

Limited Loan Rate Differentiation and the Determination of Loan Terms in the Chinese Commercial Credit Market

Kent Matthews, Wei Yin



**University of
Nottingham**

UK | CHINA | MALAYSIA

Faculty of Business, University of Nottingham Ningbo China, 199 Taikang East Road, Ningbo, 315100, Zhejiang, China.

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Order of Authors:	Kent Matthews, Ph.D. Wei Yin, Ph.D.

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Abstract

China has partially liberalized loan rate setting by the banks since 2004 but loan rates remain stubbornly within narrow bounds. We argue that competition in the loan market is signalled through the variation of loan deal terms and loan maturity rather than loan rates. We examine the determinants of loan deal conditions in terms of size and maturity. This paper focuses on the role of single firm-bank relationships in determining loan deal conditions. Commercial loan deal terms of listed companies are matched to provider banks over the period 1999-2012 and sub-sample estimation for the pre-2004 and post-2004 periods confirm change in the bank-firm-loan relationship. We find that single firm-bank relationships are associated with larger loan size and longer loan maturity in the pre-liberalization period but that this relationship has weakened in the liberalization period.

Key words: China banks; Loan terms; firm-bank relationships

JEL: G2, M14, M31

1. Introduction

Up until the late 1990s, the primary function of the Chinese banking sector was to provide low-cost funds to state-owned-enterprises (SOEs). Since the reform process signalled by the Banking Law of 1995, the banking sector has been gradually evolving towards full commercialisation. This gradual process has involved recapitalisation, foreign strategic investment, reformed governance, modern methods of risk management and limited liberalisation of loan rate setting. Up until 2004 lending rates were strictly controlled within a narrow range by the Peoples Bank of China (PBOC). The legacy of the policy of strict control of lending rates along with policy directed lending was the under-pricing of risk and the well-known history of China's non-performing loans (NPLs). After 2004 the upper limit on interest rates were lifted and banks had the capability to risk price marginal lending.

However, in the main, banks have not taken advantage of this new-found freedom and loan rates have remained clustered around the benchmark rate set by the PBOC. The reasons for the homogeneity of Chinese bank behaviour are uncertain. Podpiera (2006) surmises that interest rate pricing may have been a low priority in an environment of abundant liquidity or the familiar arguments of adverse selection and adverse incentives associated with the credit rationing literature (Stiglitz and Weiss, 1981). In an environment of limited loan rate differentiation, the terms and conditions of the loan that make up the vector of non-interest price factors can be expected to reflect risk and market conditions.

The purpose of this paper is to explore the determinants of terms and conditions of the bank loans of listed companies in China covering a data span 1999-2012. It argues that competition in the loan market is signalled through the variation in loan terms rather than the loan rate. We examine the determinants of loan deal conditions in terms of size and maturity of a commercial loan. We focus on the role of single firm-bank relationships. We match commercial loan deal terms of listed companies to provider banks over the period 1999-2012 and conduct sub-sample estimation for the

pre-2004 and post-2004 periods. Controlling for firm, bank ownership and market characteristics, we find that single firm-bank relationships generate better loan covenant in terms of longer loan maturity, but a single firm-bank relationship is not associated with larger loan size, allowing for other factors. We also investigate the single firm-bank relationship in the context of the ownership status of the bank and the firm. We find that state-owned banks (SOBs) are associated with larger loan deals and longer maturity.

To anticipate the rest of our results we find that firm size and its debt exposure provide strong effects on loan maturity and loan size. The larger the firm measured by assets, the larger loan size and maturity of loans. The greater the debt exposure, the lower the loan size and the longer the maturity. On the supply characteristics, SOBs and single firm-bank-relationships (SBRs) are associated with longer maturity loan terms but have no clear relationship to loan size. Our results also confirm the well-known bias in lending by SOBs. A parameter stability test shows that the firm-bank loan relationship changed after 2004.

This paper is organised along the following lines. The next section presents a brief context of Chinese banking. The third section offers the literature review. The fourth section outlines a theoretical framework and the empirical model. The fifth section examines the data and discusses the empirical results. The final section concludes.

2. The Chinese banking context

The remarkable growth of the Chinese economy and the development of her banking system continue to generate both plaudits and scepticism in almost equal amounts¹. The use of the banking system for policy lending had saddled it with inefficiency and a large non-performing loans problem. Privatisation of a sort occurred with the creation of the joint-stock banks alongside the big-four SOBs, but the reality is that

¹For example Coase and Wang (2012) compared with Huang (2008).

government remains firmly in control². Through the creation of asset management companies, the big four banks were recapitalised with the use of the dollar reserves prior to their listing. Since 2001 foreign banks and financial institutions could take a stake in selected Chinese banks. But, while control of individual Chinese banks remains out of reach for the foreign institution³, the pressure to reform management, consolidate balance sheets, improve risk management and reduce unit costs has increased with greater foreign exposure.

Studies of Chinese bank efficiency conclude that while large inefficiencies exist (Chen et al., 2005; Fu and Heffernan, 2009), these inefficiencies are declining. The conventional finding is that the SOBs have a higher level of average inefficiency and a slower speed of inefficiency decline than the JSBs (Joint-stock commercial banks). Efficiency and performance is found to be related to risk management processes and the internal decision making of the banks, indicating a strong learning activity on the part of the banks to 'up their game' (Matthews, 2013). The listing of the big four banks in China is intended to improve management, governance, transparency and ultimately profit performance.

Despite clear improvements in performance and efficiency, the Chinese banking system remains dominated by the SOBs and its lending is largely directed to the SOEs. Firth et al. (2009) quote that despite the private sector accounts for 50% of the economy it is the recipient of only 7% of bank credit. The banking system is still constrained by political influence and directed lending. Anecdotal evidence provided by Dobson and Kashyap (2006) and quoted in Bailey et al. (2011) suggest that despite the substantial progress in reform, banks face considerable political pressure in their loan decisions. Yet the Chinese approach of gradualist reform continues at its pace. There has been limited reform of loan rate setting allowed by the Peoples Bank of

²The Joint Stock Banks, while not directly owned by the Chinese government are owned by SOEs and entities that are ultimately traced to SOEs or Provincial government.

³There is a cap of 25% on total equity held by foreigners and a maximum of 20% for any single investor, except in the case of joint-venture banks.

China (PBOC) and previous limits to interest rate setting have been lifted. Table 1 shows the evolution of the regulation of interest rates for commercial banks.

Table 1: Regulation of lending rates for commercial banks

Year	Loans Regulation
1996	All enterprises: 0.9 to 1.1 times the official benchmark rate
1998	Small enterprises 0.9 to 1.2 times the benchmark rate Medium and large enterprises 0.9 to 1.1 times the benchmark rate
1999	Small and Medium enterprises 0.9 to 1.3 times the benchmark rate Large enterprises 0.9 to 1.1 times the benchmark rate
2004	All enterprises 0.9 to 1.7
2004 October	Upper limit removed. Lower limit unchanged
2012 June	Lower limit changed as 0.7times the benchmark rate
2013 June	Lower limit removed.

Source: PBOC.

Both anecdotal evidence and evidence in Podpiera (2006) suggest that despite the liberalisation of lending rates most new loans were contracted at or below the PBOC benchmark rate. Evidence by He and Wang (2012) confirm that even in 2010, over 80% of bank loans were contracted in the bounds 0.9-1.3 of the benchmark rate at a time when the benchmark rate was at its lowest since liberalisation. Based on the survey data of 2400 enterprises for 2003, He (2010) makes an empirical study on firm-bank relationship and loan price in China. The results show that the length of firm-bank relationship has no significant effect on loan interest rate. The implication is that a single firm-bank relationship will be reflected in other aspects of the loan contract rather than the interest rate.

The origin of the practice of limited loan rate differentiation may be traced to custom and practice, goodwill, legal constraints (such as usury laws), and institutional rigidities. Theoretical explanations are based on asymmetric information resulting in adverse selection and adverse incentives (Stiglitz and Weiss, 1981). The Stiglitz and Weiss (1981) model results in an interest rate effect that has not only a direct positive effect on the bank's return but also an indirect negative effect. This negative effect comes in two forms. First, the interest rate charged affects the riskiness of the loan, which is the adverse selection effect. Second, the higher the rate of interest

charged, the greater the incentive is to take on riskier projects, which is the adverse incentive effect. While such explanations may explain limited loan rate differentiation post-2004 in Chinese banks, the structure and political economy of the banking system suggests that central direction remains a strong imperative for lending to SOEs on favourable terms (Zhang, 2013).

Figure 1 shows that post-2004 after an initial widening, the variability of lending rates has degenerated. According to data from PBOC, around 80% of the loan rate are in the 0.9-1.3 times of benchmark interest rate range from 2004-2013, which shows that the loan rate are still limited even after the loan rate liberation in 2004. Even during the period from 2007-2011, the share of loans priced at 0.9-1.1 times the benchmark rate was 81.7%.

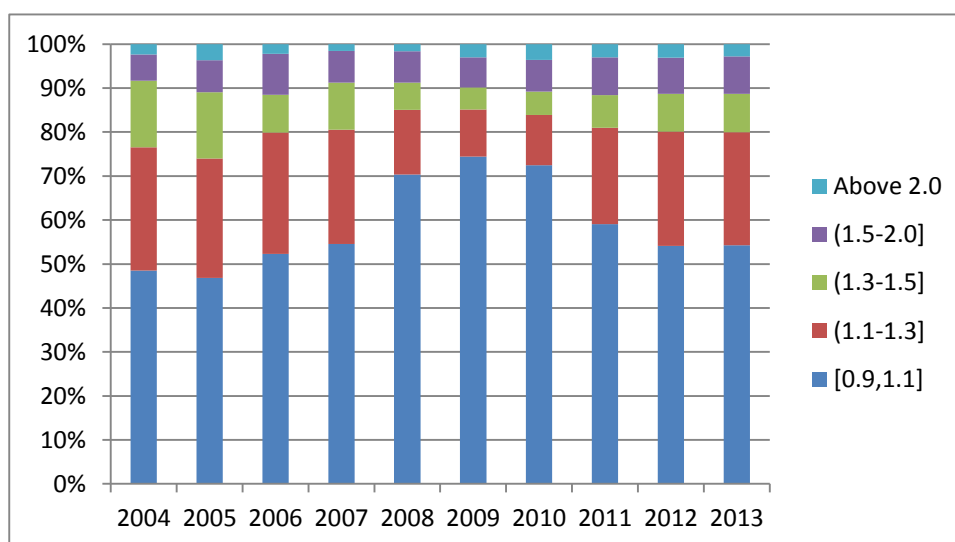


Figure 1: Distribution of effective interest rate on loans. Source: PBOC database.

There are several possible reasons for this. First, while the credit rationing arguments of Jaffe and Russell (1976) and Stiglitz and Weiss (1981) can explain limited loan rate differentiation, but there is little suggestion that SOEs and listed companies in China face credit rationing (Zhang, 2013). Second, the banking market may have been trapped in a Nash equilibrium following deregulation, awaiting the market leader to be the first mover. Third, competition may have swiftly equalised lending rates.

With such limited loan rate differentiation between banks, the question arises how do banks compete if the rate of interest is not used to price risk as expected following liberalisation? In this paper we propose that banks compete using the maturity of a loan⁴ as a choice variable in determining loan contracts. But first, we review the scope of relationship banking in China and briefly introduce how banks manage risk by adjusting loan size and maturity.

3. Literature review

In the Chinese banking market, SOBs have a closer relationship with state-owned enterprises based on both political imperative and political connections. Research on the banking relationship with non-financial firms has been a growing area of endeavour in China. Relationship banking plays an important role in resolving information problems and the benefits from strong banking relationships have been shown in many empirical studies (e.g. Berger and Udell, 1995; Berger et al. 2008). The opacity of business in China, and information asymmetry are viewed by some as the key impact variables that define the lending relationship (Cao et al., 2010; Chang et al., 2014). The level of transparency of a firm is an important factor in banking relationships, where it is argued that the relationship bank can exploit its informational advantage to ‘lock-in’ the relationship firm (Gopalan et al., 2011). The avoidance of lock-in by firms leads to the development of multiple bank relationships, and the decision between a single versus a multiple bank relationships is the outcome of a trade-off between better loan terms in a single firm-bank relationship and flexibility in the provision of other bank services in a multiple bank-firm relationship.

However, banks face costs in collecting information from non-relationship firms, which make it even harder for opaque firms to secure external funds (Ziane, 2003).

⁴The term of a loan is determined after consultation between the lender and the borrower according to the borrower’s production or business cycle, repayment capability, and the lender’s ability to provide funds. The term of a loan shall be stated clearly in the lending contract. Generally, the term of a loan for one’s own account shall not exceed ten years. Loans with a term exceeding 10 years shall be reported to the People’s Bank of China for a record. (See Lending General Provisions (PBOC, 28.06. 1996)).

Hence, firms that lack transparency has a higher likelihood in maintaining a single banking relationship (Berger et al., 2008). In the China context, He (2005) argues that commercial banks and firms tend to keep closer relationships in order to communicate information and enhance the efficiency of credit financing. However, a closer banking relationship also gives rise to the risk of 'lock-in'. Using the 2003 NSSBF (National Survey of Small Business Finances) data, Chen (2008) examines the impact of banking relationship maturity on the repeated loan availability and loan cost, and finds that the longer the bank-firm relationship the higher the cost of credit. Based on survey data of 1186 SMEs in China, He and Wang (2009) study the impact of bank-firm relationship on the growth of firms and find that the longer the maturity and the greater the number of lending relationships, the slower the growth of firms.

The role of SOBs in national lending strategies is well-established in the literature. Sapienza (2004) uses information on individual loan contracts in Italy to study the effects of state ownership on bank lending behaviour, showing that SOBs charge lower interest rate and mostly favour large firms and firms located in depressed areas. The parallel with China is clear. Domestic growth was mainly promoted by state policy banks and SOBs. Foreign banks are also observed to have higher efficiency to domestic banks (Berger et al., 2009). However, as newcomers to the China's banking market, foreign banks remain in a weak position in sustaining closer banking relationships (Yin and Matthews, 2016).

Bank lending can also signal poor subsequent performance reflected in stock market performance. Using the Chinese listed firm's data from 1999 to 2004, Bailey et al. (2011) conduct an event analysis and find that poor financial performance and high managerial expenses increase the likelihood of obtaining a bank loan, and bank loan approval predicts poor subsequent borrower performance. However, it can be argued as with all studies on China the rapid development of China's banking market makes all such studies time dependent. Unlike the past when the banking system was wedded to the socialist plan, Chinese commercial banks, in recent years have focussed on credit quality when making lending decisions (Chang et al., 2014). The average

non-performing loan ratio of the major commercial banks in China decreased from 17.9% in 2003 to 0.9% in 2012⁵. Modern credit risk management methods and risk pricing since 2004 has become standard practice (He and Wang, 2012). Loan quality is an important factor in the lending decision. Banks have also reduced their loan exposure to individual enterprises and widened the loan portfolio to more firms to diversify their risk (Yin and Matthews, 2017).

The key factors in the lending contract are the size of the loan, loan maturity, interest rate and collateral. While risk is typically managed through the risk premium and collateral, (Berger and Udell, 1995; Ferri and Messori, 2000; Lehmann et al., 2004) in practice, banks also use the loan covenant to control default risk. Although few studies have focussed on how asymmetric information and borrower's risk affects the loan covenant, limiting the loan size and varying the maturity are part of the kit bag of risk management tools (Strahan, 1999; Ortiz-Molina and Penas, 2008; Kirschenmann and Norden, 2012).

Using Dealscan data from 1988 to 1998, Strahan (1999) finds that firms with a higher cash flow ratio or higher profitability (high quality firms) tend to secure larger loan size, while low rated firms face restricted loan volumes. Banks may also share the risk with their competitors by limiting the loan amount, in which low quality firms are forced to seek more banks for additional credit (Ferri and Messori, 2000).

Similarly, loan maturity is also part of the bank's risk management strategy. The liquidity constraints banks facing make a higher frequency of short term loans. And short maturities are supplied to more risky firms (Diamond, 1991). Berger et al. (2005) also show that decreasing asymmetric information is associated with an increase in loan maturities. Larger firm secure longer loan maturity since they are more transparent⁶ and usually low risk (too big to fail⁷), while less mature firms and firm

⁵See China banking regulatory commission annual report (year 2003-2012).

⁶large firms are usually more transparent than small firms (Elyasiani and Goldberg, 2004; Stephan et al., 2012)

⁷See Detragiache et al. (2000)

owners with poor credit histories tend to get shorter loan maturity (Ortiz-Molina and Penas, 2008).

4. A Simple Model

In this section we set out a simple model of bank market behaviour based on asymmetric information and *guanxi* which is the traditional business culture in China.

For the firm, the objective is to obtain finance at the best terms possible which includes the longest maturity and most favourable repayment plan. As cash flow is important in the early stages of investment, we argue that the success of the project is positive in the uninterrupted access to loanable funds for the longest possible duration. The firm needs to borrow a minimum amount of funds L , from the bank to realise the project. Higher levels of loanable funds are used to obtain higher returns from the project. Let y be the total return generated from the investment for a given maturity of the loan.

Loan activity by the banks is highly regulated in China by the China Banking Regulatory Commission (CBRC)⁸. A *guanxi* relationship with the bank will help the firm to manoeuvre around the restrictive regulations to ensure a smooth flow of funding. We denote the intensity of the *guanxi* relationship as G and other exogenous factors like firms' characteristics that may affect the return on the project as X . Let the probability of success of the investment be given by ρ and the probability density function be given by $f(\rho)$ that describes the distribution of returns of the project. We assume that the objective of the Chief Financial Officer (CFO) of the borrowing firm is to maximise the expected cash flow $E(C)$ over the maturity of the loan.

⁸Loans are categorised by purpose with regulated duration of loans. Loans for working capital are typically of one-year duration, loans for fixed asset investment will typically be for 1-3 years, loans for projects depend on the nature of the project but will have to satisfy a raft of regulations before the loan application and loans for M&A is less than a year.

$$E(C) = \int_0^u f(\rho) d\rho [y(L, G, X)] - (1+r)^\mu L \quad \mu \geq 1$$

$$E(C) = \bar{y}(L, G, X) - (1+r)^\mu L \quad (1)$$

The assumptions are that bank credit is used to finance inputs to production in the sense of Bernanke and Blinder (1988). The expected value of the return on the investment by the firm is \bar{y} . An increase in the borrowing level, increases the return from the investment but with diminishing returns. So $\frac{\partial \bar{y}}{\partial L} > 0$; $\frac{\partial^2 \bar{y}}{\partial L^2} < 0$; but also $\frac{\partial \bar{y}}{\partial G} > 0$; where u is the upper limit of the return on a successful investment, r is the fixed rate of interest, and $\mu =$ maturity of loan. An interior solution exists for (1) on the condition $\frac{\partial \bar{y}}{\partial L} > (1+r)^\mu$.

It can be shown that (1) yields an iso-cash flow function that can be interpreted as a demand for loanable funds that is positive in μ and L and responds with an increase in μ for an increase in *guanxi* intensity.

$$\frac{\partial \mu}{\partial L} = \frac{\left[\frac{\partial \bar{y}}{\partial L} - (1+r)^\mu \right]}{\mu(1+r)^{\mu-1}} > 0 \quad \text{and} \quad \frac{\partial \mu}{\partial G} = \frac{\left[\frac{\partial \bar{y}}{\partial G} \right]}{\mu(1+r)^{\mu-1}} > 0$$

From the perspective of the bank, it trades off increased risk from committing the loan to a longer maturity against the greater value of the *guanxi* relation. Let the value function for the banks be V_b , the bank's perception of the probability of success be φ , which is a function of the term of the loan (given by μ). The nature of asymmetric information is that while the borrower is aware of the objective probability of the success of the investment the bank has a subjective probability of repayment which declines with the length the maturity of the loan. The amount of the loan is L , collateral is a fraction $0 < \sigma < 1$ of the loan, and the gain from the *guanxi* relation G is such that the fraction of collateral posted declines with the increase in its intensity, $\sigma(G)$. The bank's subjective assessment of the risk of the project increases with the term of the loan so $\varphi' = \frac{\partial \varphi}{\partial \mu} < 0$ and $\sigma_G = \frac{\partial \sigma}{\partial G} < 0$.

The value function of the bank is;

$$V_b = (1+r)^\mu \varphi(\mu)L + (1-\varphi(\mu))(\sigma(G)L) \quad (2)$$

$$\begin{aligned} \frac{\partial V_b}{\partial \mu} &= \mu(1+r)^{\mu-1}\varphi L + (1+r)^\mu \varphi' L - \varphi'(\sigma L) = 0 \\ &= \mu(1+r)^{\mu-1}\varphi L + \varphi'((1+r)^\mu L - (\sigma L)) = 0 \end{aligned} \quad (3)$$

Clearly the above expression cannot be zero unless the second term is negative, which holds by assumption of the collateral condition. Totally differentiating (2) and setting to zero to derive an iso-value function for the bank;

$$\begin{aligned} d(V_b) &= [\varphi'\{(1+r)^\mu L - \sigma L\} + \mu(1+r)^{\mu-1}\varphi L]d\mu + [(1+r)^\mu \varphi + (1-\varphi)\sigma]dL \\ &\quad + (1-\varphi)\sigma_G dG = 0 \end{aligned}$$

The first term in the square brackets is positive for values of μ less than the FOC of (3). Since the second term in the square brackets is positive, this results in;

$$\frac{\partial \mu}{\partial L} = -\frac{[(1+r)^\mu \varphi + (1-\varphi)\sigma]}{\varphi'\{(1+r)^\mu L - \sigma L\} + \mu(1+r)^{\mu-1}\varphi L} < 0 \quad \text{and} \quad \frac{\partial \mu}{\partial G} = -\frac{(1-\varphi)\sigma_G}{\varphi'\{(1+r)^\mu L - \sigma L\} + \mu(1+r)^{\mu-1}\varphi L} > 0$$

Equilibrium in loan size and duration is described in figure 2 showing a *guanxi* effect on loan size and duration. The firm's iso-cost function is shown by D_1 . The bank's iso-value function is shown by S_1 .

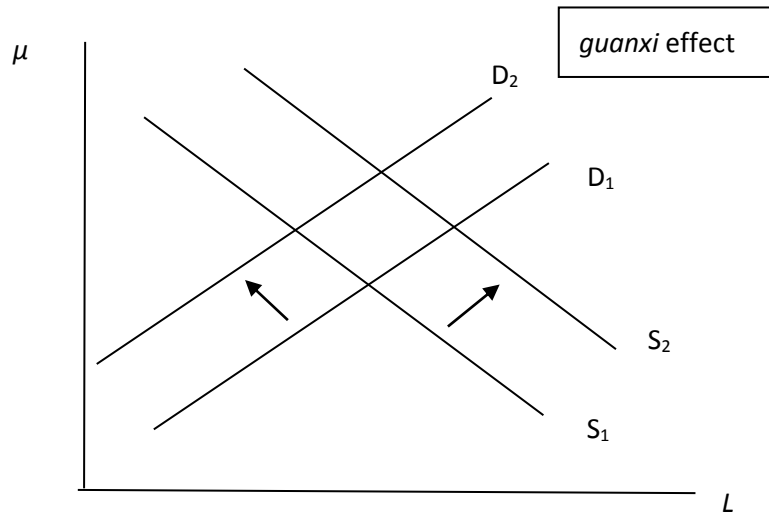


Figure 2: Guanxi effect in the loan market

In this framework, the rate of interest r is not seen as a choice variable in determining equilibrium in the loan market. An increase in intensity of *guanxi* shifts the supply curve up to the right and the demand curve up to the left (as shown in figure 2). The loan duration rises. However, the effect on loan size is ambiguous, which needs further testing. We have no direct measure of intensity of *guanxi*, but we posit that a single bank relationship is more consistent with it than a multiple bank relationship. Hence, the first hypothesis is:

H1: In China's banking market, firms with a single bank relationship will get more favourable loan terms.

Previous studies suggest that SOBs have a special relationship with SOEs in China (Berger et al., 2009; Lu et al., 2012). The mitigation of loan risk when banks offer more favourable loan terms to specific firms is examined by Dong et al. (2014) who find that SOBs are better in controlling the NPL ratio than other types of Chinese banks in practice. Lu et al. (2012) highlight the collateral requirement for the “related loan” in China. There is a high probability that SOBs use collateral to secure *guanxi* loans. The following hypothesis relates to the joint effect of *guanxi* and collateral on loan terms.

H2: The joint effect of a single banking relationship and collateral issued by SOBs is positively linked to loan terms.

Although traditionally SOBs have been more involved in *guanxi* lending (Yin and Matthews, 2017), they have gradually moved towards commercial principles when making lending decisions (Firth et al., 2009). Unlike the unlisted period when the SOBs followed the dictates of the socialist plan, they have increasingly focussed on credit quality when making lending decisions (Chang et al., 2014). Furthermore competition in China's banking market has intensified, while the interest rate still

varies in a small range, which implies the lending behaviours of SOBs have changed only gradually. The above analysis suggests that the *guanxi* effect weakened in the loan liberalisation period. Hence our third hypothesis is:

H3: *Compared with the limited loan rate period, the benefits of a single banking relationship are weaker in the loan liberalisation period.*

Other control variables [X] are: the size of the firm – it is posited that banks would make credit more easily available to large firms than small ones according to the information asymmetric theory. Also larger firms tend to have more bargaining power, which can make them secure more favourable loan terms (Harhoff and Körting, 1998; Stephan et al., 2012); a vector of firm-bank characteristics (firm quality, firm age); negative demand side characteristics (debt/asset ratio); and bank ownership.

The two functions *Loan* and *Maturity* are to be interpreted as reduced form specifications and therefore SUR (seeming uncorrelated regression) method is chosen to deal with the empirical model. The Breusch-Pagan test is used to check the significant positive relationship between *Loan*⁹ and *Maturity*. The benchmark empirical equation is designed as follow:

$$\begin{aligned} Loan_{it} = & \alpha_0 + \alpha_1 Collateral_{it} + \alpha_2 lnTasset_{it-1} + \alpha_3 ln(firmage)_{it} + \\ & \alpha_4 Cashflows_{it-1} + \alpha_5 liquidity_{it-1} + \alpha_6 Single_{it} + \alpha_7 Bankownership_{it} + \alpha_8 Macro_{it} + \\ & \alpha_9 Industry\ dummy_{it} + u_{it} \end{aligned} \quad (4)$$

$$\begin{aligned} Maturity_{it} = & \beta_0 + \beta_1 Collateral_{it} + \beta_2 lnTasset_{it-1} + \beta_3 ln(firmage)_{it} + \\ & \beta_4 Cashflows_{it-1} + \beta_5 liquidity_{it-1} + \beta_6 Single_{it} + \beta_7 Bankownership_{it} + \beta_8 Macro_{it} + \\ & \beta_9 Industry\ dummy_{it} + \varepsilon_{it} \end{aligned} \quad (5)$$

In equation (4) and (5), *Collateral*¹⁰ is a dummy variable, which distinguishes the loan

⁹Loan size was deflated by CPI.

¹⁰Collateral includes guaranteed loans, mortgage loans, and hypothecated loans.

deal with or without collateral, *Tasset* stands for real firm size¹¹, firm age and Cash flowratio are denoted as *firmage* and *Cashflows* respectively, and *liquidity* stands for debt/asset ratio. In order to solve the potential endogeneity problem the lagged values of *Tasset*, *cashflows* and *liquidity* are used. *Bankownership* is a dummy variable, which distinguishes state-owned banks and foreign banks with other banks respectively. *Macro* variables include banking market competition ratio and growth ratio of real GDP. The details of variable definition are listed in Table 2 as follows:

Table 2: Definition of the variables

Variables	Definition	Unit
Deal terms		
Size of loan	The amount of money of each loan contract	CNY
Maturity of loan	The maturity of each loan contract	Year
Collateral	Loan deal with collateral=1, otherwise=0	-
Firm Characteristics		
Firm asset	Annual total asset of firm	CNY
Firm age	The age of firm	Year
Cash flow ratio	Firm's annual net cash flow over total asset	%
Liquidity	Firm's total current liabilities over total asset	%
Bank ownership		
State-owned Banks	state-owned banks=1, otherwise=0	-
Banking relationship		
Single	Single banking relationship =1, otherwise=0	-
Macro Terms		
Banking market competition ratio (HHI)	The sum of the squares of the market shares (percentage of banks' assets over the total assets of the entire banking sector) of the five largest banks.	-
Annual growth of GDP (GGDP)	Annual growth ratio of real GDP	%
Industry		
Manufacture ^a	Dummy variable for industry Classification. Manufacture industry=1, otherwise=0	-
Real estate ^b	Dummy variable for industry Classification. Real estate industry=1, otherwise=0	-
Service ^c	Dummy variable for industry Classification. Service industry=1, otherwise=0	-

^aManufacture: Manufacture industry

^bReal estate: Real estate industry

^cServices: Wholesale, retail, trades hotels and catering services industry

¹¹Firm size was deflated by CPI.

5. Data and Empirical Results

5.1 Data

This research has a data set assembled from the CSMAR (China Stock Market Financial Statements) database, which contains information on listed firms' borrowing behaviour, their individual balance sheet and income statements. We conduct two sets of estimation. One set covers the period pre-2004 and the other is post-2004. The argument is that in the pre-2004 period when loan rate differentiation was even more limited, maturity of the loan played an even bigger part in defining the conditions of a loan. Specifically, we refer to the 1999–2004 period as “limited loan rate period”, and the 2005–2012 period as “the loan rate liberalisation period”.

Data on 716 firms with 7140 lending relationship are employed from year 1999 to 2012. We exclude borrowers that are in the financial services sector. However, the sample is unbalanced because of a lack of data in some years but since these gaps appear at random, they should not affect the estimation in any other way other than reducing the sample size (Wooldridge, 2009). All deals involve a single lender.

All monetary values of variables are deflated by the CPI. In the sample, the highest and lowest real loan size is 0.26 Billion and 0.1 Million CNY respectively. The average lending maturity in loan rate limitation period is 1.53 year, while the value in loan rate liberalisation period is 1.54 year. Most deal durations (around 65%) are between 1-2 years in both periods. A higher proportion of collateralised loans are observed in post-2004 period (89.6%) than in pre-2004 period (68.3%). The average values of firms' characteristics are unaltered between the “limited loan rate period” and “the loan rate liberalisation period” except for firm age. Firm ages are variation from 2 to 59 years¹², with the mean of 8.71 during the pre-2004 period and 15.59 during the post-2004 period. Two-thirds of firms have ages between 10-20 years. It can also be seen that average firm size increased slightly in the latter period. The

¹²Short firm age is caused by restructuring, mergers and acquisitions.

average cash flow ratio is positive, with the mean value of 4.12 during pre-2004 and 3.39 during post-2004 respectively; while the average debt/asset ratio is 46.82 during pre-2004 and 48.24 during post-2004 respectively.

As to bank ownership, there is a big performance gap between the SOBs and other banks in both periods. It can be seen that 63.3% of the loan deals are initiated with the SOBs of deals during the pre-2004 period; and the data decreased to 45.7% in the post-2004 period. Single bank-firm relationships are in the minority with 28.3% of deals during pre-2004 period and only 13% of deals during post-2004 period, but as expected the mass of loan deals are with SOEs (around 80% in both periods) and manufacturing companies count for most of the firms from 1999-2012. The value of HHI as a measure of market concentration, keep decreasing from 1068.50 in year 1999 to 564.59 in year 2012, which may indicate an increasing competition in China banking market. Table 3 below summarises the data.

Table 3: Summary statistics for the different time periods

Variables	Loan rate limitation period 1999-2004					Loan rate liberalisation period 2005-2012				
	Obs	Mean	S.D.	Min	Max	Obs	Mean	S.D.	Min	Max
Deal terms										
Ln(Loan size)	2200	18.212	1.247	13.726	24.079	4428	18.458	1.270	12.300	27.100
Maturity of loan (years)	2218	1.526	2.211	0.080	13.020	4712	1.537	1.642	0.164	20.333
Collateral	2221	0.683	0.465	0	1	4739	0.896	0.305	0	1
Firm Characteristics										
Ln(Firm asset)	2228	21.391	0.836	18.403	24.464	4910	22.005	1.045	18.802	28.100
Firm age	2228	8.714	4.817	2	48	4739	15.586	7.220	2	59
Cash flow ratio	2115	4.123	7.364	-28.979	40.428	4705	3.386	8.412	-30.576	50.651
Liquidity	2115	46.821	21.232	0.907	170.429	4705	48.243	18.324	1.347	146.515
Bank ownership										
State-owned Banks	2228	0.633	0.481	0	1	4912	0.457	0.498	0	1
Banking relationship										
Single	2228	0.283	0.450	0	1	4912	0.130	0.337	0	1
Macro Terms										
HHI	2228	870.228	56.004	819.756	1068.500	4912	627.304	41.000	564.589	788.873
Annual growth of GDP	2228	9.454	0.685	7.620	10.090	4912	10.080	1.416	7.654	14.166
Industrial terms										
Manufacture	2228	0.426	0.495	0	1	4912	0.408	0.491	0	1
Real estate	2228	0.202	0.401	0	1	4912	0.219	0.413	0	1
Services	2228	0.110	0.313	0	1	4912	0.107	0.309	0	1

5.2 Empirical results

The first set of regression results from SUR estimation is detailed below in Table 4. All data in the regression are winsorized at the 1st and 99th percentiles. We treat each period as a different sample and for each period we run three SUR models. These results represent the base case as well as variants. The Breusch-Pagan test accepts the validity of cross-equation correlation of the errors which validates the assumption of both functions being a reduced form from the same model.

A parameter stability test for the models 1-2 in Table 4 confirm that the firm-bank loan relationship changed after the introduction of the removal of the loan rate ceiling in 2004. Surprisingly *Collateral* appears to have a positive effect on loan maturity but has no effect on loan size. This suggests that collateral mitigates default risk allowing banks to increase loan maturity at the margin. From the regression results, it is also clear that the pattern of firm's characteristics on loan terms is largely unchanged in the two periods but clearly there was a change in the impact. The results confirm our expectations. First, *firm size* is positively related to the size of loan and maturity. Large firms are usually more transparent and less risky. Second, older firms will have a known history but the results show that *Firm age* does not play a significant role. Third, the effect of the *Liquidity* of the firms has the effect of increasing loan size. This result supports the notion that financially leveraged firms are more likely to get a larger loan as a form of insurance. However, it is also the case that weak firms and fast-growing firms are most likely to have a high debt-asset ratio, so high financial leverage is not necessarily consistent with weak quality. It is also note-worthy that the *Liquidity* variable is associated with a decrease in the loan maturity, as shorter loan maturities can serve to mitigate the risk problems by banks. These results may reflect the existing risk management strategy of Chinese banks. Hence banks tend to satisfy a low liquidity firm's loan requirement but with short maturity. Given that both weak firms and fast-growing firms will have a low liquidity ratio, this strategy will help the development of firms but effectively control the lending risk of banks.

Comparing the results of the two periods, we can see the differences in the impact of the cash flow ratio and ownership. Cash flow ratio has no significant relationship with loan size and maturity in the regulated loan rate period, but is associated with larger loans in the latter period. This implies that Chinese banks tend to offer more loans to high quality firms in the deregulated period, which is consistent with the finds of Chang et al. (2014). During the period of 1999-2004, when the state-owned banks dominated the market, ownership had no effect on maturity or size. However, during the loan rate liberalisation period, the SOBs are positively related to both loan size and maturity confirming the policy oriented status of its lending function.

Market structure measured by *HHI* is positive and significant with loan size and maturity during the loan rate limitation period, suggesting that the more concentrated bank market dominated by SOBs led to more favourable lending terms. This result suggests that the concentrated market power of the big-5 SOBs in China was used to support loss-making social projects that the collusive behaviour associated with the structure-conduct-performance hypothesis. Hence banks were less likely to consider risk control in a less competitive market. However, during the Loan rate liberalisation period, market structure has no effect on loan size but is positively associated with maturity which suggests a complex interaction of both demand and supply effects, but ownership comes into play in this period with SOBs offering better deal terms. The negative effect of GDP growth on loan size is easier to interpret as the effect of a contraction in supply through the quantitative controls (credit quotas and window guidance¹³) placed on bank lending in boom times.

We find that manufacturing firms are associated with lower loan size in both periods. And real estate firms are associated with shorter loan maturity during the pre-2004 period, but comparatively longer loan maturity during 2004-2012, reflecting the change in lending pattern and the real estate boom of this period.

¹³"Window guidance" is a non-compulsory monetary policy tool employed by the PBOC in the form of advice to commercial banks to affect their lending behaviour, similar to the "moral suasion" method employed by the Bank of England to affect bank lending behaviour in the 1960s in the UK.

Table 4: The determinants of banks' lending behaviour during 1999-2012 (z statistics in parenthesis)

Period Model	Loan rate limitation period 1999-2004						Loan rate liberation period 2005-2012					
	I		II		III		I		II		III	
	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)
Deal Term												
Collateral	-0.021 (-0.431)	0.014* (1.804)	-0.008 (-0.150)	0.013* (1.731)	-0.010 (-0.202)	0.012* (1.664)	-0.012 (-0.197)	0.037* (1.776)	-0.012 (-0.198)	0.039** (1.971)	-0.013 (-0.219)	0.039** (1.963)
Firm Characteristics												
Ln(Firm size)	0.715*** (23.405)	0.048*** (10.228)	0.704*** (22.765)	0.045*** (9.528)	0.700*** (22.444)	0.046*** (9.676)	0.425*** (24.838)	0.016*** (2.885)	0.424*** (24.808)	0.016*** (2.931)	0.423*** (24.784)	0.016*** (2.930)
Ln(Firm age+1)	-0.084 (-1.435)	-0.012 (-1.158)	-0.020 (-0.358)	-0.002 (-0.254)	-0.002 (-0.026)	-0.007 (-0.766)	0.056 (1.233)	0.034 (0.930)	0.050 (1.086)	0.027 (0.783)	0.044 (0.969)	0.026 (0.744)
Cash flow ratio	-0.001 (-0.714)	0.0001 (0.559)	-0.0002 (-0.296)	0.0001 (0.858)	-0.0004 (-0.422)	0.0001 (0.661)	0.004** (2.401)	-0.0003 (-0.392)	0.004** (2.354)	-0.0003 (-0.213)	0.003** (1.968)	-0.0002 (-0.109)
Liquidity	0.003*** (3.944)	-0.0003** (-2.490)	0.002** (2.119)	-0.001*** (-3.387)	0.002** (2.389)	-0.001*** (-3.462)	0.003*** (3.442)	-0.003*** (-10.612)	0.003*** (3.494)	-0.003*** (-10.649)	0.003*** (3.483)	-0.003*** (-10.642)
Bank ownership												
State-owned banks			-0.043 (-0.842)	0.010 (0.741)	-0.035 (-0.690)	0.009 (0.675)			0.069** (1.984)	0.118*** (10.062)	0.070** (1.978)	0.118*** (10.082)
Macro terms												
HHI			0.003*** (3.308)	0.001*** (5.981)	0.003*** (3.113)	0.001*** (5.606)			-0.0001 (-0.147)	0.001*** (6.831)	-0.0001 (-0.196)	0.001*** (6.823)
Growth rate of GDP			-0.198*** (-3.833)	0.121 (1.085)	-0.197*** (-3.742)	0.105 (0.903)			-0.045*** (-3.719)	-0.009** (-2.269)	-0.045*** (-3.718)	-0.009** (-2.273)
Industry												
Manufacture					-0.156***	-0.012					-0.074*	-0.009

					(-2.610)	(-1.303)					(-1.869)	(-0.691)
Real estate					-0.134*	-0.035***					0.016	0.009**
					(-1.872)	(-3.193)					(0.349)	(2.273)
Service					-0.152*	-0.017					-0.045	-0.017
					(-1.716)	(-1.269)					(-0.767)	(-0.892)
C	2.909***	-0.658***	5.155***	-0.379***	5.297***	-0.369***	7.729***	0.596***	8.263***	-0.042	8.341***	-0.023
	(4.285)	(-6.288)	(6.121)	(-2.937)	(6.286)	(-2.857)	(18.494)	(4.244)	(16.182)	(-0.262)	(16.276)	(-0.142)
Observation	2065		2065		2065		4426		4426		4426	
R square	0.367	0.166	0.379	0.191	0.383	0.196	0.227	0.129	0.231	0.175	0.232	0.175
Breusch-Pagan testChi ²	87.669		77.672		76.017		14.715		16.667		17.196	
Prob> Chi2	0.000		0.000		0.000		0.000		0.000		0.000	
Chow test for parameter stability F(k, 6491)	122.3***	230.1***	12.7***	17.2***	10.0***	12.9***						

Note: * significant at 10%; ** significant at 5%; *** significant at 1%; z statistics in parentheses.

We now dig deeper into the data to identify the impact of the single bank-firm relationship in the two periods. Table 5 and table 6 shows these results. We treat each period as a different sample and estimate two SUR models. During the loan rate regulation period, the results of model I show that firms benefit from larger loan size and longer maturity through single firm-banking relationships. This result is consistent with the findings of Bharath et al. (2009). Single bank-firm relationships are typically associated with relationship banking, which alleviates the asymmetric information problem and help firms to get better lending terms. However, in the loan rate liberalisation period (Table 6), the results of model I suggests that the effect of a single bank-firm relationship falls entirely on the maturity of a loan and not the size. This may be interpreted as a weakening of the traditional bond of relationship banking as more commercial imperatives began to take effect, but that banks continue to compete by using the maturity of the loan as a choice variable. It is clear that the above results generally support hypothesis 1. No matter in which period, firms with single banking relationship get better loan terms.

We use an interaction term between SOB and Single bank-firm relationship to identify the joint-effect of these two factors. We find that SOBs provide longer maturity loans than others. Even during the loan rate regulation period when the lending behaviour of SOBs were no different to other banks, SOBs tended to give larger loans and longer durations through a single banking relationship. Firms maintaining closer ties with state-owned banks were more likely to benefit from better loan terms. Model IV of Tables 5 and 6, show the effect of the interaction of SOB, single banking relationship and collateral, which reconfirms the SOB and relationship banking bias in lending in the pre-liberalization period, but a weakening in the liberalization period as only maturity seems to be affected and not loan size. The above results support hypothesis 2.

In model III of table 5, the joint variable single*Collateral has a significant positive effect on loan size and loan maturity, which supports the notion that firms with single banking relationship tends to get more favourable loan terms even with a

collateral condition. However, in the liberalization period (Table 6), this is only significant for loan maturity suggesting a weakening of the single firm-bank relationship effect. This result supports hypothesis 3.

Table 5: Relationship banking 1999-2004

Period Model	Loan rate limitation period 1999-2004							
	I		II		III		IV	
	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)
Bank-firm relationship								
Single	0.486*** (8.894)	0.081*** (9.717)						
State-owned banks*Single			0.490*** (7.121)	0.075*** (7.162)				
Deal term								
Collateral	-0.012 (-0.246)	0.013* (1.840)	-0.011 (-0.219)	0.014* (1.851)	-0.106* (-1.898)	-0.007 (-0.919)	-0.067 (-1.249)	-0.002 (-0.316)
Single*Collateral					0.366*** (4.153)	0.083*** (6.240)		
State-owned banks*Single *Collateral							0.342*** (3.249)	0.098*** (6.182)
Firm Characteristics								
Ln(Firm size)	0.698*** (23.000)	0.045*** (9.672)	0.696*** (22.761)	0.044*** (9.494)	0.697*** (22.543)	0.044*** (9.463)	0.692*** (22.349)	0.043*** (9.203)
Firm age	-0.026 (-0.491)	-0.002 (-0.270)	-0.017 (-0.318)	-0.001 (-0.099)	-0.030 (-0.551)	-0.003 (-0.362)	-0.024 (-0.436)	-0.001 (-0.165)
Cash flow ratio	-0.0003 (-0.405)	0.0001 (0.796)	-0.0005 (-0.546)	0.0001 (0.650)	-0.0003 (-0.392)	0.0001 (0.746)	-0.0003 (-0.411)	0.0001 (0.664)
Liquidity	0.003*** (2.857)	-0.0004*** (-2.687)	0.002** (2.579)	-0.0004*** (-2.976)	0.002** (2.283)	-0.0004*** (-3.164)	0.002** (2.221)	-0.0004*** (-3.208)

Bank ownership								
State-owned banks	-0.043 (-0.877)	0.011 (0.843)	-0.170*** (-3.181)	-0.005 (-0.663)	-0.040 (-0.798)	0.014 (0.860)	-0.074 (-1.429)	0.004 (0.551)
Macro terms								
HHI	0.003*** (3.207)	0.001*** (5.957)	0.003** (3.378)	0.001*** (6.100)	0.003*** (3.286)	0.001*** (5.988)	0.003*** (3.438)	0.001*** (6.263)
Growth rate of GDP	-0.147*** (-2.899)	0.082 (0.609)	-0.180*** (-3.540)	0.081 (0.586)	-0.187*** (-3.631)	0.078 (0.528)	-0.197*** (-3.822)	0.082 (0.596)
C	4.651*** (5.599)	-0.473*** (-3.745)	5.124*** (6.142)	-0.392*** (-3.075)	5.214*** (6.190)	-0.387*** (-3.028)	5.412*** (6.414)	-0.337*** (-2.640)
Observation	2065		2065		2065		4426	
R square	0.308	0.139	0.398	0.218	0.383	0.211	0.381	0.211
Breusch-Pagan testChi2	50.088		60.114		67.969		70.000	
Prob> Chi2	0.000		0.000		0.000		0.000	

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Z statistics in parentheses.

Table 6: Relationship banking 2005-2012

Period Model	Loan rate liberation period 2005-2012							
	I		II		III		IV	
	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)
Bank-firm relationship								
Single	0.069 (1.326)	0.032** (1.973)						
State-owned banks*Single			0.109* (1.740)	0.047** (2.014)				
Deal term								
Collateral	-0.021 (-0.348)	0.043** (2.127)	-0.011 (-0.190)	0.042** (2.061)	-0.002 (-0.038)	0.033* (1.735)	-0.012 (-0.188)	0.034* (1.676)
Single*Collateral					-0.073 (-1.276)	0.046** (2.445)		
State-owned banks*Single *Collateral							-0.006 (-0.083)	0.068*** (2.728)
Firm Characteristics								
Ln(Firm size)	0.423*** (24.774)	0.017*** (2.971)	0.424*** (24.805)	0.017*** (2.977)	0.423*** (24.798)	0.017*** (2.960)	0.424*** (24.807)	0.016*** (2.951)
Firm age	0.049 (1.062)	0.030 (0.814)	0.050 (1.085)	0.026 (0.762)	0.049 (1.071)	0.028 (0.801)	0.050 (1.088)	0.026 (0.711)
Cash flow ratio	0.004** (2.298)	-0.0003 (-0.451)	0.003** (1.975)	-0.0003 (-0.483)	0.003** (1.992)	-0.0002 (-0.395)	0.003** (1.952)	-0.0004 (-0.693)
Liquidity	0.003*** (3.421)	-0.003*** (-10.552)	0.003*** (3.495)	-0.003*** (-10.498)	0.003*** (3.405)	-0.003*** (-10.476)	0.003*** (3.482)	-0.003*** (-10.469)

Bank ownership								
State-owned banks	0.070**	0.117***	0.067*	0.112***	0.071**	0.116***	0.070*	0.110***
	(1.979)	(10.016)	(1.843)	(9.231)	(1.990)	(9.967)	(1.906)	(9.137)
Macro terms								
HHI	-0.0001	0.001***	-0.0001	0.001***	-0.0001	0.001***	-0.0001	0.001***
	(-0.105)	(6.583)	(-0.161)	(6.599)	(-0.095)	(6.522)	(-0.141)	(6.604)
Growth rate of GDP	-0.044***	-0.009**	-0.046***	-0.010**	-0.044***	-0.010**	-0.045***	-0.010**
	(-3.608)	(-2.387)	(-3.720)	(-2.392)	(-3.594)	(-2.475)	(-3.704)	(-2.453)
C	8.241***	-0.024	8.266***	-0.018	8.219***	-0.005	8.261***	-0.003
	(16.134)	(-0.143)	(16.173)	(-0.112)	(16.061)	(-0.030)	(16.142)	(-0.019)
Observation	4426		4426		4426		4426	
R square	0.231	0.175	0.231	0.175	0.232	0.176	0.231	0.177
Breusch-Pagan testChi2	15.832		16.792		15.480		16.600	
Prob> Chi2	0.000		0.000		0.000		0.000	

Note: * significant at 10%; ** significant at 5%; *** significant at 1%.Z statistics in parentheses.

6. Conclusion

We have proposed a framework for understanding bank lending in an environment of limited loan rate differentiation between borrowers in China. The framework suggests that the choice variable used by banks to equilibrate the loan market is the maturity of the loan rather than the interest rate. The empirical results explain the effects of firm size, on loan deal size and maturity as well the impact of bank ownership and indebtedness of the firm. Collateral plays a weak part in the pre-liberalization period in determining the maturity of a loan but strengthens in the liberalization period.

The results for the single firm-bank relationship which would typically be associated with relationship banking shows a change in impact and pattern between the two periods. The pre-liberalization period shows a stronger relationship for the single firm-bank relationship than in the liberalization period. This result holds true even allowing for the interaction of collateral and SOBs. The single firm-bank relationship in the liberalization period works to increase the maturity of the loan only suggesting a weakening of the single-relationship. The single firm-bank relationship is perhaps less important in the liberalization period as it is possible for firms to entertain a multiple bank-firm relationship with more than one SOB. However, the single firm-bank relationship continues to provide benefits in terms of improved maturity loans to firms. The results confirm the standard finding of a SOB bias in lending.

The results of the model are tentative and cannot be viewed as definitive and need to be revisited with continuous change and reforms to the Chinese banking market. It also goes without saying that continuing development of the Chinese banking system is such that any empirical results describing the past are likely to be superseded by the process of gradual but continuous change. However, given that reform in China's banking system is gradual and not sudden, the results of this paper are indicative of recent trends in the lending behaviour of the banks.

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Limited Loan Rate Differentiation and the Determination of Loan Terms in the
Chinese Commercial Credit Market

Kent Matthews^{1,2}

(¹School of Public Finance and Taxation, Zhongnan University of Economics &
Law, China)

(²Cardiff Business School, Cardiff University, UK)

and

Wei Yin^{3,4}

(³School of Economics and Management, Southeast University, China)

(⁴Jiangsu Key Laboratory of Financial Engineering (Nanjing Audit University),
China)

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Abstract

China has partially liberalized loan rate setting by the banks since 2004 but loan rates remain stubbornly within narrow bounds. We argue that competition in the loan market is signalled through the variation of loan deal terms and loan maturity rather than loan rates. We examine the determinants of loan deal conditions in terms of size and maturity. This paper focuses on the role of single firm-bank relationships in determining loan deal conditions. Commercial loan deal terms of listed companies are matched to provider banks over the period 1999-2012 and sub-sample estimation for the pre-2004 and post-2004 periods confirm change in the bank-firm-loan relationship. We find that single firm-bank relationships are associated with larger loan size and longer loan maturity in the pre-liberalization period but that this relationship has weakened in the liberalization period.

Key words: China banks; Loan terms; firm-bank relationships

JEL: G2, M14, M31

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1. Introduction

Up until the late 1990s, the primary function of the Chinese banking sector was to provide low-cost funds to state-owned-enterprises (SOEs). Since the reform process signalled by the Banking Law of 1995, the banking sector has been gradually evolving towards full commercialisation. This gradual process has involved recapitalisation, foreign strategic investment, reformed governance, modern methods of risk management and limited liberalisation of loan rate setting. Up until 2004 lending rates were strictly controlled within a narrow range by the Peoples Bank of China (PBOC). The legacy of the policy of strict control of lending rates along with policy directed lending was the under-pricing of risk and the well-known history of China's non-performing loans (NPLs). After 2004 the upper limit on interest rates were lifted and banks had the capability to risk price marginal lending.

However, in the main, banks have not taken advantage of this new-found freedom and loan rates have remained clustered around the benchmark rate set by the PBOC. The reasons for the homogeneity of Chinese bank behaviour are uncertain. Podpiera (2006) surmises that interest rate pricing may have been a low priority in an environment of abundant liquidity or the familiar arguments of adverse selection and adverse incentives associated with the credit rationing literature (Stiglitz and Weiss, 1981). In an environment of limited loan rate differentiation, the terms and conditions of the loan that make up the vector of non-interest price factors can be expected to reflect risk and market conditions.

The purpose of this paper is to explore the determinants of terms and conditions of the bank loans of listed companies in China covering a data span 1999-2012. It argues that competition in the loan market is signalled through the variation in loan terms rather than the loan rate. We examine the determinants of loan deal conditions in terms of size and maturity of a commercial loan. We focus on the role of single firm-bank relationships. We match commercial loan deal terms of listed companies to provider banks over the period 1999-2012 and conduct sub-sample estimation for the

1 pre-2004 and post-2004 periods. Controlling for firm, bank ownership and market
2 characteristics, we find that single firm-bank relationships generate better loan
3 covenant in terms of longer loan maturity, but a single firm-bank relationship is not
4 associated with larger loan size, allowing for other factors. We also investigate the
5 single firm-bank relationship in the context of the ownership status of the bank and
6 the firm. We find that state-owned banks (SOBs) are associated with larger loan deals
7 and longer maturity.
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10 To anticipate the rest of our results we find that firm size and its debt exposure
11 provide strong effects on loan maturity and loan size. The larger the firm measured by
12 assets, the larger loan size and maturity of loans. The greater the debt exposure, the
13 lower the loan size and the longer the maturity. On the supply characteristics, SOBs
14 and single firm-bank-relationships (SBRs) are associated with longer maturity loan
15 terms but have no clear relationship to loan size. Our results also confirm the
16 well-known bias in lending by SOBs. A parameter stability test shows that the
17 firm-bank loan relationship changed after 2004.
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32 This paper is organised along the following lines. The next section presents a
33 brief context of Chinese banking. The third section offers the literature review. The
34 fourth section outlines a theoretical framework and the empirical model. The fifth
35 section examines the data and discusses the empirical results. The final section
36 concludes.
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44 **2. The Chinese banking context**

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46 The remarkable growth of the Chinese economy and the development of her banking
47 system continue to generate both plaudits and scepticism in almost equal amounts¹.
48 The use of the banking system for policy lending had saddled it with inefficiency and
49 a large non-performing loans problem. Privatisation of a sort occurred with the
50 creation of the joint-stock banks alongside the big-four SOBs, but the reality is that
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60 ¹For example Coase and Wang (2012) compared with Huang (2008).
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1 government remains firmly in control². Through the creation of asset management
2 companies, the big four banks were recapitalised with the use of the dollar reserves
3 prior to their listing. Since 2001 foreign banks and financial institutions could take a
4 stake in selected Chinese banks. But, while control of individual Chinese banks
5 remains out of reach for the foreign institution³, the pressure to reform management,
6 consolidate balance sheets, improve risk management and reduce unit costs has
7 increased with greater foreign exposure.
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10 Studies of Chinese bank efficiency conclude that while large inefficiencies exist
11 (Chen et al., 2005; Fu and Heffernan, 2009), these inefficiencies are declining. The
12 conventional finding is that the SOBs have a higher level of average inefficiency and
13 a slower speed of inefficiency decline than the JSBs (Joint-stock commercial banks).
14 Efficiency and performance is found to be related to risk management processes and
15 the internal decision making of the banks, indicating a strong learning activity on the
16 part of the banks to ‘up their game’ (Matthews, 2013). The listing of the big four
17 banks in China is intended to improve management, governance, transparency and
18 ultimately profit performance.
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35 Despite clear improvements in performance and efficiency, the Chinese banking
36 system remains dominated by the SOBs and its lending is largely directed to the
37 SOEs. Firth et al. (2009) quote that despite the private sector accounts for 50% of the
38 economy it is the recipient of only 7% of bank credit. The banking system is still
39 constrained by political influence and directed lending. Anecdotal evidence provided
40 by Dobson and Kashyap (2006) and quoted in Bailey et al. (2011) suggest that despite
41 the substantial progress in reform, banks face considerable political pressure in their
42 loan decisions. Yet the Chinese approach of gradualist reform continues at its pace.
43 There has been limited reform of loan rate setting allowed by the Peoples Bank of
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56 ²The Joint Stock Banks, while not directly owned by the Chinese government are owned by SOEs
57 and entities that are ultimately traced to SOEs or Provincial government.

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59 ³There is a cap of 25% on total equity held by foreigners and a maximum of 20% for any single
60 investor, except in the case of joint-venture banks.
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1 China (PBOC) and previous limits to interest rate setting have been lifted. Table 1
2 shows the evolution of the regulation of interest rates for commercial banks.
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5 **Table 1: Regulation of lending rates for commercial banks**

Year	Loans Regulation
1996	All enterprises: 0.9 to 1.1 times the official benchmark rate
1998	Small enterprises 0.9 to 1.2 times the benchmark rate Medium and large enterprises 0.9 to 1.1 times the benchmark rate
1999	Small and Medium enterprises 0.9 to 1.3 times the benchmark rate Large enterprises 0.9 to 1.1 times the benchmark rate
2004	All enterprises 0.9 to 1.7
2004 October	Upper limit removed. Lower limit unchanged
2012 June	Lower limit changed as 0.7times the benchmark rate
2013 June	Lower limit removed.

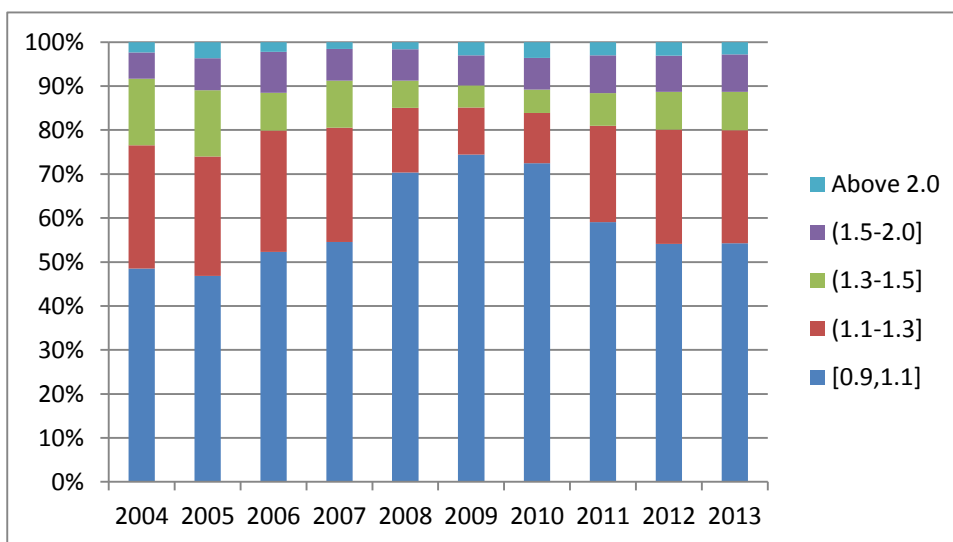
20 Source: PBOC.
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23 Both anecdotal evidence and evidence in Podpiera (2006) suggest that despite the
24 liberalisation of lending rates most new loans were contracted at or below the PBOC
25 benchmark rate. Evidence by He and Wang (2012) confirm that even in 2010, over
26 80% of bank loans were contracted in the bounds 0.9-1.3 of the benchmark rate at a
27 time when the benchmark rate was at its lowest since liberalisation. Based on the
28 survey data of 2400 enterprises for 2003, He (2010) makes an empirical study on
29 firm-bank relationship and loan price in China. The results show that the length of
30 firm-bank relationship has no significant effect on loan interest rate. The implication
31 is that a single firm-bank relationship will be reflected in other aspects of the loan
32 contract rather than the interest rate.
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44 The origin of the practice of limited loan rate differentiation may be traced to
45 custom and practice, goodwill, legal constraints (such as usury laws), and institutional
46 rigidities. Theoretical explanations are based on asymmetric information
47 resulting in adverse selection and adverse incentives (Stiglitz and Weiss, 1981).
48 The Stiglitz and Weiss (1981) model results in an interest rate effect that has not only
49 a direct positive effect on the bank's return but also an indirect negative effect. This
50 negative effect comes in two forms. First, the interest rate charged affects the riskiness of
51 the loan, which is the adverse selection effect. Second, the higher the rate of interest
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1 charged, the greater the incentive is to take on riskier projects, which is the adverse
 2 incentive effect. While such explanations may explain limited loan rate differentiation
 3 post-2004 in Chinese banks, the structure and political economy of the banking system
 4 suggests that central direction remains a strong imperative for lending to SOEs on
 5 favourable terms (Zhang, 2013).
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 11 Figure 1 shows that post-2004 after an initial widening, the variability of lending
 12 rates has degenerated. According to data from PBOC, around 80% of the loan rate are in
 13 the 0.9-1.3 times of benchmark interest rate range from 2004-2013, which shows that the
 14 loan rate are still limited even after the loan rate liberation in 2004. Even during the
 15 period from 2007-2011, the share of loans priced at 0.9-1.1 times the benchmark rate
 16 was 81.7%.
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 42 **Figure 1: Distribution of effective interest rate on loans. Source: PBOC database.**

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 45 There are several possible reasons for this. First, while the credit rationing
 46 arguments of Jaffe and Russell (1976) and Stiglitz and Weiss (1981) can explain limited
 47 loan rate differentiation, but there is little suggestion that SOEs and listed companies in
 48 China face credit rationing (Zhang, 2013). Second, the banking market may have been
 49 trapped in a Nash equilibrium following deregulation, awaiting the market leader to be
 50 the first mover. Third, competition may have swiftly equalised lending rates.
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1 With such limited loan rate differentiation between banks, the question arises
2 how do banks compete if the rate of interest is not used to price risk as expected
3 following liberalisation? In this paper we propose that banks compete using the
4 maturity of a loan⁴ as a choice variable in determining loan contracts. But first, we
5 review the scope of relationship banking in China and briefly introduce how banks
6 manage risk by adjusting loan size and maturity.
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13 **3. Literature review**

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16 In the Chinese banking market, SOBs have a closer relationship with state-owned
17 enterprises based on both political imperative and political connections. Research on
18 the banking relationship with non-financial firms has been a growing area of
19 endeavour in China. Relationship banking plays an important role in resolving
20 information problems and the benefits from strong banking relationships have been
21 shown in many empirical studies (e.g. Berger and Udell, 1995; Berger et al. 2008).
22 The opacity of business in China, and information asymmetry are viewed by some as
23 the key impact variables that define the lending relationship (Cao et al., 2010; Chang
24 et al., 2014). The level of transparency of a firm is an important factor in banking
25 relationships, where it is argued that the relationship bank can exploit its
26 informational advantage to ‘lock-in’ the relationship firm (Gopalan et al., 2011). The
27 avoidance of lock-in by firms leads to the development of multiple bank relationships,
28 and the decision between a single versus a multiple bank relationships is the outcome
29 of a trade-off between better loan terms in a single firm-bank relationship and
30 flexibility in the provision of other bank services in a multiple bank-firm relationship.
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48 However, banks face costs in collecting information from non-relationship firms,
49 which make it even harder for opaque firms to secure external funds (Ziane, 2003).
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53 ⁴The term of a loan is determined after consultation between the lender and the borrower
54 according to the borrower’s production or business cycle, repayment capability, and the lender’s
55 ability to provide funds. The term of a loan shall be stated clearly in the lending contract.
56 Generally, the term of a loan for one’s own account shall not exceed ten years. Loans with a term
57 exceeding 10 years shall be reported to the People’s Bank of China for a record. (See Lending
58 General Provisions (PBOC, 28.06. 1996)).
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1 Hence, firms that lack transparency has a higher likelihood in maintaining a single
2 banking relationship (Berger et al., 2008). In the China context, He (2005) argues that
3 commercial banks and firms tend to keep closer relationships in order to communicate
4 information and enhance the efficiency of credit financing. However, a closer banking
5 relationship also gives rise to the risk of ‘lock-in’. Using the 2003 NSSBF (National
6 Survey of Small Business Finances) data, Chen (2008) examines the impact of
7 banking relationship maturity on the repeated loan availability and loan cost, and
8 finds that the longer the bank-firm relationship the higher the cost of credit. Based on
9 survey data of 1186 SMEs in China, He and Wang (2009) study the impact of
10 bank-firm relationship on the growth of firms and find that the longer the maturity and
11 the greater the number of lending relationships, the slower the growth of firms.
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24 The role of SOBs in national lending strategies is well-established in the literature.
25 Sapienza (2004) uses information on individual loan contracts in Italy to study the
26 effects of state ownership on bank lending behaviour, showing that SOBs charge
27 lower interest rate and mostly favour large firms and firms located in depressed areas.
28 The parallel with China is clear. Domestic growth was mainly promoted by state
29 policy banks and SOBs. Foreign banks are also observed to have higher efficiency to
30 domestic banks (Berger et al., 2009). However, as newcomers to the China’s banking
31 market, foreign banks remain in a weak position in sustaining closer banking
32 relationships (Yin and Matthews, 2016).
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43 Bank lending can also signal poor subsequent performance reflected in stock
44 market performance. Using the Chinese listed firm’s data from 1999 to 2004, Bailey
45 et al. (2011) conduct an event analysis and find that poor financial performance and
46 high managerial expenses increase the likelihood of obtaining a bank loan, and bank
47 loan approval predicts poor subsequent borrower performance. However, it can be
48 argued as with all studies on China the rapid development of China’s banking market
49 makes all such studies time dependent. Unlike the past when the banking system was
50 wedded to the socialist plan, Chinese commercial banks, in recent years have focussed
51 on credit quality when making lending decisions (Chang et al., 2014). The average
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1 non-performing loan ratio of the major commercial banks in China decreased from
2 17.9% in 2003 to 0.9% in 2012⁵. Modern credit risk management methods and risk
3 pricing since 2004 has become standard practice (He and Wang, 2012). Loan quality
4 is an important factor in the lending decision. Banks have also reduced their loan
5 exposure to individual enterprises and widened the loan portfolio to more firms to
6 diversify their risk (Yin and Matthews, 2017).
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13 The key factors in the lending contract are the size of the loan, loan maturity,
14 interest rate and collateral. While risk is typically managed through the risk premium
15 and collateral, (Berger and Udell, 1995; Ferri and Messori, 2000; Lehmann et al.,
16 2004) in practice, banks also use the loan covenant to control default risk. Although
17 few studies have focussed on how asymmetric information and borrower's risk affects
18 the loan covenant, limiting the loan size and varying the maturity are part of the kit
19 bag of risk management tools (Strahan, 1999; Ortiz-Molina and Penas, 2008;
20 Kirschenmann and Norden, 2012).
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31 Using Dealscan data from 1988 to 1998, Stranhan (1999) finds that firms with a
32 higher cash flow ratio or higher profitability (high quality firms) tend to secure larger
33 loan size, while low rated firms face restricted loan volumes. Banks may also share
34 the risk with their competitors by limiting the loan amount, in which low quality firms
35 are forced to seek more banks for additional credit (Ferri and Messori, 2000).
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42 Similarly, loan maturity is also part of the bank's risk management strategy. The
43 liquidity constraints banks facing make a higher frequency of short term loans. And
44 short maturities are supplied to more risky firms (Diamond, 1991). Berger et al. (2005)
45 also show that decreasing asymmetric information is associated with an increase in
46 loan maturities. Larger firm secure longer loan maturity since they are more
47 transparent⁶ and usually low risk (too big to fall⁷), while less mature firms and firm
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56 ⁵See China banking regulatory commission annual report (year 2003-2012).

57 ⁶large firms are usually more transparent than small firms (Elyasiani and Goldberg, 2004; Stephan
58 et al., 2012)

59 ⁷See Detragiache et al. (2000)
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1 owners with poor credit histories tend to get shorter loan maturity (Ortiz-Molina and
2 Penas, 2008).
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4 **4. A Simple Model**

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8 In this section we set out a simple model of bank market behaviour based on
9 asymmetric information and *guanxi* which is the traditional business culture in China.
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13 For the firm, the objective is to obtain finance at the best terms possible which
14 includes the longest maturity and most favourable repayment plan. As cash flow is
15 important in the early stages of investment, we argue that the success of the project is
16 positive in the uninterrupted access to loanable funds for the longest possible
17 duration. The firm needs to borrow a minimum amount of funds L , from the bank to
18 realise the project. Higher levels of loanable funds are used to obtain higher returns
19 from the project. Let y be the total return generated from the investment for a given
20 maturity of the loan.
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31 Loan activity by the banks is highly regulated in China by the China Banking
32 Regulatory Commission (CBRC)⁸. A *guanxi* relationship with the bank will help the
33 firm to manoeuvre around the restrictive regulations to ensure a smooth flow of
34 funding. We denote the intensity of the *guanxi* relationship as G and other exogenous
35 factors like firms' characteristics that may affect the return on the project as X . Let the
36 probability of success of the investment be given by ρ and the probability density
37 function be given by $f(\rho)$ that describes the distribution of returns of the project.
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39 We assume that the objective of the Chief Financial Officer (CFO) of the borrowing
40 firm is to maximise the expected cash flow $E(C)$ over the maturity of the loan.
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56 ⁸Loans are categorised by purpose with regulated duration of loans. Loans for working capital are
57 typically of one-year duration, loans for fixed asset investment will typically be for 1-3 years,
58 loans for projects depend on the nature of the project but will have to satisfy a raft of regulations
59 before the loan application and loans for M&A is less than a year.
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$$E(C) = \int_0^u f(\rho) d\rho [y(L, G, X)] - (1+r)^\mu L \quad \mu \geq 1$$

$$E(C) = \bar{y}(L, G, X) - (1+r)^\mu L \quad (1)$$

The assumptions are that bank credit is used to finance inputs to production in the sense of Bernanke and Blinder (1988). The expected value of the return on the investment by the firm is \bar{y} . An increase in the borrowing level, increases the return from the investment but with diminishing returns. So $\frac{\partial \bar{y}}{\partial L} > 0$; $\frac{\partial^2 \bar{y}}{\partial L^2} < 0$; but also $\frac{\partial \bar{y}}{\partial G} > 0$; where u is the upper limit of the return on a successful investment, r is the fixed rate of interest, and $\mu =$ maturity of loan. An interior solution exists for (1) on the condition $\frac{\partial \bar{y}}{\partial L} > (1+r)^\mu$.

It can be shown that (1) yields an iso-cash flow function that can be interpreted as a demand for loanable funds that is positive in μ and L and responds with an increase in μ for an increase in *guanxi* intensity.

$$\frac{\partial \mu}{\partial L} = \frac{\left[\frac{\partial \bar{y}}{\partial L} - (1+r)^\mu \right]}{\mu(1+r)^{\mu-1}} > 0 \quad \text{and} \quad \frac{\partial \mu}{\partial G} = \frac{\left[\frac{\partial \bar{y}}{\partial G} \right]}{\mu(1+r)^{\mu-1}} > 0$$

From the perspective of the bank, it trades off increased risk from committing the loan to a longer maturity against the greater value of the *guanxi* relation. Let the value function for the banks be V_b , the bank's perception of the probability of success be φ , which is a function of the term of the loan (given by μ). The nature of asymmetric information is that while the borrower is aware of the objective probability of the success of the investment the bank has a subjective probability of repayment which declines with the length the maturity of the loan. The amount of the loan is L , collateral is a fraction $0 < \sigma < 1$ of the loan, and the gain from the *guanxi* relation G is such that the fraction of collateral posted declines with the increase in its intensity, $\sigma(G)$. The bank's subjective assessment of the risk of the project increases with the term of the loan so $\varphi' = \frac{\partial \varphi}{\partial \mu} < 0$ and $\sigma_G = \frac{\partial \sigma}{\partial G} < 0$.

The value function of the bank is;

$$V_b = (1+r)^\mu \varphi(\mu)L + (1-\varphi(\mu))(\sigma(G)L) \quad (2)$$

$$\frac{\partial V_b}{\partial \mu} = \mu(1+r)^{\mu-1}\varphi L + (1+r)^\mu \varphi' L - \varphi'(\sigma L) = 0$$

$$= \mu(1+r)^{\mu-1}\varphi L + \varphi'((1+r)^\mu L - (\sigma L)) = 0 \quad (3)$$

Clearly the above expression cannot be zero unless the second term is negative, which holds by assumption of the collateral condition. Totally differentiating (2) and setting to zero to derive an iso-value function for the bank;

$$d(V_b) = [\varphi'\{(1+r)^\mu L - \sigma L\} + \mu(1+r)^{\mu-1}\varphi L]d\mu + [(1+r)^\mu \varphi + (1-\varphi)\sigma]dL + (1-\varphi)\sigma_G dG = 0$$

The first term in the square brackets is positive for values of μ less than the FOC of (3). Since the second term in the square brackets is positive, this results in;

$$\frac{\partial \mu}{\partial L} = -\frac{[(1+r)^\mu \varphi + (1-\varphi)\sigma]}{\varphi'\{(1+r)^\mu L - \sigma L\} + \mu(1+r)^{\mu-1}\varphi L} < 0 \quad \text{and} \quad \frac{\partial \mu}{\partial G} = -\frac{(1-\varphi)\sigma_G}{\varphi'\{(1+r)^\mu L - \sigma L\} + \mu(1+r)^{\mu-1}\varphi L} > 0$$

Equilibrium in loan size and duration is described in figure 2 showing a *guanxi* effect on loan size and duration. The firm's iso-cost function is shown by D_1 . The bank's iso-value function is shown by S_1 .

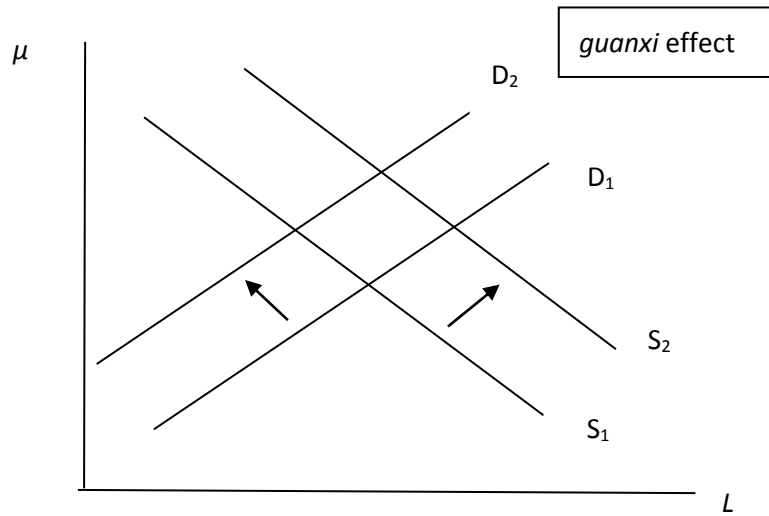


Figure 2: Guanxi effect in the loan market

1 In this framework, the rate of interest r is not seen as a choice variable in determining
2 equilibrium in the loan market. An increase in intensity of *guanxi* shifts the supply
3 curve up to the right and the demand curve up to the left(as shown in figure 2). The
4 loan duration rises. However, the effect on loan size is ambiguous, which needs
5 further testing. We have no direct measure of intensity of *guanxi*, but we posit that a
6 single bank relationship is more consistent with it than a multiple bank relationship.
7 Hence, the first hypothesis is:
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16 *H1: In China's banking market, firms with a single bank relationship will get more*
17 *favourable loan terms.*
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23 Previous studies suggest that SOBs have a special relationship with SOEs in China
24 (Berger et al., 2009; Lu et al., 2012). The mitigation of loan risk when banks offer
25 more favourable loan terms to specific firms is examined by Dong et al. (2014) who
26 find that SOBs are better in controlling the NPL ratio than other types of Chinese
27 banks in practice. Lu et al. (2012) highlight the collateral requirement for the “related
28 loan” in China. There is a high probability that SOBs use collateral to secure *guanxi*
29 loans. The following hypothesis relates to the joint effect of *guanxi* and collateral on
30 loan terms.
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41 *H2: The joint effect of a single banking relationship and collateral issued by SOBs is*
42 *positively linked to loan terms.*
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49 Although traditionally SOBs have been more involved in *guanxi* lending (Yin and
50 Matthews, 2017), they have gradually moved towards commercial principles when
51 making lending decisions (Firth et al., 2009). Unlike the unlisted period when the
52 SOBs followed the dictates of the socialist plan, they have increasingly focussed on
53 credit quality when making lending decisions (Chang et al., 2014). Furthermore
54 competition in China's banking market has intensified, while the interest rate still
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varies in a small range, which implies the lending behaviours of SOBs have changed only gradually. The above analysis suggests that the *guanxi* effect weakened in the loan liberalisation period. Hence our third hypothesis is:

H3: *Compared with the limited loan rate period, the benefits of a single banking relationship are weaker in the loan liberalisation period.*

Other control variables [X] are: the size of the firm – it is posited that banks would make credit more easily available to large firms than small ones according to the information asymmetric theory. Also larger firms tend to have more bargaining power, which can make them secure more favourable loan terms (Harhoff and Körting, 1998; Stephan et al., 2012); a vector of firm-bank characteristics (firm quality, firm age); negative demand side characteristics (debt/asset ratio); and bank ownership.

The two functions *Loan* and *Maturity* are to be interpreted as reduced form specifications and therefore SUR (seemingly uncorrelated regression) method is chosen to deal with the empirical model. The Breusch-Pagan test is used to check the significant positive relationship between *Loan*⁹ and *Maturity*. The benchmark empirical equation is designed as follow:

$$\begin{aligned} Loan_{it} = & \alpha_0 + \alpha_1 Collateral_{it} + \alpha_2 lnTasset_{it-1} + \alpha_3 ln(firmage)_{it} + \\ & \alpha_4 Cashflows_{it-1} + \alpha_5 liquidity_{it-1} + \alpha_6 Single_{it} + \alpha_7 Bankownership_{it} + \alpha_8 Macro_{it} + \\ & \alpha_9 Industry\ dummy_{it} + u_{it} \end{aligned} \quad (4)$$

$$\begin{aligned} Maturity_{it} = & \beta_0 + \beta_1 Collateral_{it} + \beta_2 lnTasset_{it-1} + \beta_3 ln(firmage)_{it} + \\ & \beta_4 Cashflows_{it-1} + \beta_5 liquidity_{it-1} + \beta_6 Single_{it} + \beta_7 Bankownership_{it} + \beta_8 Macro_{it} + \\ & \beta_9 Industry\ dummy_{it} + \varepsilon_{it} \end{aligned} \quad (5)$$

In equation (4) and (5), *Collateral*¹⁰ is a dummy variable, which distinguishes the loan

⁹Loan size was deflated by CPI.

¹⁰Collateral includes guaranteed loans, mortgage loans, and hypothecated loans.

deal with or without collateral, *Tasset* stands for real firm size¹¹, firm age and Cash flowratio are denoted as *firmage* and *Cashflows* respectively, and *liquidity* stands for debt/asset ratio. In order to solve the potential endogeneity problem the lagged values of *Tasset*, *cashflows* and *liquidity* are used. *Bankownership* is a dummy variable, which distinguishes state-owned banks and foreign banks with other banks respectively. *Macro* variables include banking market competition ratio and growth ratio of real GDP. The details of variable definition are listed in Table 2 as follows:

Table 2: Definition of the variables

Variables	Definition	Unit
Deal terms		
Size of loan	The amount of money of each loan contract	CNY
Maturity of loan	The maturity of each loan contract	Year
Collateral	Loan deal with collateral=1, otherwise=0	-
Firm Characteristics		
Firm asset	Annual total asset of firm	CNY
Firm age	The age of firm	Year
Cash flow ratio	Firm's annual net cash flow over total asset	%
Liquidity	Firm's total current liabilities over total asset	%
Bank ownership		
State-owned Banks	state-owned banks=1, otherwise=0	-
Banking relationship		
Single	Single banking relationship =1, otherwise=0	-
Macro Terms		
Banking market competition ratio (HHI)	The sum of the squares of the market shares (percentage of banks' assets over the total assets of the entire banking sector) of the five largest banks.	-
Annual growth of GDP (GGDP)	Annual growth ratio of real GDP	%
Industry		
Manufacture ^a	Dummy variable for industry Classification. Manufacture industry=1, otherwise=0	-
Real estate ^b	Dummy variable for industry Classification. Real estate industry=1, otherwise=0	-
Service ^c	Dummy variable for industry Classification. Service industry=1, otherwise=0	-

^aManufacture: Manufacture industry

^bReal estate: Real estate industry

^cServices: Wholesale, retail, trades hotels and catering services industry

¹¹Firm size was deflated by CPI.

5. Data and Empirical Results

5.1 Data

This research has a data set assembled from the CSMAR (China Stock Market Financial Statements) database, which contains information on listed firms' borrowing behaviour, their individual balance sheet and income statements. We conduct two sets of estimation. One set covers the period pre-2004 and the other is post-2004. The argument is that in the pre-2004 period when loan rate differentiation was even more limited, maturity of the loan played an even bigger part in defining the conditions of a loan. Specifically, we refer to the 1999–2004 period as “limited loan rate period”, and the 2005–2012 period as “the loan rate liberalisation period”.

Data on 716 firms with 7140 lending relationship are employed from year 1999 to 2012. We exclude borrowers that are in the financial services sector. However, the sample is unbalanced because of a lack of data in some years but since these gaps appear at random, they should not affect the estimation in any other way other than reducing the sample size (Wooldridge, 2009). All deals involve a single lender.

All monetary values of variables are deflated by the CPI. In the sample, the highest and lowest real loan size is 0.26 Billion and 0.1 Million CNY respectively. The average lending maturity in loan rate limitation period is 1.53 year, while the value in loan rate liberalisation period is 1.54 year. Most deal durations (around 65%) are between 1-2 years in both periods. A higher proportion of collateralised loans are observed in post-2004 period (89.6%) than in pre-2004 period (68.3%). The average values of firms' characteristics are unaltered between the “limited loan rate period” and “the loan rate liberalisation period” except for firm age. Firm ages are variation from 2 to 59 years¹², with the mean of 8.71 during the pre-2004 period and 15.59 during the post-2004 period. Two-thirds of firms have ages between 10-20 years. It can also be seen that average firm size increased slightly in the latter period. The

¹²Short firm age is caused by restructuring, mergers and acquisitions.

1 average cash flow ratio is positive, with the mean value of 4.12 during pre-2004 and
2 3.39 during post-2004 respectively; while the average debt/asset ratio is 46.82 during
3 pre-2004 and 48.24 during post-2004 respectively.
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7 As to bank ownership, there is a big performance gap between the SOBs and other
8 banks in both periods. It can be seen that 63.3% of the loan deals are initiated with the
9 SOBs of deals during the pre-2004 period; and the data decreased to 45.7% in the
10 post-2004 period. Single bank-firm relationships are in the minority with 28.3% of
11 deals during pre-2004 period and only 13% of deals during post-2004 period, but as
12 expected the mass of loan deals are with SOEs (around 80% in both periods) and
13 manufacturing companies count for most of the firms from 1999-2012. The value of
14 HHI as a measure of market concentration, keep decreasing from 1068.50 in year
15 1999 to 564.59 in year 2012, which may indicate an increasing competition in China
16 banking market. Table 3below summarises the data.
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Table 3: Summary statistics for the different time periods

Variables	Loan rate limitation period 1999-2004					Loan rate liberalisation period 2005-2012				
	Obs	Mean	S.D.	Min	Max	Obs	Mean	S.D.	Min	Max
Deal terms										
Ln(Loan size)	2200	18.212	1.247	13.726	24.079	4428	18.458	1.270	12.300	27.100
Maturity of loan (years)	2218	1.526	2.211	0.080	13.020	4712	1.537	1.642	0.164	20.333
Collateral	2221	0.683	0.465	0	1	4739	0.896	0.305	0	1
Firm Characteristics										
Ln(Firm asset)	2228	21.391	0.836	18.403	24.464	4910	22.005	1.045	18.802	28.100
Firm age	2228	8.714	4.817	2	48	4739	15.586	7.220	2	59
Cash flow ratio	2115	4.123	7.364	-28.979	40.428	4705	3.386	8.412	-30.576	50.651
Liquidity	2115	46.821	21.232	0.907	170.429	4705	48.243	18.324	1.347	146.515
Bank ownership										
State-owned Banks	2228	0.633	0.481	0	1	4912	0.457	0.498	0	1
Banking relationship										
Single	2228	0.283	0.450	0	1	4912	0.130	0.337	0	1
Macro Terms										
HHI	2228	870.228	56.004	819.756	1068.500	4912	627.304	41.000	564.589	788.873
Annual growth of GDP	2228	9.454	0.685	7.620	10.090	4912	10.080	1.416	7.654	14.166
Industrial terms										
Manufacture	2228	0.426	0.495	0	1	4912	0.408	0.491	0	1
Real estate	2228	0.202	0.401	0	1	4912	0.219	0.413	0	1
Services	2228	0.110	0.313	0	1	4912	0.107	0.309	0	1

5.2 Empirical results

The first set of regression results from SUR estimation is detailed below in Table 4. All data in the regression are winsorized at the 1st and 99th percentiles. We treat each period as a different sample and for each period we run three SUR models. These results represent the base case as well as variants. The Breusch-Pagan test accepts the validity of cross-equation correlation of the errors which validates the assumption of both functions being a reduced form from the same model.

A parameter stability test for the models 1-2 in Table 4 confirm that the firm-bank loan relationship changed after the introduction of the removal of the loan rate ceiling in 2004. Surprisingly *Collateral* appears to have a positive effect on loan maturity but has no effect on loan size. This suggests that collateral mitigates default risk allowing banks to increase loan maturity at the margin. From the regression results, it is also clear that the pattern of firm's characteristics on loan terms is largely unchanged in the two periods but clearly there was a change in the impact. The results confirm our expectations. First, *firm size* is positively related to the size of loan and maturity. Large firms are usually more transparent and less risky. Second, older firms will have a known history but the results show that *Firm age* does not play a significant role. Third, the effect of the *Liquidity* of the firms has the effect of increasing loan size. This result supports the notion that financially leveraged firms are more likely to get a larger loan as a form of insurance. However, it is also the case that weak firms and fast-growing firms are most likely to have a high debt-asset ratio, so high financial leverage is not necessarily consistent with weak quality. It is also note-worthy that the *Liquidity* variable is associated with a decrease in the loan maturity, as shorter loan maturities can serve to mitigate the risk problems by banks. These results may reflect the existing risk management strategy of Chinese banks. Hence banks tend to satisfy a low liquidity firm's loan requirement but with short maturity. Given that both weak firms and fast-growing firms will have a low liquidity ratio, this strategy will help the development of firms but effectively control the lending risk of banks.

1 Comparing the results of the two periods, we can see the differences in the
2 impact of the cash flow ratio and ownership. Cash flow ratio has no significant
3 relationship with loan size and maturity in the regulated loan rate period, but is
4 associated with larger loans in the latter period. This implies that Chinese banks tend
5 to offer more loans to high quality firms in the deregulated period, which is consistent
6 with the finds of Chang et al. (2014). During the period of 1999-2004, when the
7 state-owned banks dominated the market, ownership had no effect on maturity or size.
8 However, during the loan rate liberalisation period, the SOBs are positively related to
9 both loan size and maturity confirming the policy oriented status of its lending
10 function.
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21 Market structure measured by *HHI* is positive and significant with loan size and
22 maturity during the loan rate limitation period, suggesting that the more concentrated
23 bank market dominated by SOBs led to more favourable lending terms. This result
24 suggests that the concentrated market power of the big-5 SOBs in China was used to
25 support loss-making social projects that the collusive behaviour associated with the
26 structure-conduct-performance hypothesis. Hence banks were less likely to consider
27 risk control in a less competitive market. However, during the Loan rate liberalisation
28 period, market structure has no effect on loan size but is positively associated with
29 maturity which suggests a complex interaction of both demand and supply effects, but
30 ownership comes into play in this period with SOBs offering better deal terms. The
31 negative effect of GDP growth on loan size is easier to interpret as the effect of a
32 contraction in supply through the quantitative controls (credit quotas and window
33 guidance¹³) placed on bank lending in boom times.
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48 We find that manufacturing firms are associated with lower loan size in both
49 periods. And real estate firms are associated with shorter loan maturity during the
50 pre-2004 period, but comparatively longer loan maturity during 2004-2012, reflecting
51 the change in lending pattern and the real estate boom of this period.
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57 ¹³"Window guidance" is a non-compulsory monetary policy tool employed by the PBOC in the form of
58 advice to commercial banks to affect their lending behaviour, similar to the "moral suasion" method
59 employed by the Bank of England to affect bank lending behaviour in the 1960s in the UK.
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Table 4: The determinants of banks' lending behaviour during 1999-2012 (z statistics in parenthesis)

Period	Loan rate limitation period 1999-2004						Loan rate liberation period 2005-2012					
	I		II		III		I		II		III	
Model	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)
Deal Term												
Collateral	-0.021 (-0.431)	0.014* (1.804)	-0.008 (-0.150)	0.013* (1.731)	-0.010 (-0.202)	0.012* (1.664)	-0.012 (-0.197)	0.037* (1.776)	-0.012 (-0.198)	0.039** (1.971)	-0.013 (-0.219)	0.039** (1.963)
Firm Characteristics												
Ln(Firm size)	0.715*** (23.405)	0.048*** (10.228)	0.704*** (22.765)	0.045*** (9.528)	0.700*** (22.444)	0.046*** (9.676)	0.425*** (24.838)	0.016*** (2.885)	0.424*** (24.808)	0.016*** (2.931)	0.423*** (24.784)	0.016*** (2.930)
Ln(Firm age+1)	-0.084 (-1.435)	-0.012 (-1.158)	-0.020 (-0.358)	-0.002 (-0.254)	-0.002 (-0.026)	-0.007 (-0.766)	0.056 (1.233)	0.034 (0.930)	0.050 (1.086)	0.027 (0.783)	0.044 (0.969)	0.026 (0.744)
Cash flow ratio	-0.001 (-0.714)	0.0001 (0.559)	-0.0002 (-0.296)	0.0001 (0.858)	-0.0004 (-0.422)	0.0001 (0.661)	0.004** (2.401)	-0.0003 (-0.392)	0.004** (2.354)	-0.0003 (-0.213)	0.003** (1.968)	-0.0002 (-0.109)
Liquidity	0.003*** (3.944)	-0.0003** (-2.490)	0.002** (2.119)	-0.001*** (-3.387)	0.002** (2.389)	-0.001*** (-3.462)	0.003*** (3.442)	-0.003*** (-10.612)	0.003*** (3.494)	-0.003*** (-10.649)	0.003*** (3.483)	-0.003*** (-10.642)
Bank ownership												
State-owned banks			-0.043 (-0.842)	0.010 (0.741)	-0.035 (-0.690)	0.009 (0.675)			0.069** (1.984)	0.118*** (10.062)	0.070** (1.978)	0.118*** (10.082)
Macro terms												
HHI			0.003*** (3.308)	0.001*** (5.981)	0.003*** (3.113)	0.001*** (5.606)			-0.0001 (-0.147)	0.001*** (6.831)	-0.0001 (-0.196)	0.001*** (6.823)
Growth rate of GDP			-0.198*** (-3.833)	0.121 (1.085)	-0.197*** (-3.742)	0.105 (0.903)			-0.045*** (-3.719)	-0.009** (-2.269)	-0.045*** (-3.718)	-0.009** (-2.273)
Industry												
Manufacture					-0.156***	-0.012					-0.074*	-0.009

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					(-2.610)	(-1.303)					(-1.869)	(-0.691)
Real estate					-0.134*	-0.035***					0.016	0.009**
					(-1.872)	(-3.193)					(0.349)	(2.273)
Service					-0.152*	-0.017					-0.045	-0.017
					(-1.716)	(-1.269)					(-0.767)	(-0.892)
C	2.909***	-0.658***	5.155***	-0.379***	5.297***	-0.369***	7.729***	0.596***	8.263***	-0.042	8.341***	-0.023
	(4.285)	(-6.288)	(6.121)	(-2.937)	(6.286)	(-2.857)	(18.494)	(4.244)	(16.182)	(-0.262)	(16.276)	(-0.142)

Observation	2065		2065		2065		4426		4426		4426	
R square	0.367	0.166	0.379	0.191	0.383	0.196	0.227	0.129	0.231	0.175	0.232	0.175
Breusch-Pagan testChi ²	87.669		77.672		76.017		14.715		16.667		17.196	
Prob> Chi2	0.000		0.000		0.000		0.000		0.000		0.000	
Chow test for parameter stability	122.3***	230.1***	12.7***	17.2***	10.0***	12.9***						
F(k, 6491)												

Note: * significant at 10%; ** significant at 5%; *** significant at 1%; z statistics in parentheses.

1 We now dig deeper into the data to identify the impact of the single bank-firm
2 relationship in the two periods. Table 5 and table 6 shows these results. We treat each
3 period as a different sample and estimate two SUR models. During the loan rate
4 regulation period, the results of model I show that firms benefit from larger loan size
5 and longer maturity through single firm-banking relationships. This result is
6 consistent with the findings of Bharath et al. (2009). Single bank-firm relationships
7 are typically associated with relationship banking, which alleviates the asymmetric
8 information problem and help firms to get better lending terms. However, in the loan
9 rate liberalisation period (Table 6), the results of model I suggests that the effect of a
10 single bank-firm relationship falls entirely on the maturity of a loan and not the size.
11 This may be interpreted as a weakening of the traditional bond of relationship banking
12 as more commercial imperatives began to take effect, but that banks continue to
13 compete by using the maturity of the loan as a choice variable. It is clear that the
14 above results generally support hypothesis 1. No matter in which period, firms with
15 single banking relationship get better loan terms.
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31 We use an interaction term between SOB and Single bank-firm relationship to
32 identify the joint-effect of these two factors. We find that SOBs provide longer
33 maturity loans than others. Even during the loan rate regulation period when the
34 lending behaviour of SOBs were no different to other banks, SOBs tended to give
35 larger loans and longer durations through a single banking relationship. Firms
36 maintaining closer ties with state-owned banks were more likely to benefit from better
37 loan terms. Model IV of Tables 5 and 6, show the effect of the interaction of SOB,
38 single banking relationship and collateral, which reconfirms the SOB and relationship
39 banking bias in lending in the pre-liberalization period, but a weakening in the
40 liberalization period as only maturity seems to be affected and not loan size. The
41 above results support hypothesis 2.
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55 In model III of table 5, the joint variable single*Collateral has a significant
56 positive effect on loan size and loan maturity, which supports the notion that firms
57 with single banking relationship tends to get more favourable loan terms even with a
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collateral condition. However, in the liberalization period (Table 6), this is only significant for loan maturity suggesting a weakening of the single firm-bank relationship effect. This result supports hypothesis 3.

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Table 5: Relationship banking 1999-2004

Period Model	Loan rate limitation period 1999-2004							
	I		II		III		IV	
	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)
Bank-firm relationship								
Single	0.486*** (8.894)	0.081*** (9.717)						
State-owned banks*Single			0.490*** (7.121)	0.075*** (7.162)				
Deal term								
Collateral	-0.012 (-0.246)	0.013* (1.840)	-0.011 (-0.219)	0.014* (1.851)	-0.106* (-1.898)	-0.007 (-0.919)	-0.067 (-1.249)	-0.002 (-0.316)
Single*Collateral					0.366*** (4.153)	0.083*** (6.240)		
State-owned banks*Single *Collateral							0.342*** (3.249)	0.098*** (6.182)
Firm Characteristics								
Ln(Firm size)	0.698*** (23.000)	0.045*** (9.672)	0.696*** (22.761)	0.044*** (9.494)	0.697*** (22.543)	0.044*** (9.463)	0.692*** (22.349)	0.043*** (9.203)
Firm age	-0.026 (-0.491)	-0.002 (-0.270)	-0.017 (-0.318)	-0.001 (-0.099)	-0.030 (-0.551)	-0.003 (-0.362)	-0.024 (-0.436)	-0.001 (-0.165)
Cash flow ratio	-0.0003 (-0.405)	0.0001 (0.796)	-0.0005 (-0.546)	0.0001 (0.650)	-0.0003 (-0.392)	0.0001 (0.746)	-0.0003 (-0.411)	0.0001 (0.664)
Liquidity	0.003*** (2.857)	-0.0004*** (-2.687)	0.002** (2.579)	-0.0004*** (-2.976)	0.002** (2.283)	-0.0004*** (-3.164)	0.002** (2.221)	-0.0004*** (-3.208)

Bank ownership								
State-owned banks	-0.043	0.011	-0.170***	-0.005	-0.040	0.014	-0.074	0.004
	(-0.877)	(0.843)	(-3.181)	(-0.663)	(-0.798)	(0.860)	(-1.429)	(0.551)
Macro terms								
HHI	0.003***	0.001***	0.003**	0.001***	0.003***	0.001***	0.003***	0.001***
	(3.207)	(5.957)	(3.378)	(6.100)	(3.286)	(5.988)	(3.438)	(6.263)
Growth rate of GDP	-0.147***	0.082	-0.180***	0.081	-0.187***	0.078	-0.197***	0.082
	(-2.899)	(0.609)	(-3.540)	(0.586)	(-3.631)	(0.528)	(-3.822)	(0.596)
C	4.651***	-0.473***	5.124***	-0.392***	5.214***	-0.387***	5.412***	-0.337***
	(5.599)	(-3.745)	(6.142)	(-3.075)	(6.190)	(-3.028)	(6.414)	(-2.640)
Observation	2065		2065		2065		4426	
R square	0.308	0.139	0.398	0.218	0.383	0.211	0.381	0.211
Breusch-Pagan testChi2	50.088		60.114		67.969		70.000	
Prob> Chi2	0.000		0.000		0.000		0.000	

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Z statistics in parentheses.

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Table 6: Relationship banking 2005-2012

Period Model	Loan rate liberation period 2005-2012							
	I		II		III		IV	
	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)	Ln(loan)	Ln(1+dur)
Bank-firm relationship								
Single	0.069 (1.326)	0.032** (1.973)						
State-owned banks*Single			0.109* (1.740)	0.047** (2.014)				
Deal term								
Collateral	-0.021 (-0.348)	0.043** (2.127)	-0.011 (-0.190)	0.042** (2.061)	-0.002 (-0.038)	0.033* (1.735)	-0.012 (-0.188)	0.034* (1.676)
Single*Collateral					-0.073 (-1.276)	0.046** (2.445)		
State-owned banks*Single *Collateral							-0.006 (-0.083)	0.068*** (2.728)
Firm Characteristics								
Ln(Firm size)	0.423*** (24.774)	0.017*** (2.971)	0.424*** (24.805)	0.017*** (2.977)	0.423*** (24.798)	0.017*** (2.960)	0.424*** (24.807)	0.016*** (2.951)
Firm age	0.049 (1.062)	0.030 (0.814)	0.050 (1.085)	0.026 (0.762)	0.049 (1.071)	0.028 (0.801)	0.050 (1.088)	0.026 (0.711)
Cash flow ratio	0.004** (2.298)	-0.0003 (-0.451)	0.003** (1.975)	-0.0003 (-0.483)	0.003** (1.992)	-0.0002 (-0.395)	0.003** (1.952)	-0.0004 (-0.693)
Liquidity	0.003*** (3.421)	-0.003*** (-10.552)	0.003*** (3.495)	-0.003*** (-10.498)	0.003*** (3.405)	-0.003*** (-10.476)	0.003*** (3.482)	-0.003*** (-10.469)

Bank ownership								
State-owned banks	0.070**	0.117***	0.067*	0.112***	0.071**	0.116***	0.070*	0.110***
	(1.979)	(10.016)	(1.843)	(9.231)	(1.990)	(9.967)	(1.906)	(9.137)
Macro terms								
HHI	-0.0001	0.001***	-0.0001	0.001***	-0.0001	0.001***	-0.0001	0.001***
	(-0.105)	(6.583)	(-0.161)	(6.599)	(-0.095)	(6.522)	(-0.141)	(6.604)
Growth rate of GDP	-0.044***	-0.009**	-0.046***	-0.010**	-0.044***	-0.010**	-0.045***	-0.010**
	(-3.608)	(-2.387)	(-3.720)	(-2.392)	(-3.594)	(-2.475)	(-3.704)	(-2.453)
C	8.241***	-0.024	8.266***	-0.018	8.219***	-0.005	8.261***	-0.003
	(16.134)	(-0.143)	(16.173)	(-0.112)	(16.061)	(-0.030)	(16.142)	(-0.019)
Observation	4426		4426		4426		4426	
R square	0.231	0.175	0.231	0.175	0.232	0.176	0.231	0.177
Breusch-Pagan testChi2	15.832		16.792		15.480		16.600	
Prob> Chi2	0.000		0.000		0.000		0.000	

Note: * significant at 10%; ** significant at 5%; *** significant at 1%.Z statistics in parentheses.

6. Conclusion

We have proposed a framework for understanding bank lending in an environment of limited loan rate differentiation between borrowers in China. The framework suggests that the choice variable used by banks to equilibrate the loan market is the maturity of the loan rather than the interest rate. The empirical results explain the effects of firm size, on loan deal size and maturity as well the impact of bank ownership and indebtedness of the firm. Collateral plays a weak part in the pre-liberalization period in determining the maturity of a loan but strengthens in the liberalization period.

The results for the single firm-bank relationship which would typically be associated with relationship banking shows a change in impact and pattern between the two periods. The pre-liberalization period shows a stronger relationship for the single firm-bank relationship than in the liberalization period. This result holds true even allowing for the interaction of collateral and SOBs. The single firm-bank relationship in the liberalization period works to increase the maturity of the loan only suggesting a weakening of the single-relationship. The single firm-bank relationship is perhaps less important in the liberalization period as it is possible for firms to entertain a multiple bank-firm relationship with more than one SOB. However, the single firm-bank relationship continues to provide benefits in terms of improved maturity loans to firms. The results confirm the standard finding of a SOB bias in lending.

The results of the model are tentative and cannot be viewed as definitive and need to be revisited with continuous change and reforms to the Chinese banking market. It also goes without saying that continuing development of the Chinese banking system is such that any empirical results describing the past are likely to be superseded by the process of gradual but continuous change. However, given that reform in China's banking system is gradual and not sudden, the results of this paper are indicative of recent trends in the lending behaviour of the banks.

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Limited Loan Rate Differentiation and the Determination of Loan Terms in the
Chinese Commercial Credit Market

Kent Matthews^{1,2}

(¹School of Public Finance and Taxation, Zhongnan University of Economics &
Law, China)

(²Cardiff Business School, Cardiff University, UK)

and

Wei Yin^{3,4}

(³School of Economics and Management, Southeast University, China)

(⁴Jiangsu Key Laboratory of Financial Engineering (Nanjing Audit University),
China)

1. Kent Matthews

Research Interest:

Modelling and forecasting the macro economy; Monetary and credit influences on the economy; Money and banking deregulation in developing economies; Economics of the underground economy (including violent injury determination)

Recently Publications:

Page, N., Matthews, K. G. P. 2016. Preventing violence-related injuries in England and Wales: A panel study examining the impact of on- and off-trade alcohol prices. *Injury Prevention* 23(1), pp. 33-39.

Yin, W. and Matthews, K. G. P. 2016. The determinants and profitability of switching costs in Chinese banking. *Applied Economics* 48(43), pp. 4156-4166.

Asmild, M., Kronborg, D. and Matthews, K. G. P. 2016. Introducing and modeling inefficiency contributions. *European Journal of Operational Research* 248(2), pp. 725-730.

Pointon, C. and Matthews, K. G. P. 2016. Dynamic efficiency in the English and Welsh water and sewerage industry. *Omega* 58, pp. 86-96.

2. Wei Yin

Research Interest:

Banking markets; Banking Relationship; Internet finance; Development of competitiveness in emerging market economies

Recently Publications:

Yin, W. and Matthews, K. G. P. 2017. Why do firms switch banks? Evidence from China. *Emerging Markets Finance and Trade*, online publication , Aug 2017.

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