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Panel Analysis of Chinese Corporate Debt

-- How Far Have Market Mechanisms Penetrated? --

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Panel Analysis of Chinese Corporate Debt ^{*}

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Abstract

In this paper, we investigate the impact of reforms in the banking sector and shifts of the monetary policy focus from quantitative controls to interest-rate controls on bank-lending and corporate-borrowing activities by applying a panel-data analysis of financial data of listed Chinese companies.

Our three main conclusions on corporate borrowing are as follows: 1) quantitative controls on bank lending still remain through such mechanisms as ‘window guidance’, but their impacts are diminishing; 2) the effect of official lending rates is increasing; and 3) banks are placing more emphasis on financial indicators and corporate conditions when lending money to borrowing companies.

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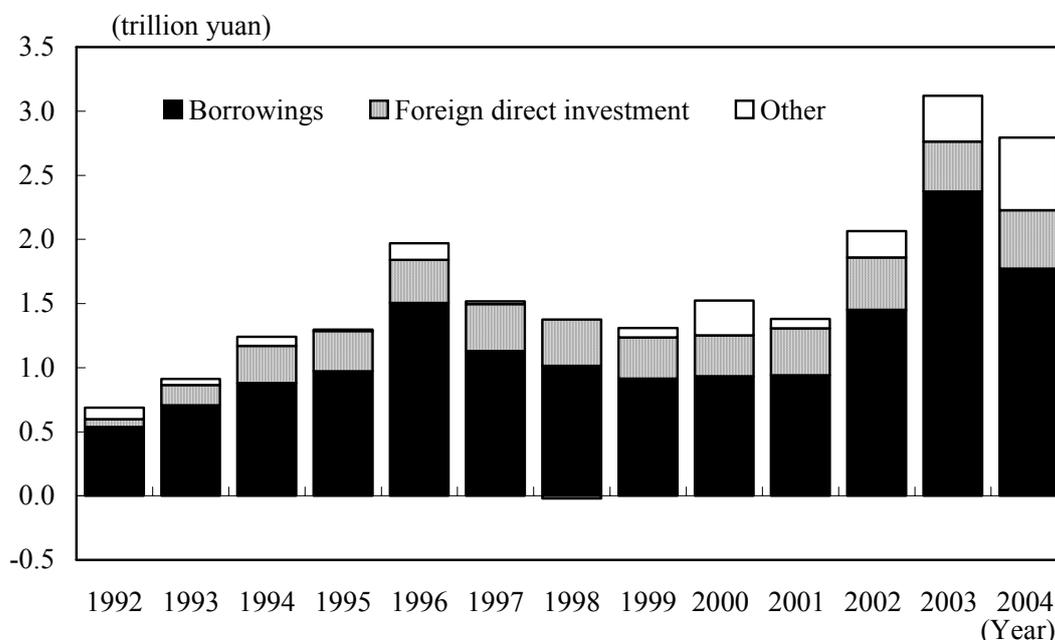
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1. Introduction

In the past, the primary monetary policy method used in the Chinese financial system has involved quantitative control through such mechanisms as ‘window guidance’ for banks that play the main role as suppliers of funds under the regulated interest-rate regime. This formed the backdrop for a lending system in which banks themselves did not necessarily take full account of risks and returns.

Recently, this situation has been changing gradually. On the monetary policy side, various reforms are underway that will reorient the system away from quantitative control in favor of adjustments utilizing interest-rate functions. On the banking side, China’s accession to the World Trade Organization (WTO) at the end of 2001 included commitments to open the banking sector to other countries, which has resulted in rapid reforms to governance systems and improvements in risk management capacity to ensure international competitiveness.

Figure 1: Corporate Fundraising Structures (Flow Base)



Source: Tang Cheng (2005), *People’s Bank of China Quarterly Statistical Bulletin*.

In this paper, we focus on the impact of these reforms on corporate borrowing behavior both in the monetary policy sphere and in the banking sector. We draw on the financial data of individual listed Chinese companies to undertake panel estimation of a corporate borrowing function, which provides quantitative insights into the extent to which quantitative controls have been eliminated and the extent to which functions representing the financial situation and interest rates have come to the fore in the borrowing activities of listed companies.

This paper is structured as follows. In Sections 2 and 3, we provide an overview of the developments in Chinese monetary policy and reforms in the banking sector. In Section 4, we survey previous researches on the borrowing activities of Chinese corporations. In Section 5, we conduct panel estimation of the borrowing function for

listed Chinese companies. Using panel estimation, we measure the impact on the borrowing activities of listed Chinese companies of interest rates, quantitative controls on bank lending and the financial conditions of individual companies. An interpretive discussion obtained from the estimation follows. In Section 6, we draw conclusions.

2. Development of the Monetary Policy of the People’s Bank of China

The People’s Bank of China (PBoC) was established as a central bank in the mid-1980s when the monetary policy function was divided from the commercial banking services functions. Before then, China employed a ‘mono bank system’ in which the PBoC performed virtually all financial services. As a result of the division, the PBoC specialized in central banking while the state specialist banks (the China Construction Bank, the Industrial and Commercial Bank of China, the Bank of China, the Agricultural Bank of China) provided both financial policy services and commercial banking.

Having jettisoned its commercial banking functions, the PBoC had two primary monetary policy tools: quantitative controls and interest-rate regulation. With regard to quantitative controls, the PBoC established an ‘aggregate lending ceiling’ that resulted in quantitative controls being the primary means of pursuing monetary policy. Within this context, ‘aggregate lending ceiling’ refers to the maximum amount of lending that is set by the PBoC for each individual financial institution.

As is pointed out by Minami and Makino (2005), this regulation provided the basis for monetary operation because of the nature of China’s immature short-term money markets in which open market operations on bonds and bills are carried out. The aggregate lending ceiling was eliminated in 1998, and monetary policy began a gradual shift in focus towards open market operations, which were first introduced in 1996. Nonetheless, the PBoC continues to view window guidance positively as an effective policy tool.¹

Figure 2: Developments in Quantitative Controls as a Tool of Monetary Policy

Timing	Content
1984	Separate the functions of the PBoC and the state specialist banks
1985	Introduce the aggregate lending ceiling
1996	Introduce open market operations
1998	Eliminate the aggregate lending ceiling for the commercial banks Fully fledged use of open market operations

Source: Nanbu (1991), Wang (2005), among others.

¹ For example, even the latest *China Monetary Policy Report* (first quarter 2006) states “‘window guidance’ and credit policy guidance were strengthened to promote improvement of the credit structure by commercial banks.”

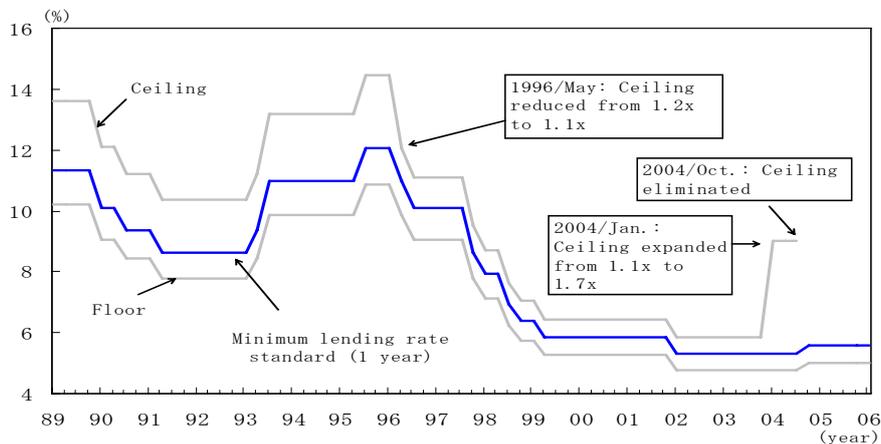
In addition to using quantitative controls, the PBoC also employs regulations on the deposit and lending rates used by financial institutions. These regulations establish standard interest rates for each maturity and allow actual interest rates to vary within certain bands on either side of the standard rate. Reviewing the history of interest-rate regulation, in 1996 China temporarily reduced the upper band to 10% of the standard rate and then gradually expanded it in a deregulatory process that ultimately eliminated the lending rate ceiling in 2004.²

Figure 3: Developments in Lending Interest-Rate Regulations

Timing	Description
1987	Permit the commercial-bank lending rates to fluctuate from the standard rate (ceiling: 20%; floor: 10%)
1996	Reduce the upper fluctuation band for the commercial-bank lending rates (20% → 10%)
1998	Expand the upper fluctuation band for the commercial-bank lending rates for smaller enterprises (10% → 20%)
1999	Expand the upper fluctuation band for the commercial-bank lending rates for smaller enterprises (20% → 30%)
2004	Expand the upper fluctuation band for the commercial-bank lending rates (large enterprises 10% → 70%; smaller enterprises 30% → 70%) <January> Eliminate the commercial-bank lending rate ceiling <October>

Source: Kuroiwa (2005), PBoC (2005).

Figure 4: Official Lending Rates (One Year) and Fluctuation Bands



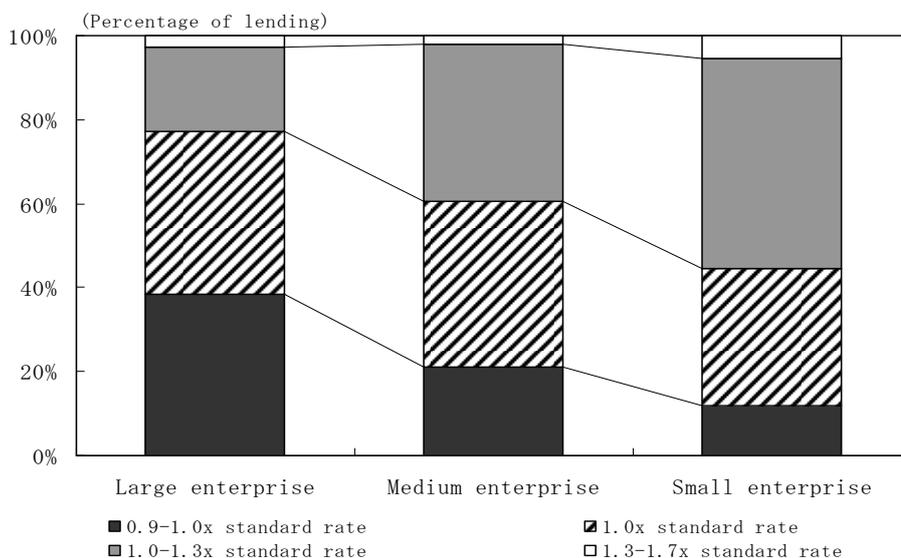
Source: CEIC.

Under the framework described above, the lending rates actually charged to borrowing companies do not necessarily match the standard rates set by the PBoC because of the fluctuation bands. Nonetheless, at least in the case of lending to large enterprises with strong creditworthiness, interest is more or less on par with standard rates.

² However, minimum lending rate regulations and maximum deposit rate regulations remain in force.

Using the *China Monetary Policy Report* to check the development of the lending interest rates for different sizes of enterprise reveals that nearly 80% of the lending to large enterprises is within 0.9–1.0 times the standard rate (97% of lending to large enterprises was within 0.9–1.3 times). On the other hand, there are wider variances for smaller enterprises. Over 60% of lending to medium-sized enterprises and over 40% of lending to small-sized enterprises are within 0.9–1.0 times the standard rate.³

Figure 5: Breakdown of Lending Rates (by Size of Enterprise)



Source: *China Monetary Policy Report* (January 2005).

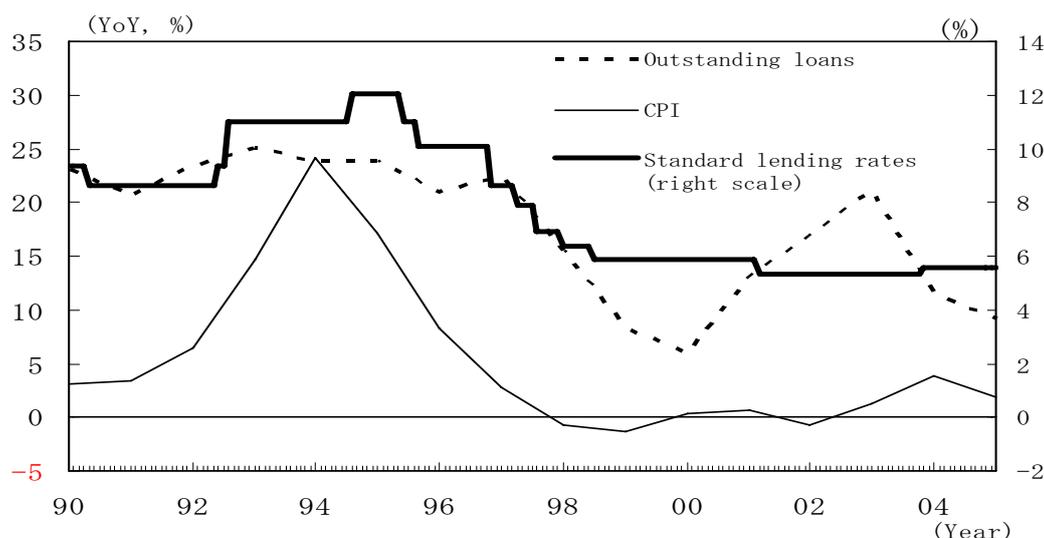
Looking back over the history of lending rate standards, there were frequent changes prior to the Asian currency crisis, but few thereafter. Between 1993 and 1995, the PBoC raised official lending rates four times in response to the persistently high inflation rate that reflected overheating in the economy. Then, as the rate of growth of prices declined, the bank lowered official lending rates three times between 1996 and 1997. The Asian currency crisis caused slumps in consumption and exports, which in turn produced negative price growth rates in 1998 and 1999. The government responded with an active fiscal policy, and the PBoC lowered official lending rates four times. While there were large swings in the growth rate of outstanding loans, in 2002 and 2004 there were small declines and small increases, respectively.⁴ The reason for such reactions may be that the Chinese government and/or the PBoC wanted to avoid negative effects, such as a deterioration of balance sheets resulting from large interest rate hikes for state enterprises.⁵

³ Even with the wider variances, interest rates generally fell within the 0.9–1.3 times range (for medium-sized enterprises, 97% of lending was within 0.9–1.3 times the standard rate; 94% for small enterprises).

⁴ PBoC (2005), Dai (1999).

⁵ According to Dai (1999), the decisions of the PBoC on interest rates are made from a general evaluation of: 1) overall price levels; 2) interest burdens on state-owned large and medium-sized enterprises; 3) state finances and bank profits; and 4) state policy and social demands for funding.

Figure 6: Official Lending Rates, the CPI and Outstanding Loans



Source: *China Statistical Abstract*, CEIC.

3. Overview of Reforms in the Chinese Banking Sector

During the period of change in the PBoC’s monetary policy, the commercial banking sector undertook institutional preparation to prepare for marketization. In the first half of the 1990s, commercial banks had little discretion over the amounts they lent because of the aggregate lending ceiling. In particular, local governments would often interfere in lending decisions,⁶ which has been suggested as a factor exacerbating the nonperforming loans of commercial banks.⁷ In 1994, the policy lending functions of the state specialist banks were transferred to policy banks and the state specialist banks were allowed to concentrate on commercial banking. This was followed in 1995 by the enactment of the Commercial Banking Law. By the time the aggregate lending ceiling was eliminated in 1998, commercial banks had made the transition to loan management systems based on deposit–loan ratios, for example, and local government interference in lending had declined.

⁶ One example comes from Imai (1997), who claims that, at the time, local governments would interfere with commercial banks on an ad hoc basis, noting that “they would coerce lending for projects implemented for the political advantage of the head of local government” and “this was not rare”.

⁷ According to Tamaki and Yamazawa (2005), “Zhou Xiaochuan, Governor of the PBoC, commented that of the nonperforming loans held by the four largest state-owned commercial banks prior to the Asian Currency Crisis, direct government orders and government interventions (here, ‘government’ includes local governments) were a factor in approximately 30%, with approximately another 30% accounted for by support to state-owned enterprises, approximately 10% by the impact of local protectionism in government administration and capital, and the remaining 20% by business decisions made by the banks themselves.”

Figure 7: Development of Banking Reforms

Timing	Description
1984	Establish the state specialist banks and separate the functions of the PBoC from state specialist banks
1994	Assign the policy lending functions of state specialist banks to the policy banks and let the state specialist banks concentrate on commercial banking
1995	Implementation of the Commercial Banking Law
1998	Injection of 270 billion yuan into four major state commercial banks Change to commercial-bank loan asset assessment standards (move to the international standard of five categories from the unique Chinese system of four categories)
1999–2000	Four major state commercial banks sell 1.4 trillion yuan in nonperforming loans to asset management company
2001	Establishment of ‘Guiding Principles for Lending Risk Categorization’ Accession to the WTO
2002	Enactment of ‘Financial Enterprise Accounting Standards’ (internationalization of accounting rules) Establishment of ‘Guidelines for Bad Debt Reserves’
2003	Establishment of China Banking Regulatory Commission Injection of 22.5 billion dollars of public funds to both the Bank of China and the China Construction Bank
2004	Bank of China and China Construction Bank sell nonperforming loans to an asset management company Bank of China and China Construction Bank converted to joint-stock companies Commercial Bank Capital Adequacy Management Law enacted – Capital adequacy to be boosted to at least 8% by January 1, 2007 ‘Guidelines on Corporate Governance Reform and Supervision at Bank of China and China Construction Bank’ – Bank of China and China Construction Bank selected as ‘test banks’, with targets announced for results to be achieved by reforms
2005	Bank of Communications and China Construction Bank listed on the Hong Kong Stock Exchange Industrial and Commercial Bank of China converted to joint-stock company

Source: Okazaki (2005), among others.

Recently, when China acceded to the WTO at the end of 2001, it committed to fully opening its banking sector to foreign countries by the end of 2006, which led to active efforts by domestic banks to strengthen their operations. Under the guidance of government authorities, they have segregated their nonperforming loans, received injections of public funds, established stricter screening methods for loan credits, improved their capital adequacy and have taken other measures to ensure soundness. Some banks have also attempted to introduce more advanced risk management techniques by, for example, allowing foreign financial institutions to take capital stakes. This is seen as a method of improving their management expertise and ensuring their

competitiveness. In the light of the progress that has been made in reforming the banking sector, it is likely that commercial banks are more aware of credit risk in their lending activities.

Figure 8: WTO Accession Commitments and Implementation (Banking)

Commitment		Implementation
Foreign currency services	Complete elimination of customer and geographical restrictions at the time of WTO accession	C
Renminbi services	Geographical restrictions: At the time of accession: Shenzhen, Shanghai, Dalian, Tianjin Within one year: Guangzhou, Qingdao, Nanjing, Wuhan Within two years: Jinan, Fuzhou, Chengdu, Zhongqing Within three years: Kunming, Zhuhai, Beijing, Xiamen Within four years: Shantou, Ningbo, Shenyang, Xian Within five years: Remainder	C
	Customer restrictions: Services to Chinese enterprises to be permitted within two years of accession; services to individuals within five years	U (to be eliminated in December 2006)
Establishment conditions	Restrictions on foreign bank investment ratios, form of management and establishment and permits to establish subsidiaries to be eliminated within five years	U (to be eliminated in December 2006)

Note: **C** denotes completed; **U** denotes uncompleted.

Source: Okazaki (2003), newspaper reports, among others.

4. Previous Studies

One example of recent research based on the financial data of individual companies that analyzes the impact of different financial variables on Chinese enterprise borrowing is the study of Shirai (2002). She examines the results of the series of banking reforms initiated in the mid-1990s from the perspectives of both banks and enterprises. Shirai (2002) uses financial data of 1,098 listed Chinese companies covering the period 1994–2000 and reveals a bias among banks for granting more loans to poorly performing enterprises, in particular to large state enterprises. More specifically, he uses panel estimation for three periods: 1994–2000, 1994–1997, and 1998–2000, with bank borrowing as the dependent variable. Financial explanatory variables are the return on assets (ROA), gross assets, the ratio of fixed assets to gross assets, and gross asset growth rates; other explanatory variables are the number of years since establishment, the government ownership percentage and listing status on the A/B/H share markets. He finds that the gross assets parameter is significantly positive while the ROA parameter is

significantly negative. These results indicate that banks lend more to large enterprises than to smaller enterprises and that they lend more to enterprises with lower profitability.⁸

Shirai (2002) points to three background factors driving these lending activities. The first is the tendency to rely on past lending records when making decisions. The second is the tendency to consider companies to be more creditworthy the larger they are. The third factor, which does not necessarily apply in all cases, is the possibility that ‘additional lending’ is undertaken as liabilities increase.

A similar study, although not one on Chinese enterprises, is that of Nagano (2005), which examines the impact of corporate size on lending activities in East Asia. The paper’s focus is on five East Asian countries (Indonesia, Korea, Malaysia, the Philippines and Thailand). The equation estimated is a debt ratio function that uses as explanatory variables ROA [(the total book value of liabilities + the market value of capital) / the total book value of assets] and the ratio of tangible fixed assets to total assets. He concludes that in most East Asian countries, the larger the company, the greater are the liabilities; this effect is the so-called ‘scale effect of liabilities’.⁹ This effect also suggests a strong tendency for banks to allow larger companies to have higher liability ratios because of their assumed high credibility.

There is little research that uses financial data of individual companies to estimate corporate borrowing functions, whether or not Chinese enterprises are the focus. However, Fazzari, Hubbard and Petersen (1988) use financial data of individual companies to estimate a capital investment function. This is relevant because corporate borrowing is mainly used for capital investment. Among the many studies to follow Fazzari, Hubbard and Petersen (1988) is that of Hanazaki and Takeuchi (1997), which uses financial data of individual manufacturing firms in Japan, the United States and France to estimate a capital investment function in which ROA, interest rates, cash flow, debt ratios and the capital stock are the explanatory variables.

5. Estimation

5-1. The Model

The studies surveyed above contain detailed analyses of the relationships between financial variables and corporate borrowing (or fixed investment), but do not necessarily compare different points in time. Nor do any of them share our main concern, which is to estimate the impact of changing central bank policy tools (quantitative controls and official lending rates). Even Shirai (2002), who conducts a detailed analysis of the borrowing activities of Chinese enterprises by using financial data of individual enterprises and undertakes a thorough analysis of the relationship between corporate

⁸ According to the results obtained by Shirai (2002), the parameter of local government ownership is in decline, but the parameters of ROA, gross assets, and the gross asset growth rate yield roughly the same results for each period. “Interest rates” (defined in Shirai (2002, footnote 12)) are included for all sample periods to represent corporate borrowing costs, but are not included in the estimation of equations for individual periods, and there is no comparison of the interest-rate parameters at different points in time.

⁹ Nagano (2005) uses sales as a proxy for corporate size.

borrowing activities and financial variables such as ROA and liability ratios, estimates only one formula that includes interest rates (she estimates several formulas without interest rates). Nor does Shirai (2002) include an explanatory variable that expresses quantitative controls, which are arguably an influential factor.

Therefore, in this paper, we include measures of interest rates and quantitative controls to the estimating equations in addition to the standard financial variables used to explain corporate borrowing by previous studies. Specifically, we use the following variables for estimation: 1) financial variables: (a) ROA, to represent profitability; (b) year-on-year changes of core operation revenues, which represent growth potential; and (c) borrowing ratios, which represent safety;¹⁰ 2) corporate size: gross assets;¹¹ 3) policy variables: (a) the difference from the previous year's financial institution official lending rates (one year);¹² and (b) year-on-year changes in financial institution lending. Including these policy variables is an additional distinguishing feature of our paper.

Obviously, the difference from the previous year's financial institution official lending rates (one year) is a variable that represents interest rate policy,¹³ and the year-on-year comparison of outstanding financial institution lending is a proxy variable for quantitative controls. The monetary base is another variable that could conceivably be used to express quantitative controls, but in China's case the credit multiplier is unstable and the monetary base has not been established as a policy tool. Given that window guidance continues to occupy a primary position in quantitative controls, we choose to use a more comprehensive concept, in the form of data of macro-level financial institution lending (faced by enterprises on the supply side). In this context, one could argue that lending plans should be used to represent quantitative controls rather than lending results, which are an after-the-fact measure. However, it is impossible to access data of before-the-fact lending plans, and, even if it were possible, initial plans are subject to various adjustments prior to their implementation, for example, because of changes in the external environment and consequent policy and political decisions. We therefore consider it to be appropriate to use ex post macro-level lending results, which provide a good measure of what actually took place.¹⁴

¹⁰ According to the Bank of Japan (2001), when Japanese banks assign internal ratings to their assets, they use factors such as the 'capital adequacy ratio', the 'ratio of ordinary profit to total capital', and 'revenue growth rates' as quantitative factors.

¹¹ Shirai (2002) also considers gross assets to be significantly related to corporate size.

¹² Shirai (2002) includes "interest rates", which are measured by dividing corporate interest payments by outstanding borrowing in the estimating equations. (More accurately, the interest-rate variable is included in one of several estimating equations). It would be more appropriate to use an 'average interest rate', measured after the fact, to represent the market interest rates perceived by companies. However, in this paper, we use the more primitive 'financial institution official lending rate (one year)' to measure the interest rate. This is because: 1) it is impossible to extract just interest payment amounts from the database used in this analysis; and 2) by using the ex-post 'average interest rate', it is not necessarily possible to distinguish between 'movements in the average interest rate' that are due to bias and changes that are associated with the term structure of borrowing, which is essentially unrelated to interest rate movements.

¹³ As described above, the lending interest rates actually offered to borrowing companies do not necessarily match the official lending rate. Nonetheless, interest rates are at virtually the same level as the official lending rate, at least for large enterprises.

¹⁴ To create an artificial 'before-the-fact lending plan', we used the forecasts of the growth rate (Y) and prices (P) announced by the government at the beginning of the year to calculate the money supply (M)

To confirm the relationship between financial institution lending, which is an explanatory variable, and corporate borrowing, which is the dependent variable, from the enterprise perspective, the left-hand side of the equation (corporate borrowing) represents the demand for funds, while the right-hand side (financial institution lending) represents the supply of funds (and hence, the estimation formula is expressed as a reduced form). In this case, the left-hand side (corporate borrowing), which is the total amount borrowed by the 1,385 listed Chinese companies covered in this analysis, is equivalent to approximately 7% of all outstanding financial institution lending. Within the sample, the maximum borrowing amount per enterprise in recent years (2003–2004) accounts for only 0.7–0.8% of total financial institution lending.

(Equation)

$$\Delta L_{i,t} = \alpha + \beta * ROA_{i,t} + \gamma * D_{i,t} + \delta * \Delta S_{i,t} + \varphi * Asset_{i,t} + \theta * \Delta R_t + \zeta * Chinaloan_t$$

The notation for individual terms in the formula are as follows: L_i denotes outstanding borrowing by enterprise i (in logs); ROA_i denotes the return on total assets of enterprise i ; D_i denotes the ratio of liabilities with interest to total assets (the debt ratio) of enterprise i ; S_i denotes the year-on-year changes (logarithmic year-on-year differences) in the core operation revenues of enterprise i ; $Asset_i$ denotes the gross assets of enterprise i (in logs); R denotes the difference from the previous year's official lending rates; and $Chinaloan$ denotes the year-on-year changes in outstanding financial institution lending. (See Appendix 2 for details of the data.)

The variable R is the PBoC's policy variable, and its coefficient is expected to have a negative sign because rising interest rates will increase debt burdens. $Chinaloan$, which comprehensively represents quantitative controls, is expected to have a positive effect, because an increase in this variable means that monetary policy has been eased.

Turning to the financial variables, ROA is highly likely to have a positive effect. Although the coefficients of financial variables could depend on the lending attitudes of banks and on the financial circumstances surrounding enterprises, if one assumes that banks take account of credit risk when they make decisions about lending, then higher enterprise profitability facilitates bank lending, and strongly performing enterprises are also likely to have higher demand for funding to expand capacity. However, ROA might also have a negative effect because high profits may allow enterprises to reduce borrowing, and low-profit enterprises may be given loans to cover their losses, and so on.

The coefficient on D is expected to have a negative sign because credit risk is greater the higher is the debt ratio. However, the sign could also be positive if lending decisions are based on past lending records. The effect of S is expected to be positive because it is easier to lend to companies with high growth potential, and these companies have higher demand for funding. The coefficient on $Asset$ is also expected to be positive if there is a tendency to lend more to larger enterprises that have lower risk.

from the formula for the quantity theory of money ($MV = PY$; for the velocity of money $\langle V \rangle$, we used the mean value for several years prior) and then used this in the estimation. However, it did not yield statistically significant results.

5-2. Data and Estimation Period

The data used for estimation are individual financial data of 1,385 companies listed on the Shanghai and Shenzhen stock exchanges.¹⁵ Panel estimation requires detailed and reliable data, and we judged this data set to be a good compromise between data reliability and sample size. However, because these are listed companies, most of the companies included in sample are large in size, and it should be explicitly noted that virtually all of them had sales of at least 5 million yuan (1,378 of 1,385 companies had sales of at least 5 million yuan). Survey estimates of the number of enterprises in China vary between 11 million and 30 million when medium, small and micro enterprises are included. Only about 1–2% of these, or approximately 220,000 (medium, small and micro) enterprises, have sales in excess of 5 million yuan.

The actual number of observations used in the estimation is smaller than 1,385 because of data limitations. There are some extreme fluctuations in the data of outstanding corporate borrowing, and observations for year-on-year changes that deviated from the mean by more than two standard deviations were excluded as outliers.

We separated the full sample into two periods for estimation in order to compare the impact of institutional changes and other factors: (a) the 2002–2004 period, which follows accession to the WTO; and (b) the 1992–1996 period, which predates the banking reforms.

5-3. Estimation Results and Interpretation

The following table reports the estimation results.

Explanatory variable	(a) 2002–2004			(b) 1992–1996		
	Coefficient	<S. E.>	(t-value)	Coefficient	<S. E.>	(t-value)
<i>a</i>	−9.997	<0.827>	(−12.084)***	−8.429	<1.459>	(−5.778)***
<i>ROA</i>	0.005	<0.001>	(5.548)***	−0.005	<0.003>	(−2.055)**
<i>D</i>	0.012	<0.001>	(14.983)***	0.019	<0.002>	(11.095)***
<i>S</i>	0.052	<0.018>	(2.868)***	0.007	<0.007>	(0.996)
<i>Asset</i>	0.458	<0.039>	(11.784)***	0.249	<0.053>	(4.735)***
<i>R</i>	−0.150	<0.024>	(−6.174)***	−0.085	<0.027>	(−3.085)***
<i>Chinaloan</i>	0.495	<0.185>	(2.681)***	13.999	<2.984>	(4.690)***
Adjusted R ²	0.205			0.135		
Observations	3,535			1,688		
Enterprises	1,281			746		

***, ** and * denote significance at 1%, 5% and 10%, respectively.

¹⁵ We used the *Trend Statistics* provided by the Shenzhen Stock Exchange (<http://www.data.cninfo.com.cn/>).

On an all-enterprises basis, the estimation results indicate that the coefficient on financial institution lending (*Chinaloan*), which represents quantitative controls, is significant for both periods (a) and (b). Moreover, the parameter is clearly smaller for the period 2002–2004. Hence, the effect of controls on financial institution lending seems to have declined between subperiods.¹⁶

Financial institution lending probably has a significant effect for the period 1992–1996 because the aggregate lending ceiling imposed strict quantitative constraints on the banking sector.¹⁷ Its significance for the period 2002–2004, in which the aggregate lending ceiling had been eliminated, probably arises because of the impact of window guidance, which was strengthened from July 2003 to reduce overheating in the economy.

The period 2002–2004 is characterized by a declining influence of financial institution lending (*Chinaloan*) and a rising influence of official lending rates (*R*). This is probably because, following the elimination of the aggregate lending ceiling, quantitative controls exerted less influence on corporate borrowing, at least for listed companies, and official lending rates exerted more influence.¹⁸

Turning to the financial parameters, the parameter of ROA is slightly positive in the 2002–2004 period, and the coefficient of the rate of change for core operation revenues is also significant. These results seem to reflect the fact that banks have begun to take account of the financial circumstances of borrowers when making decisions about lending, whereas in the past, financial statements were not taken into consideration. In addition, the parameter of the debt ratio is positive for both periods. This indicates that banks continued to lend to enterprises with high debt ratios.¹⁹

¹⁶ It should, however, be noted that all of the enterprises in this analysis are listed companies and more than 90% of listed companies are state-owned enterprises. Thus, during the period 1992–1996, almost all of the loans made by financial institutions were made to state-owned enterprises, and so it is possible that the results for this parameter are larger and more significant than was actually the case. On the other hand, for the period 2002–2004, there was not that much growth in lending to state enterprises among the new lending of financial institutions, while home loans, bill discounts and other loans to private enterprises increased. Thus, it is possible that the results for this parameter are somewhat underestimated. To put it in a different way, inasmuch as the analysis covers listed companies (which are more or less equivalent to state-owned enterprises), it could be difficult to declare that the decline in this parameter explains all of the decline in the impact of quantitative controls on corporate borrowing. At least in part, it is also an indication of freer allocation (a greater variety) of borrowers for lenders.

¹⁷ At the time, state specialist banks can be assumed to have gained from the PBoC the funds to be lent to enterprises for projects planned by the government. This is different from the ordinary monetary policy transmission mechanisms in which the central bank supplies commercial financial institutions with high-powered money that is then supplied as funding to enterprises.

¹⁸ During period (a), there was a hike in the official lending rate in October 2004, and around the same time the four largest state-owned commercial banks, in particular, were instructed by the authorities to reduce their nonperforming loan ratios and improve their capital adequacy rates. Hence, this is considered a period in which banks themselves voluntarily restrained their lending. It is conceivable that such bank-side lending constraints also played a role in the decline in corporate borrowing, but it is also possible that the official lending rate parameter is slightly overestimated and it should probably be discounted when we evaluate the results.

¹⁹ However, it should be noted that the dependent variable, corporate borrowing, and the explanatory variable, the debt ratio, are simultaneously determined. We should note this simultaneity problem, which may have distorted the estimation results in some way.

We also divided the sampled enterprises into manufacturing and nonmanufacturing categories, and we obtained almost identical estimates as those for the whole sample.²⁰ (See Appendix 1 for details of the estimation results when enterprises are divided into manufacturing and nonmanufacturing categories.)

6. Concluding Remarks

In this paper, we used individual financial data of listed Chinese companies to quantitatively measure the relationship between their borrowing and both policy variables (official lending rates and financial institution lending) and individual corporate financial variables. We attempted to identify the impact of the monetary policy tools used by the People's Bank of China (PBoC) and the effect on corporate borrowing and bank lending of the series of reforms in the Chinese banking sector. In the context of corporate borrowing, we found: 1) quantitative controls on bank lending still have an impact through mechanisms such as window guidance, but that impact is diminishing; 2) official bank lending rates are having an increasing effect; and 3) banks are placing more emphasis on corporate borrowers' financial and managerial conditions when they decide their lending.

These findings lead us to conclude that, in the financial environment in which Chinese enterprises operate, there is a gradual emergence of lending activities based on interest-rate mechanisms and financial performance. That is, the financial environment is becoming subject to 'market mechanisms.' This will, in the future, provide China with a more effective transmission mechanism for interest-rate policy and will also make it possible to set higher interest rates for enterprises with relatively higher risks, and thereby price in credit risks property. In order for market mechanisms to play a more fundamental role in the behavior of Chinese enterprises and banks, however, the policy authorities will need to depart from their dependence on quantitative controls as the primary instrument for monetary policy and will need to further relax interest-rate regulations. In conjunction with these efforts,²¹ the banking sector will also need to improve its risk management and pricing strategy.

²⁰ Strictly speaking, the parameter of the interest rate (R) had somewhat different results for manufacturing and nonmanufacturing enterprises. In the early period, interest-rate trends had no impact on manufacturing, but in the period 2002–2004 borrowing activities began to take account of interest-rate movements. On the other hand, interest-rate movements had virtually the same effect on the nonmanufacturing sector in both periods. Nonetheless, the parameter for financial institution lending (*Chinaloan*), which represents the effect of quantitative controls, and the parameters for financial conditions yielded virtually identical results to those for the full sample.

²¹ On this point, there are some studies that indicate that state-owned commercial banks in China are unable to price in line with the amount of credit risks and do not take account of corporate results in lending decisions (see, for example, Podpiera (2006) and Odaka (2006)). However, banks are slowly beginning to strengthen their risk management and pricing capabilities. According to the *China Monetary Policy Report* (fourth quarter 2004), "Commercial banks are strengthening their internal controls and risk management in conjunction with their reformative developments, and some banks have introduced internal credit rating systems and begun to make preliminary risk assessments."

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Borrowing-function Estimation Results for Manufacturing and Nonmanufacturing Sectors

In this section, we apply the same framework used in Section 5 of the paper to conduct panel estimations of the manufacturing and nonmanufacturing sectors to check the robustness of the results we obtained from the whole sample. The estimating equation is the same as that described on Page 11.

(1) Manufacturing

Explanatory variable	(a) 2002–2004			(b) 1992–1996		
	Coefficient	<S. E.>	(t value)	Coefficient	<S. E. >	(t value)
<i>a</i>	−9.247	<0.984>	(−9.397)***	−8.633	<1.809>	(−4.771)***
<i>ROA</i>	0.005	<0.001>	(4.339)***	−0.005	<0.003>	(−1.908)*
<i>D</i>	0.010	<0.001>	(11.424)***	0.015	<0.002>	(8.135)***
<i>S</i>	0.053	<0.027>	(1.968)**	−0.004	<0.008>	(−0.483)
<i>Asset</i>	0.428	<0.046>	(9.254)***	0.328	<0.067>	(4.899)***
<i>R</i>	−0.124	<0.029>	(−4.317)***	−0.031	<0.031>	(−0.987)
<i>Chinaloan</i>	0.296	<0.216>	(1.370)	8.143	<3.387>	(2.405)**
Adjusted R ²	0.167			0.151		
Observations	2,449			1,075		
Enterprises	890			491		

***, ** and * denote significance at 1%, 5% and 10%, respectively.

(2) Nonmanufacturing

Explanatory variable	(a) 2002–2004			(b) 1992–1996		
	Coefficient	<S. E.>	(t value)	Coefficient	<S. E. >	(t value)
<i>a</i>	−13.001	<1.455>	(−8.938)***	−8.651	<2.405>	(−3.597)***
<i>ROA</i>	0.006	<0.002>	(3.855)***	0.009	<0.007>	(1.384)
<i>D</i>	0.021	<0.002>	(11.105)***	0.034	<0.003>	(10.009)***
<i>S</i>	0.041	<0.024>	(1.724)*	0.017	<0.012>	(1.473)
<i>Asset</i>	0.580	<0.068>	(8.485)***	0.135	<0.084>	(1.602)
<i>R</i>	−0.197	<0.044>	(−4.526)***	−0.159	<0.050>	(−3.179)***
<i>Chinaloan</i>	1.035	<0.335>	(3.087)***	23.194	<5.451>	(4.255)***
Adjusted R ²	0.316			0.213		
Observations	1,082			617		
Enterprises	390			256		

***, ** and * denote significance at 1%, 5% and 10%, respectively.

Focusing on the interest rate (**R**) parameter, interest rates previously had no impact on manufacturing-sector borrowing (the parameter was not significant), but during the 2002–2004 period, borrowing activities began to take account of interest-rate movements; that is, the coefficient is significant and of the expected sign. On the other hand, interest-rate trends had virtually the same effect in the nonmanufacturing sector during both periods. Thus, interest rates had a larger impact on borrowing activities during the 2002–2004 period in the full sample probably because manufacturing-sector borrowing activities began to take account of interest-rate movements.

The parameter of financial institution lending (**Chinaloan**) is significant for the manufacturing sector for the 1992–1996 period, but was not significant in the 2002–2004 period. For the nonmanufacturing sector, the parameter is significant in both periods, but its size for the period 2002–2004 is less than 5% of that in the previous period. Quantitative controls strongly influenced borrowing in both the manufacturing and nonmanufacturing sectors under the aggregate lending ceiling regime. Hence, our analysis suggests that now that these regulations have been eliminated, quantitative controls by the PBoC or the government are less effective.

Next, we consider the parameters of variables representing financial conditions. The effect of **ROA** is significant for both the manufacturing and nonmanufacturing sectors in the 2002–2004 period. (For manufacturing, core operation revenues (**S**) were also significant during the period 2002–2004). This appears to indicate that commercial financial institutions have begun to consider the financial conditions of borrowers regardless of whether they are in the manufacturing or nonmanufacturing sector when making decisions about lending to corporations. The parameter of debt ratio (**D**) is significantly positive for both periods in both sectors, which suggests that lending activities in both sectors depend on previous loan results.

Data Description

Below are detailed descriptions of the variables used in the paper. Data from *Trend Statistics* were used for outstanding borrowing, the return on assets, the debt ratio, core operation revenues and gross assets. CEIC data were used for financial institution official lending rates. Data from the *China Statistical Abstract* were used for outstanding financial institution lending.

Outstanding borrowing

Outstanding borrowings (L) = Short-term borrowing + Long-term borrowing + Current portion of long-term liabilities

(Current portion of long-term liabilities includes funds raised from nondebt sources, but the entire amount is assumed to be borrowing because of data limitations.)

Return on total assets

Return on total assets (ROA) = (Operating profits + Financial expenses) / Gross assets

(Financial expenses were added to operating profits and divided by gross assets in order to eliminate the impact of interest payments associated with borrowing.)

Debt ratio

Ratio of borrowing to gross assets (D) = Liabilities with interest / Gross assets

(Liabilities with interest = Short-term borrowing + Long-term borrowing + Current portion of long-term borrowing + Short-term bonds + Long-term bonds.)

Core operation revenues

Core operation revenues as recorded in profit and loss statements

Gross assets

Gross assets as recorded in balance sheets

Financial institution official lending rates

Standard one-year lending rates

Financial institution outstanding lending

Outstanding loans for all financial institutions in China