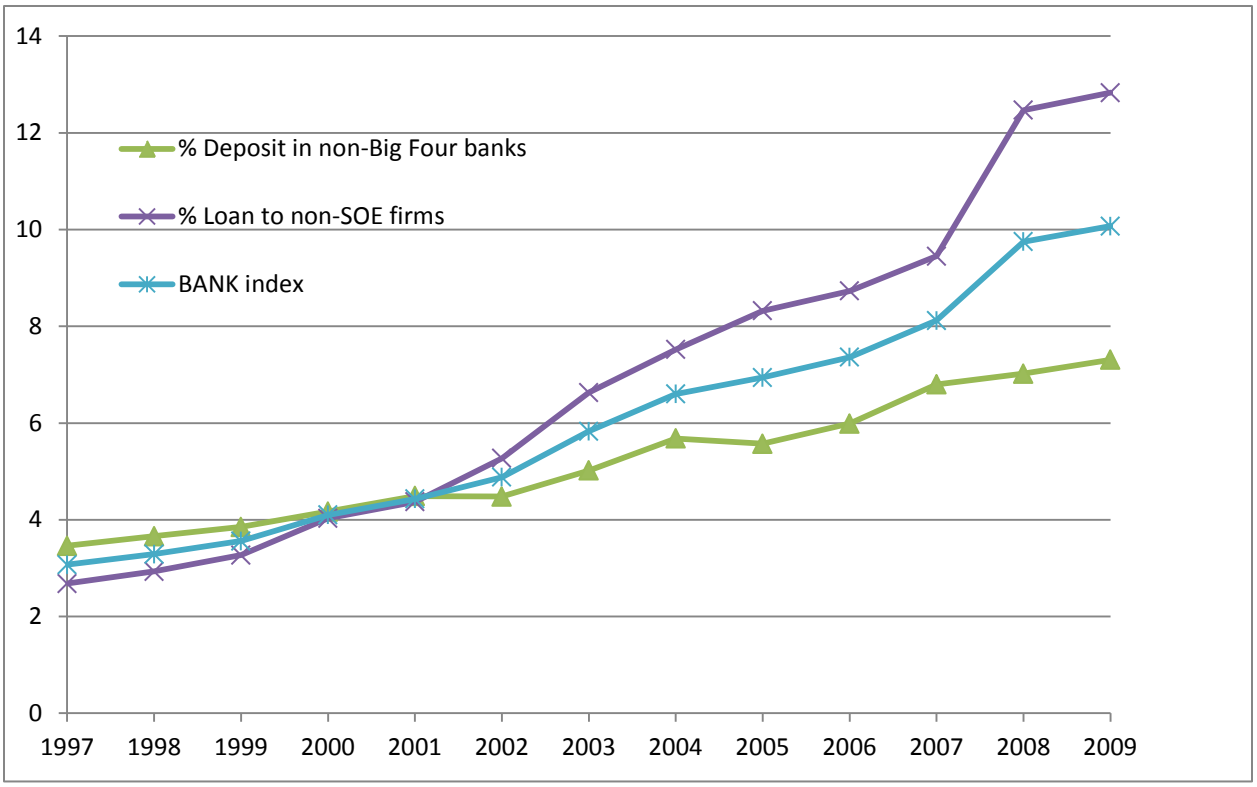

Table 1: Bank Market Development in Different Regions

Panel A reports the province-specific overtime average values for measures of bank market development and economic development. $BANK_{p,t}$ is the average of *%Deposit in Non-Big Four Banks*$_{p,t}$ and *%Loan to Private firms*$_{p,t}$. *%Deposit in Non-Big Four Banks*$_{p,t}$ is an index value based on the bank deposits held by non-Big four banks as a percentage of total bank deposits banks in each province-year. *%Loan to Private firms*$_{p,t}$ an index value based on the bank loans to by non-SOE firms as a percentage of total loans in each province-year. Panel B reports correlation among variables. ***, ** and * denote significance at the 1%, 5%, and 10% level.

Panel A: Bank market development index by region

Region	*N*	*BANK*	*% Deposit in Non-Big 4 banks*	*% Loan to Private firms*	*GDP Growth Rate*	*Total Deposit/GDP*	*Total Loan/GDP*
Zhejiang	706	9.58	8.67	10.48	0.14	1.12	1.39
Shanghai	1340	8.76	9.7	7.82	0.13	1.45	2.09
Jiangsu	769	8.45	6.76	10.13	0.15	0.81	1.11
Shandong	713	7.82	7.94	7.7	0.15	0.75	0.91
Guangdong	1424	7.6	6.94	8.25	0.15	1.03	1.59
Chongqing	255	7.26	7.77	6.74	0.14	1.07	1.26
Liaoning	537	7.2	7.8	6.59	0.13	1.07	1.36
Fujian	558	6.99	4.42	9.56	0.13	0.76	0.99
Hebei	309	6.91	5.93	7.89	0.13	0.63	0.91
Henan	346	6.88	6.98	6.79	0.14	0.8	0.95
Shaanxi	241	6.46	5.91	7	0.16	1.14	1.55
Tianjin	199	6.42	6.59	6.26	0.16	1.19	1.45
Anhui	430	6.36	5.3	7.42	0.13	0.83	1.01
Hunan	411	6.21	5.48	6.94	0.14	0.72	0.9
Beijing	509	6.04	6.12	5.96	0.16	1.89	3.45
Shanxi	234	5.97	4.4	7.53	0.15	1.09	1.59
Ningxia	113	5.92	5.26	6.58	0.16	1.33	1.43
Yunnan	227	5.75	5.6	5.91	0.12	1.1	1.38
Sichuan	669	5.57	4.14	7	0.13	0.99	1.27
Jiangxi	237	5.55	4.76	6.33	0.14	0.83	1.04
Hubei	556	5.5	5.57	5.43	0.14	0.93	1.1
Guangxi	240	5.24	3.58	6.9	0.13	0.79	1.05
Hainan	264	5.16	2.89	7.42	0.12	1.21	1.57
Gansu	182	4.73	3.96	5.5	0.13	1.11	1.42
Guizhou	133	4.73	4.37	5.09	0.14	1.08	1.23
Inner-Mongolia	203	4.58	3.64	5.52	0.19	0.79	0.82
Jilin	327	4.37	5.22	3.52	0.14	1.14	1.1
Xinjiang	284	3.87	2.05	5.69	0.13	0.99	1.33
Heilongjiang	308	3.57	3.38	3.75	0.11	0.92	1.09
Qinghai	109	3.31	0.62	6	0.15	1.23	1.23
Tibet	72	3.1	-2.84	9.04	0.16	0.72	1.66
Average	416	6.02	5.21	6.84	0.14	1.02	1.33

Panel B: Correlation

	Bank	*% Deposit in Non-Big 4 banks*	*% Loan to Private firms*	*GDP Growth Rate*	*Total Loan/GDP*
% Deposit in Non-Big 4 banks	0.799***				
% Loan to Private firms	0.896***	0.448***			
GDP Growth Rate	0.381***	0.238***	0.391***		
Total Loan/GDP	-0.021	0.162***	-0.15***	-0.146**	
Total Deposit/GDP	0.23***	0.198***	0.191***	0.027	0.756***

Table 2: Summary Statistics

This table reports the summary statistics of all variables for the sample of Chinese listed companies during 1998 -2010. *Bank* is the index of bank market development. *SOE* is an indicator variable that equals 1 when the largest shareholder of the listed company is either a government agency or an entity controlled by a government agency. *ROA* is the ratio of after-tax earnings from core operations (before interest expense) to total assets. *Size* is the logarithm of the book value of total assets. *Age* is the logarithm of the number of years since the firm's IPO year. All variables are calculated for each firm-year. Detailed descriptions for variables are presented in the Appendix.

Variables	Mean	SD	p25	Median	p75
Profitability and Efficiency					
Bank	6.98	3.01	4.61	6.84	9.67
SOE	0.68	0.47	0.00	1.00	1.00
ROA (%)	3.38	8.65	1.76	4.46	7.32
Size (log(assets))	21.20	1.07	20.49	21.10	21.84
Age (number of years since IPO))	7.78	4.76	4.00	7.00	11.00
Bank loan balance (% of total assets))	16.28	12.33	6.33	14.24	24.30
Changes in Bank Loan/total assets (%)	1.79	9.26	-2.17	0.45	5.17
New Equity Issuance (% of total assets)	2.11	8.48	-0.13	0.17	1.96
Proportion of long term loan (% of total loan)	24.63	29.32	0.00	12.38	41.60
CAPEX (% of total assets)	6.59	8.19	1.11	3.65	8.78
Sales Per Employee (In millions RMB)	1.34	3.07	0.23	0.47	1.01
Profit Margin (profit as a % of sales)	5.26	18.23	1.40	6.15	14.03
Assets Turnover (sales/total assets)	0.60	0.46	0.29	0.48	0.75
Other receivables (% of total assets)	1.13	4.20	0.00	0.00	0.05
GDP growth	0.13	0.07	0.08	0.12	0.17
Total deposit/GDP	1.33	0.52	1.02	1.24	1.49
Total loans/GDP	1.02	0.30	0.81	0.99	1.18

Table 3: Relation between Bank Market Development and the Sensitivity of Loan to Performance

This table shows the OLS regression results from estimating equation (1) below.

$$BankLoan_{i,p,t} = \alpha_i + \delta_t + \lambda_1 ROA_{i,p,t-1} + \lambda_2 Bank_{p,t-1} * ROA_{i,p,t-1} + \lambda_3 Bank_{p,t-1} + \gamma Control_{i,p,t-1} + \varepsilon_{i,p,t} \quad (1)$$

The dependent variable is the net amount of bank loans for firm *i* in province *p*, year *t*, measured by changes in bank loan balance scaled by market value of assets. *Bank* is the index of bank market development. *SOE* is an indicator variable that equals 1 when the largest shareholder of the listed company is either a government agency or an entity controlled by a government agency. *ROA* is the ratio of after-tax earnings from core operations (before interest expense) to total assets. *Size* is the logarithm of the firm's book value of total assets. *Age* is the number of years since the firm's IPO year. All models include firm- and year-fixed effects. Standard errors adjust for heteroskadasticity and are clustered by firms. T-statistics are in the parentheses. ***, ** and * denote significance at the 1%, 5%, and 10% level, respectively, in two-tailed tests.

Panel A: Loan to Performance Sensitivity for SOEs and non-SOEs

	(1)	(2)	(3)	(4)	(5)	(6)
	Whole Sample	Non-SOEs	SOEs	Whole sample	Non-SOEs	SOEs
ROA_{t-1}	0.123***	0.189***	0.077	0.201***	0.161**	0.185*
	(3.70)	(3.35)	(1.64)	(4.43)	(2.49)	(1.94)
$BANK*ROA_{t-1}$	0.015***	0.000	0.026***	0.016***	0.004	0.026***
	(3.38)	(0.05)	(4.07)	(3.48)	(0.59)	(3.22)
$BANK_{t-1}$	-0.107	-0.108	-0.122	-0.111	-0.104	-0.124
	(-1.21)	(-0.55)	(-1.16)	(-0.87)	(-0.44)	(-1.05)
$SIZE_{t-1}$	-3.714***	-3.647***	-4.411***	-3.746***	-3.637***	-4.430***
	(-16.81)	(-9.12)	(-15.97)	(-15.48)	(-6.91)	(-16.18)
AGE_{t-1}	4.685***	5.348***	4.131***	4.737***	5.377***	4.212***
	(7.52)	(4.59)	(5.08)	(8.15)	(6.32)	(5.04)
$GDPGrowth*ROA_{t-1}$				-0.001	-0.005***	-0.001
				(-1.37)	(-5.65)	(-0.59)
$Total\ Deposit*ROA_{t-1}$				-0.003	-0.054	0.019
				(-0.06)	(-1.04)	(0.22)
$Total\ Loan*ROA_{t-1}$				-0.076	0.086	-0.125
				(-1.02)	(0.92)	(-0.82)
$GDP\ Growth_{t-1}$				0.147	-0.211	0.083
				(0.75)	(-0.83)	(0.30)
$Total\ Deposit_{t-1}$				0.013	0.604	0.139
				(0.01)	(0.30)	(0.09)
$Total\ Loan_{t-1}$				1.314	1.436	1.275
				(0.95)	(0.83)	(0.70)
Observations	12253	3955	8287	12146	3913	8222
Adjusted R^2	0.113	0.104	0.135	0.115	0.105	0.137

Panel B: Relation between bank development and loan-to-performance sensitivity by subsample of SOEs

Panel B shows the OLS regression results from estimating equation (1) on the subsamples of SOEs partitioned by various variables. Columns (1) and (2) partition SOEs by whether the firm's total book value of assets is above or below the sample median value. Columns (3) and (4) partition by whether the firm is in a protected industry. A firm is in a protected industry if the ratio of the number of SOE firms to the total number of firms in the same industry, province, and year is higher (lower) than the sample median level. Columns (5) and (6) partition by whether a firm's *Layer* value is above or below the sample median. *Layer* is calculated as the number of entities between the controlling shareholder and the listed company (the height of the pyramid in the control chain from controlling shareholders to the listed company).

	(1)	(2)	(3)	(4)	(5)	(6)
Subsamples of SOE by	Large SOEs	Small SOEs	SOEs in protected industry	SOEs in unprotected industry	SOEs with short layer	SOEs with long layer
ROA_{t-1}	-0.164*	0.174***	0.062	0.176**	0.065	0.078
	(-1.83)	(3.26)	(1.01)	(2.27)	(1.09)	(0.96)
$BANK*ROA_{t-1}$	0.058***	0.007	0.029***	0.008	0.031***	0.016
	(4.96)	(0.99)	(3.46)	(0.75)	(3.89)	(1.39)
$BANK_{t-1}$	-0.181	-0.053	-0.084	0.066	-0.180	-0.010
	(-1.06)	(-0.40)	(-0.62)	(0.35)	(-1.37)	(-0.05)
$SIZE_{t-1}$	-7.215***	-5.384***	-4.903***	-3.838***	-4.630***	-4.567***
	(-14.52)	(-15.93)	(-15.26)	(-6.88)	(-13.82)	(-7.62)
AGE_{t-1}	3.614***	2.015**	3.756***	3.253**	3.839***	4.163**
	(2.97)	(2.21)	(3.49)	(2.27)	(3.88)	(2.48)
Num. of Obs.	4814	3473	5859	2428	5917	2370
Adjusted R^2	0.181	0.199	0.147	0.132	0.147	0.133

Table 4: Relation between Bank Market Development and Loan Maturity

This table shows the OLS regression results from estimating equation (2) below.

$$Maturity_{i,p,t} = \alpha_i + \delta_t + \lambda_1 Bank_{p,t-1} + \lambda_2 Bank_{p,t-1} * SOE_{i,p,t-1} + \lambda_3 SOE_{i,p,t-1} + \gamma Control + \varepsilon_{i,p,t} \quad (2)$$

$Maturity_{i,p,t}$ is the % of long term loans to total loans for firm *i*, in province *p*, and year *t*. *Bank* is the index of bank market development. *SOE* is an indicator variable that equals 1 when the largest shareholder is a government agency or entity controlled by a government agency. *ROA* is the ratio of after-tax earnings from core operations (before interest expense) to total assets. *Size* is the logarithm of the book value of total assets. *Age* is the number of years since the firm's IPO year. SOE(Large) (SOE(Small)) are dummy variables for SOE firms with above (below) median level book value of total assets. SOE(Protected) (SOE(Unprotected)) are dummy variables for SOEs in protected (unprotected) industry. SOE(Short layer) (SOE(Long layer)) are dummy variables for SOE firms with below (above) sample median value of *Layer*. All models include firm- and year-fixed effects. Standard errors are clustered by firms. T-statistics are in the parentheses. ***, ** and * denote significance at the 1%, 5%, and 10% level, respectively, in two-tailed tests.

	(1)	(2)	(3)	(4)
$BANK_{t-1}$	0.012***	0.013***	0.012***	0.013***
	(3.44)	(3.55)	(3.51)	(3.59)
$BANK*SOE_{t-1}$	-0.013***			
	(-4.28)			
*BANK*SOE(Large)*		-0.012***		
		(-3.65)		
*BANK*SOE(Small)*		-0.014***		
		(-4.17)		
*BANK*SOE(Protected)*			-0.014***	
			(-3.96)	
*BANK*SOE(Non-protected)*			-0.010***	
			(-2.82)	
*BANK*SOE(Short layer)*				-0.016***
				(-4.34)
*BANK*SOE(Long layer)*				-0.008*
				(-2.03)
SOE_{t-1}	0.095***			
	(4.02)			
SOE(Large/Protected/Short layer)		0.123***	0.105***	0.118***
		(4.14)	(3.89)	(4.40)
SOE(Small/Unprotected/Long layer)		0.083***	0.053*	0.052
		(3.37)	(1.97)	(1.56)
ROA_{t-1}	0.002***	0.002***	0.002***	0.002***
	(5.39)	(5.06)	(5.14)	(5.22)
$SIZE_{t-1}$	0.028***	0.023***	0.028***	0.029***
	(5.22)	(4.17)	(5.46)	(5.21)
AGE_{t-1}	-0.033	-0.039*	-0.030	-0.031
	(-1.46)	(-1.74)	(-1.45)	(-1.39)
Num. of Obs.	11638	11651	11651	11651
Adjusted R2	0.446	0.448	0.447	0.447

Table 5: Relation between Bank Market Development and Sensitivity of Investment to Performance

This table shows the OLS coefficient estimates from estimating equation (3) below.

$$CAPEX_{i,p,t} = \alpha_i + \delta_t + \lambda_1 \mathrm{ROA}_{i,p,t-1} + \lambda_2 \mathrm{Bank}_{p,t-1} * \mathrm{ROA}_{i,p,t-1} + \lambda_3 \mathrm{Bank}_{p,t-1} + \gamma \mathrm{Control}_{i,p,t-1} + \varepsilon_{i,p,t} \quad (3)$$

The dependent variable is the capital expenditure scaled by total book value of assets of firm i, in province p, and year t. *Bank* is the index of bank market development. SOE is an indicator variable that equals 1 when the largest shareholder of the listed company is a government agency or an entity controlled by a government agency. *ROA* is the ratio of after-tax earnings from core operations (before interest expense) to total assets. *Size* is the logarithm of the book value of total assets. *Age* is the number of years since the firm's IPO year. Panel A shows the estimation results for the whole sample and the subsample of SOE and non-SOE firms. Panel B shows the estimation results for the subsamples of SOEs partitioned by size, by whether the SOE is in a protected industry, and by the length of control chain between the SOE's controlling shareholder and the listed company (*layer*). See the Appendix for variable definitions. All models include firm- and year-fixed effects. Standard errors adjust for heteroskadasticity and are clustered at by firms. T-statistics are in the parentheses. ***, ** and * denote significance at the 1%, 5%, and 10% level, respectively, in two-tailed tests.

Panel A: Investment-to-Performance Sensitivity of SOEs vs. NSOEs

	Whole sample	Non-SOEs	SOEs
ROA_{t-1}	0.108***	0.089**	0.089**
	(4.06)	(2.18)	(2.54)
$BANK*ROA_{t-1}$	0.008**	0.003	0.016***
	(2.22)	(0.49)	(3.45)
$BANK_{t-1}$	0.175**	0.260*	0.133
	(2.40)	(1.65)	(1.53)
$SIZE_{t-1}$	-2.660***	-2.685***	-2.850***
	(-16.91)	(-9.03)	(-14.83)
AGE_{t-1}	-1.878***	-2.447**	-1.786***
	(-3.97)	(-2.55)	(-3.04)
Num. of Obs.	12306	3969	8326
Adjusted R2	0.340	0.344	0.364

Table 5: Continued. Relation between Bank Market Development and Sensitivity of Investment to Performance

Panel B: Cross-sectional variations among SOEs

	Large SOEs	Small SOEs	SOEs in Protected industry	SOEs in Unprotected industry	SOEs with short layer	SOEs with long layer
ROA_{t-1}	0.095	0.115***	0.091**	0.094*	0.103**	0.064
	(1.32)	(2.86)	(2.05)	(1.80)	(2.25)	(1.18)
$BANK*ROA_{t-1}$	0.022**	0.004	0.018***	0.007	0.017***	0.012
	(2.40)	(0.65)	(3.08)	(1.08)	(2.70)	(1.63)
$BANK_{t-1}$	0.195	0.128	0.166	0.163	0.129	0.172
	(1.48)	(0.98)	(1.48)	(1.07)	(1.17)	(1.20)
$SIZE_{t-1}$	-4.188***	-3.189***	-3.039***	-2.952***	-3.130***	-2.469***
	(-14.43)	(-12.15)	(-13.86)	(-6.35)	(-14.56)	(-5.57)
AGE_{t-1}	-1.659**	-3.578***	-2.025***	-2.870**	-2.343***	-1.303
	(-1.98)	(-4.19)	(-2.69)	(-2.32)	(-3.41)	(-1.11)
Num. of Obs.	4832	3494	5882	2444	5943	2383
Adjusted R2	0.428	0.331	0.345	0.442	0.373	0.380

Table 6: Relation between Bank Market Development and Firm Performance

This table shows the coefficient estimates from the OLS regressions of the following equation:

$$Perf_{i,p,t} = \alpha_i + \delta_t + \lambda_1 Bank_{p,t-1} + \lambda_2 Bank_{p,t-1} * SOE_{i,p,t-1} + \lambda_3 SOE_{i,p,t-1} + \gamma Control + \varepsilon_{i,p,t} \quad (2)$$

The dependent variables are measures of performances for firm *i*, in province *p*, and year *t*. *Bank* is the index of bank market development. *SOE* is an indicator variable that equals 1 when the largest shareholder of the listed company is a government agency or an entity controlled by a government agency. *Size* is the logarithm of the book value of total assets. *Age* is the number of years since the firm's IPO year. See the Appendix for variable definitions. All models include firm- and year-fixed effects. Standard errors adjust for heteroskadasticity and are clustered by firm. T-statistics are shown in the parentheses. ***, ** and * denote significance at the 1%, 5%, and 10% level, respectively, in two-tailed tests.

	(1)	(2)	(3)	(4)	(5)
			Dependent variable		
	ROA	*Sales/Employee*	*Profit Margin*	*Assets turnover*	*Tunneling*
$BANK_{t-1}$	0.097	0.033**	0.163	-0.173	-0.055
	(0.58)	(2.30)	(0.46)	(-0.32)	(-0.80)
$BANK*SOE_{t-1}$	0.215*	0.032***	0.648***	1.034***	-0.116***
	(1.87)	(2.97)	(3.08)	(2.81)	(-3.47)
SOE_{t-1}	-2.871**	-0.400***	-7.537***	-8.919*	0.897***
	(-2.25)	(-3.85)	(-3.19)	(-2.03)	(3.52)
$SIZE_{t-1}$	-0.531**	0.224***	-0.844*	-0.193	0.466***
	(-2.15)	(8.77)	(-1.99)	(-0.22)	(4.15)
AGE_{t-1}	-3.029***	0.407***	-8.720***	0.118	1.220***
	(-5.61)	(9.24)	(-5.57)	(0.09)	(7.31)
Num. of Obs.	12366	11630	12321	12342	12428
Adjusted R2	0.304	0.712	0.346	0.697	0.267

Table 7: Relation between Bank Market Development and Proportion of Firms Relying on External Finance to Achieve Growth

Panel A shows the summary statistics for $\%Benchmark_{p,t}$ for SOEs and non-SOEs. For SOE (non-SOE) firms, $\%Benchmark_{p,t}$ defined as the number of SOE (non-SOE) firms in province *p* and year *t* with actual sales growth rates higher than their benchmark rates, scaled by the total number of listed firms in the province-year. Three benchmark rates are used: IG, SFG, and SG. IG is the rate that a firm can grow without any access to external finance. SFG is the growth rate that is achievable when firms have access to short-term financing. SG is the long-run sustainable growth rate assuming firms can access external capital to maintain its long-run debt to equity ratio). Panel B reports OLS regression results of %Benchmark on Bank index and other province-year measures. Province- and year-fixed effects are included in all regressions. Standard errors adjust for heteroskadasticity and are clustered by province. T-statistics are shown in the parentheses. ***, ** and * denote significance at the 1%, 5%, and 10% level, respectively, in two-tailed tests.

Panel A: Summary statistics

	SOEs			Non-SOEs		
Statistics	%IG	%SFG	%SG	%IG	%SFG	%SG
N	403	403	403	374	374	374
Mean	0.201	0.120	0.112	0.099	0.078	0.074
S.D.	0.105	0.080	0.079	0.084	0.076	0.073
p25	0.125	0.063	0.054	0.042	0.022	0.019
p50	0.196	0.114	0.100	0.087	0.063	0.056
p75	0.262	0.158	0.154	0.143	0.111	0.109

Panel B: Relation between Bank Market Development and Access to External Capital

Dependent variable	%IG	%SFG	%SG
SOE_{t-1}	0.152***	0.084***	0.070***
	(5.93)	(5.21)	(4.08)
$BANK*SOE_{t-1}$	-0.007**	-0.006**	-0.005**
	(-2.27)	(-2.56)	(-2.27)
$BANK_{t-1}$	-0.002	-0.004	-0.003
	(-0.45)	(-1.33)	(-1.18)
$GDP\ growth_{t-1}$	0.009	0.003	0.017
	(0.15)	(0.07)	(0.32)
$Total\ Loan/GDP_{t-1}$	-0.041*	-0.066***	-0.072***
	(-1.73)	(-2.84)	(-3.51)
$Total\ Deposit/GDP_{t-1}$	-0.034	0.012	0.022
	(-1.25)	(0.44)	(0.94)
$\%SOE_{t-1}$	-0.007	0.003	-0.006
	(-0.13)	(0.05)	(-0.12)
Province fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Num. of Obs.	769	769	769
Adjusted R2	0.481	0.399	0.380

Appendix: Variable Definitions

Variables	Definitions
Bank	An average of the index values of % deposit in private banks and % of loans provided to non-SOE firms. The data source is the National Economic Research Institute (NERI) index of Marketization of China's provinces constructed by Fan, Wang and Zhu (2011).
SOE	Indicator variable for whether the company's largest shareholder is a government agency or is an entity ultimately controlled by government.
Bank loan balance (%)	Total amount of bank loan scaled by total assets
Change of Bank Loan (%)	Changes in total bank loan in year *t*, scaled by beginning value of total assets
Proportion of long-term Loan (%)	Long-term bank loan scaled by total bank loans
ROA (%)	Ratio of after-tax operating income to book value of total assets
SIZE	Natural logarithm of book value of assets
Firm Age	The number of years since the firm was listed on the stock exchange.
Layer	The number of entities linking the listed companies and their controlling shareholders.
Protected	Indicator variable for whether the industry an SOE belongs to are dominated by SOE firms.
CAPEX (%)	Capital expenditures, scaled by book value of assets in year t-1
Sales/Employee(Million Yuan)	Sales revenue scaled by number of employees
Profit Margin (%)	Ratio of after-tax operating income to sales revenue
Assets Turnover	Sales revenue scaled by book value of assets
Other Receivables (%)	Other receivables owed by company's controlling shareholder's group, scaled by book value of total assets.