Risto Herrala and Yandong Jia

Has the Chinese growth model changed? A view from the credit market

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Abstract

A cornerstone of the Chinese growth model has been the opening up of its economy to private competition. Some observers claim that China has changed course since joining the WTO by increasingly promoting 'state capitalism', the large State Owned Enterprises, thereby compromising a growth model that has served it well. Due to the opaqueness of the Chinese system, even such a major shift in policy has been difficult to verify.

We are able to look inside the covert policy process by studying the credit supply to Chinese listed companies, the drivers of the growth miracle, of the past decade. The econometric analysis corroborates the policy shift: we find a significant improvement in credit supply conditions of government firms relative to other firms during the latter part of the decade. The estimations also provide evidence of other major trends in credit supply that reflect the Chinese government's policy objectives.

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1   Introduction

A cornerstone of the Chinese growth model has been the opening of its economy to private competition. The first decades after the 'reform and opening' policies were launched in 1978 witnessed a steady development of the private corporate sector and a gradual diminution in the role of the large state owned enterprises (SEO) in the economy. The accession of China into the WTO in 2001 was seen by many as a sign of its continued commitment to this policy (Bajona and Chu 2010).

But some observers claim that the leadership has been moving China off this path during the post-accession decade by increasingly promoting 'state capitalism', the large SEOs, and thereby compromising private competition (Walter and Howie 2011). Such a change would imply a shift away from a growth model that has served China well, with potentially far-reaching consequences for its development. Due to the opaqueness of the Chinese system, this shift has been difficult to verify.

We are able to look inside the covert policy process by studying econometrically the credit supply to Chinese listed companies, the drivers of its stellar growth over the past decade. It is well known that in China, more so than in western economies, policy makers rely on the credit channel, ie their influence of credit supply to control macroeconomic development. The Chinese government's influence over the credit supply, usually called 'window guidance' in short, is contrary to its name non-transparent. Its effectiveness was demonstrated during the recent global financial crisis, throughout which the Chinese economy remained on a high-growth trajectory due to a government-orchestrated expansion of bank credit. In China, financial markets are relatively undeveloped so that even the large corporations have to rely to a large extent on banks for their credit needs.

Our study contributes to the credit channel literature by a case study of China. Previous academic work has uncovered evidence of the role of credit markets in Chinese macroeconomic development (Hasan et al. 2009, Cheng and Degysse 2010, and Chong et al 2010) but the credit channel for the large corporate sector, the main generator of the economy's stellar growth, is not yet well understood. Studies of other developed and developing countries have shown that the credit channel is typically significant for smaller corporations and households, but less so for the large corporate sector (Khwaja and Mian 2008). It has not been clear whether China, with its original approach to economic policy, differs in this regard.

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Our econometric study of the 'front end' of the credit channel, ie the corporate-balance-sheet channel,[1] shows that although listed companies enjoyed high levels of credit availability during the estimation period even their borrowing was capital constrained. The presence of credit supply constraints is strongly supported by statistical tests. The result implies that the Chinese government was able to influence the corporate giants by adjusting their credit availability via the window guidance system. In China, contrary to many other countries, the credit channel reaches even the largest corporations.

The econometric analysis also contributes to our understanding of the policy of the Chinese government towards the large corporations. The government's policy objectives regarding the core corporate sector, a topic of much speculation, are not well understood. In an earlier study, Zhao (2009) uncovers survey-based evidence of negative discriminatory policies by the Chinese government regarding credit availability for large private corporations 2003-2006. Our quantitative econometric analysis of credit supply developments corroborates his results by indicating a shift in the Chinese government's policies towards the corporate sector. We find a significant loosening of credit supply constraints on government firms relative to other firms during the past decade. This trend strengthened significantly during the global financial crisis. The estimations also reveal other changes in the supply of credit to the corporate sector in line with stated government objectives.

An important contribution to the literature is an econometric approach to estimate credit supply constraints from borrower samples, and thereby reveal the underlying policy parameters of the lenders. Credit supply constraints are important targets of public intervention in China and also elsewhere, and an issue of considerable controversy in economics. The seminal contributions from Bernanke et al (1998), Holmström and Tirole (1997) and Kiyotaki and Moore (1998), for example, reflect different views about whether such constraints are binding.

Econometric work on the issue has been fragmented among different fields of economics. The partly overlapping methodologies include the FHP in corporate finance by Fazzari et al (1988), the split sample technique by Zeldes (1988) in consumer theory, the use of borrower surveys (Kaplan and Zingales 1997), and event studies of changes in financial regulation (Leth-Petersen 2010). Yet no fully satisfactory method has previously been presented for testing and measuring credit supply constraints. Our approach is based on stochastic frontier analysis of borrowers, pioneered in this context by Chen and Wang's (2008) study of Taiwanese firms. We

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[1] The other part is the bank lending channel, see Benanke and Gertler (1993).

are able to extend the applicability of the method significantly by a new approach which also provides a statistical test for the presence of credit supply constraints in a borrower sample. The novel approach to test and estimate such constraints presented below is economical on data requirements, as only borrower or lender data is required. A number of ongoing projects are in development with the novel methodology.

The methodology is formalized in the next section. We then discuss the data and the estimation period. This is followed by the estimation results and robustness analysis. A summary and our views, along with a discussion and suggestions for a future agenda conclude.

2   The methodology

We add to the credit channel literature a methodology for testing and estimating credit supply constraints via stochastic frontier analysis of borrower data.[2] It is well known that credit supply constraints may arise from asymmetric information problems in lender-borrower relationships. The idea that credit supply constraints can be estimated in the context of stochastic frontier analysis using corporate data was first presented by Chen and Wang (2008), and extended by an original approach in Herrala (2009). In addition to the present paper, a number of applications using the latter approach are currently in progress.[3] In the discussions about the approach the main issue has been the separation of credit supply from demand. Below we show how this issue can be resolved statistically.

The econometric approach is illustrated in Figure 1, which displays two loan distributions. The leftmost distribution is generated under standard normal credit demand without credit supply constraints; the rightmost distribution incorporates credit supply constraints. It is apparent from the Figure that the presence of credit supply constraints renders the loan distribution asymmetrical. This is because, by definition, the constraints censor credit demand above the constraint. The presence of a credit supply constraint can be identified statistically by the skew in the loan distribution. In the presence of normal observation error, the constraint can be estimated via stochastic frontier analysis of the borrower sample.

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[2] The term 'credit supply constraint' is from Bernanke et al (1998). The terms 'credit constraint', and 'liquidity constraint' have also been used.
[3] We are aware of Herrala (2010), Fungáčcvá et al (2011), and Cheng et al (2012).

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The graphical model abstracts from the observation error as well as the interest rate channel, which are treated al follows. Assume that firms face log-linear credit supply constraints:

$$L_{it} \leq \beta_t X_{it} + v_{it}$$ (1)

, where i indexes firms and t time, L is the loan stock, v is a normally distributed independent observation error, and the β are loan supply parameters. All variables are in natural logarithms. Following the literature, the non-zero elements of the β vector are assumed to include the firm's capital.

Further assume that unconstrained firms borrow in accordance with a stochastic normal log-linear credit demand function and constrained firms exit from the loan market:

$$L_{it} = \begin{cases} r_t + \alpha_t X_{it} + \varepsilon_{it} + v_{it} & \forall i \text{ such that } \varepsilon_{it} < (\beta - \alpha)X_{it} - r_t \\ 0 & \text{otherwise} \end{cases}$$ (2)

, where r_t indicates the interest rate channel, the α are demand parameters, and ε is a standard normal iid credit demand shock. To elaborate, under (1) and the normal log-linear demand function, firms characterized by $\varepsilon_{it} < (\beta - \alpha)X_{it} - r_t$ are unconstrained. The model extends straightforwardly to the case where interest rates have an idiosyncratic component reflecting, inter alia, credit risk. In (2), this component is absorbed by the idiosyncratic shock.

Note that equation (2) can alternatively be expressed as a stochastic frontier model of the supply parameters:

$$L_{it} = \begin{cases} \beta_t X_{it} + v_{it} - u_{it} & \forall i \text{ such that } \varepsilon_{it} < (\beta - \alpha)X_{it} - r_t \\ 0 & \text{otherwise} \end{cases}$$ (3)

where u is log inverse utilization rate of credit constraints: $u \equiv (\beta_t - \alpha_t)X_{it} - r_t - \varepsilon_{it}$, ie. the distance of borrowing from the constraint.

Which of the parameterizations of the borrower distribution, (2) or (3), is estimable depends on whether the credit constraints are binding for at least some firms or all firms are unconstrained. In the latter case, (2) reduces into a standard linear regression model of the credit demand parameters. If instead some firms face binding constraints, then (3) can be estimated by stochastic frontier techniques. In the econometric analysis, we use statistical tests to differentiate between the linear regression model of credit demand parameters, and the stochastic frontier

model of credit supply parameters. Identification is based on the skew criterion, which can be detected by the test of Coelli (1995).

For comparisons, we work with models that allow for variation in the β –vector across various dimensions of the industrial landscape:

$$L_{it} = \beta_{0t} + \beta_{equity,t} * Equity + \beta_{government,t} + \beta_{east,t} + \beta_{2.industry,t} +$$

$$\beta_{3.industry,t} + v_{it} - u_{it} \tag{4}$$

In the empirical model (4), the β parameters are respectively the regression constant, the variable effect of equity, and the fixed effects of government ownership, location in eastern provinces, and indicators of industry type.

Under the above assumptions, u is truncated normal and heteroscedastic. The empirical specification extends to allow alternative distributions of u that would arise if eg some constrained firms choose an interior level of borrowing rather than exiting, thereby affecting the shape of the loan distribution. We study alternative distributional assumptions of u. For robustness, we study both cross sectional models and panels. Cross section estimations allow maximum scope for temporal changes in all residual parameters. Panel estimates are more robust to possible correlation of the model residuals with each other and with the regressors.

3 The data and estimation period

Notable events during the estimation period 2000-2010 include China's WTO accession in 2001, and the start of Hu Jintao's leadership in 2002-2003. Hu's regime inherited a remarkably dynamic economy in the wake of over two decades of high growth. Downsizing and reorganization of state industries was under way in line with the 'grasping the large and letting the small go' policy. This policy entailed restructuring and listing of large enterprises, which remained under continued government control. Many smaller, previously state owned, companies were privatized or allowed to go bankrupt. The new company law held the promise to increase competition by creating a level playing field for the operation of companies.

The 10th five year plan for years 2001-2005, which laid down the main tasks of Hu's government during its first term, called for continued high growth and stable inflation, the

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strengthening of the industrial sector's international competitiveness, and its technological advancement. Growing environmental problems and the development disparity between the eastern and other parts of China were also high on the agenda. The subsequent 11th five year plan for years 2006-2011, covering the regime's second term, reflected growing environmental concerns. High GDP growth targets were accompanied by environmental efficiency objectives and a call for the strengthening of the services sector (Annex).

Hu's regime succeeded in continuing the remarkable growth of the Chinese economy: during the past decade the GDP growth exceeded 10 % per annum on average, thereby exceeding the official growth targets. By international standards, high growth rates were sustained even during the global financial crisis, at the end of the estimation period. During the crisis, very high bank lending growth provided a boost to the economy. The loan supply increase was orchestrated by the government through its window guidance system.

Hu's government also succeeded in maintaining stable consumer prices, which grew at a relatively subdued rate, 2 % per annum on average. In contrast, stock prices were quite volatile (Figure 2), and the market was in a continuous process of development. Around 2006, a number of significant regulatory changes widened the scope of firms listing in Shanghai and Shenzen, as well as the scope of domestic and foreign investors investing in these markets. These developments were accompanied by a marked increase in the number of listings, and a boom in stock prices.

Reform of the financial system proceeded at a subdued rate. The approach of the government to lifting of capital controls and the development of bond markets has been gradual. Throughout the estimation period, the financial system was dominated by domestic banks, which the policy makers controlled with an array of levers significantly broader than that in the developed countries. The government controlled the reference rates for lending and deposits, reserve requirements, and supervisory parameters, and it was the majority owner of the four largest banking institutions, which still account for 70 % of commercial banks' aggregate balance sheet. Window guidance included other channels of influence over banks' credit policy, eg via party-exerted influence over bank executives. Throughout the period, the government imposed quantitative targets for loan and money growth.

The effectiveness of window guidance was amplified by the low degree of development of the corporate bond market, which rendered even large corporations dependent on bank loans for finance. The government also had more direct control of the corporate sector, especially the

large SEO:s. To what extent and how the government used window guidance and its direct influence on corporate decisions is not transparent to outsiders.

Our estimation is based on published balance sheet data on Chinese listed companies. The data provider is Wind Information Co, which specializes in data service provision for banks and investors operating in the local markets in China. Although the data source is reputable and has been used before in published work, we have used Bloomberg for cross-checking purposes. By Chinese standards, the underlying data compilation methods are probably of relatively high quality due to listing requirements. A major modernization of accounting standards among Chinese listed companies was implemented before the start of our estimation sample in 1998.

The data covers all A -share companies, ie companies from mainland China, listed in the two mainland Chinese stock exchanges, Shanghai and Shenzen. Financial companies are excluded from our analysis. The number of companies included in estimations increases from 1109 in year 2000 to 1794 in 2010. The published data includes information on firms' outstanding loans and capital. As our loan stock indicator, we use 'financial debt', which includes bank loans as well as bonds because credit constraints apply to total lending. For capital, we use owners' equity.

Government firms are identified by the type of the largest stockholder, also taking into account indirect ownership. The majority, around 70 %, of the firms in our samples were government firms (Table 2). Government ownership share in listed companies is considerably larger than is the proportion of the value added accounted for by government, as most small unlisted firms are privately owned. In the Chinese environment, it is challenging to make a distinction between government firms and other firms, and no consensus has emerged in the literature about the preferred method. Our approach gives very similar government ownership shares as Liu and Sun's (2005) approach. The robustness of the estimation results with respect to this issue is investigated.

In the original data, the companies are classified by province of registration. For the estimations, we aggregate the provincial level indicator into three areas, 'east', 'central' and 'west' in the standard way. 4 About two-thirds of the firms originated in the eastern provinces, with the remainder about evenly split between middle and central China. In the empirical analysis,

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[4] The eastern area includes Beijing, Fujian, Guandong, Hainan, Hebei, Jiangsu, Liaoning, Shandong, Shanghai, Tianjin and Zhejiang. Hong-Kong, Canton and Macau are excluded.

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we ended up aggregating the western and middle areas for compactness, without much effect on the other parameters.

We use the three-level industry indicator: 'first', 'second', and 'third' industry, based on the 'Classification of the National Economy Industries' by the national statistical authority. In our sample, first industry comprises mostly energy and mining firms, and accounts for only 4 % of the sample. By far the largest group is second industry (70 % of the total), which includes traditional manufacturing and electronics firms. The third industry includes services firms.

4   Estimation results

Based on model stability and likelihood, we start with a normal/half normal model. The first priority is to establish, by the skew criterion, whether credit supply constrains were present in the listed company samples. The test results in Table 3, based on eleven models estimated from cross sections of years 2000-2010, provide strong evidence of residual skew. The tabulated z-test statistic has a standard normal distribution under the null hypothesis of no skew with 5 % probability threshold at -1.64. The null is easily rejected at this level for all years except 2006. The skew can also be spotted visually in the empirical borrower distributions (Figure 3 for 2010). It is also present in the government-firm subsamples. The evidence therefore strongly supports the presence of credit supply constraints for all estimation years except 2006.

For 2006, in contrast, the test statistic supports the null of a symmetric normal residual distribution. The visual (Figure 3) hints at a slight skew even in this sample, but the estimated probability value of the null is almost 100 %. Recall that 2006 was a year of significant institutional change in the stock market, during which stock prices more than doubled. It is perhaps not surprising that the absence of credit supply constraints coincides with a stock market boom.

Based on the skew criterion, we therefore conclude in favor of the stochastic frontier model of credit supply constraints over the credit demand model for all years except 2006. In Table 3, which gives the estimated stochastic frontier parameters, we include year 2006 for completeness, along with the skew test results. The eleven models converge normally. The chi-square test supports the frontier specification over a model with a constant frontier. The LR test confirms that u has positive variance, as is appropriate for a skewed residual distribution.

The parameter estimates suggest variegated development of credit supply constraints over the estimation period. From our perspective, an interesting result is the improvement in credit availability of government firms relative to other listed companies. It is clear from Table 3 that the government fixed effect was insignificant with a value of - 0.107 at the start of the sample in 2000. By 2004 the government fixed effect had increased to +0.292, with strong statistical significance. The gap in credit supply constraints for government firms versus other firms widened further during the global financial crisis so that, by 2010, the fixed effect had increased to +1.019. This result implies that, at average capital levels, state firms were able to borrow over twice the amount managed by private firms in 2010. All in all, the estimation results support the hypothesis of a policy shift towards state capitalism by indicating that credit supply constraints of government firms have developed much more favorably than those of other firms.

The estimations also reveal other trends in credit supply constraints in China, possibly related to government objectives. One such trend is the increase in the marginal effect of equity from +0.7 in 2000 to +1.0 in 2010, accompanied by a decrease in the regression constant to insignificant levels. A possible interpretation of this result is that Chinese banks moved towards prudent risk assessment policies by paying increasing attention to borrowers' solidity. This interpretation accords with expert assessments, eg by the IMF, pointing to improved risk management practices among Chinese banks in line with international standards.

The estimations also signal a shift in the effect of geography on credit availability. Earlier on, companies in relatively affluent eastern China, where the export industries are concentrated had better credit availability than companies elsewhere. In 2000, for example, the fixed effect of eastern provinces was close to one-quarter. By 2010, the fixed effect of the eastern province had turned negative. This change in credit availability may reflect the government objective, stated in the relevant official five year plan documents (Annex), to promote a more geographically balanced development of the Chinese economy.

We observe that the fixed effects of second and third industries have turned significantly positive from around the middle of the last decade. This implies that credit availability in these industries has improved relative to that of the first industry. Firms in the first industry are in our sample mostly energy and mining firms, and they typically receive large subsidies from the state budget. The tightening of their credit supply constraints may be related to the government's environmental objectives. The evidence is mixed about whether developments in credit supply constraints contributed to an expansion of services sectors, which is called for in the 11th

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five year plan. While credit availability to the services (third) industry increased significantly during the last term of Hu's government, the improvement was at par with that of the traditional (third) industry.

Estimates of average utilization rates $\exp(-u_i)$ indicate, to what extent the firms actually used the borrowing possibilities open to them. From Table 4 it is observed that the average utilization rates of government firms increased more rapidly than those of private firms during the mid of the last decade. Changes in utilization rates therefore also contributed to the fast growth of government firm borrowing relative to private firms at that time. However, the situation changed during the latter part of the decade, as utilization rates started to diminish.

To put the results into perspective, Figure 4 shows the development of the broad credit aggregate, the reference rate of lending (which is controlled by the monetary authorities) and the average utilization rates in our sample. It is observed that during the whole period, the broad loan aggregate grew fast, between 10-20%, often exceeding the central bank's loan growth targets (not shown). It is interesting, that credit growth was not particularly pronounced during the stock market boom in 2005-7. This indicates that the boom was not caused by loose credit conditions but rather by the regulatory changes at the stock markets. However, our estimation results indicate that the stock market boom significantly loosened corporate credit supply constraints in 2006.

The government orchestrated credit boom during the international financial crisis peaked in 2009. Our estimations (Table 3) indicate a significant loosening of credit supply constraints at that time. It is also observed (Table 4), however, that the average utilization rates of corporate loans fell rapidly, in spite of lowered interest rates. This confirms that changes in the credit supply constraints rather than credit demand was responsible for the credit boom.

5   Robustness analysis

The main robustness issues relate to the distributional assumptions of the estimated models. To study the sensitivity of estimation results to the distribution of u, we used both the exponential and truncated normal models. We found that the parameter estimates for the exponential model are similar to those of the reported half normal model. The results for the truncated normal model, on the other hand, were inconclusive as these models display significant instability,

which is a typical feature of this model type. All in all, even though we were not able to fully explore this model, we would conclude that our efforts did not yield evidence that would challenge the benchmark model.

The estimation results may also be sensitive to possible correlation between u and v relative to the X vector. To study this issue, we estimated models with alternative heteroscedasticity structures. Heteroscedasticity was allowed in u and v with respect to time, and in the regression variables. We found that such extensions do not challenge the main results.

We also wanted to rule out the possibility that changes in the size and composition of the estimation sample could affect the estimation results. To control for sampling, we re-estimated the models for a fixed sample of firms that were listed throughout the estimation period. In the fixed sample estimations, the improvement in government credit conditions relative to private firms was less pronounced and kicked in later than in the full sample estimations. However, the phenomenon was still statistically highly significant for the latter part of the sample period.

We studied the effects of estimation method via panel estimations. To this end, we split the sample in two subsamples (2000-2005 and 2007-2010 omitting the problematic 2006), and estimated a time-invariant stochastic frontier model for each subsample. We found that the main estimation results were not sensitive to this change in estimation method.

Since government firms tend to be larger than private firms, there is a possibility that the estimation results are affected by non-linearity in the effect of capital on credit supply constraints. We studied this issue with models that include the square of capital as an additional explanatory variable, as well as variable effects of capital in the group of government firms. Our main estimation results are not sensitive to these changes.

We have also experimented with alternative group indicators. As an alternative to our government dummy, we used a more restrictive indicator based on 50 % direct state ownership share. We find that the results are robust to such changes in the definition of a government firm. Also we investigate the possibility that the results would be related to a missing variable effect of reputation. Based on subjective assessment, we constructed a dummy variable for 'national champion status', which indicated leading firms in each of the respective cross sections. These changes did not significantly alter our conclusions. Furthermore, additional area indicators for middle or western China do not significantly affect the other parameters of interest.

We thus find that the estimation results are robust to alternative distributional assumptions of u, heteroscedasticity, sampling, estimation method, and changes in the X vector.

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6   Concluding remarks and discussion

The credit channel plays an important role in Chinese economic policy. It is therefore of considerable interest to study the credit channel of the large corporate sector, which is responsible for much of China's stellar growth. Our econometric study of listed companies in China reveals that, although large corporations enjoy high credit availability, even they face binding borrowing constraints. By controlling the constraints, the Chinese government can steer its corporate giants.

Due to the opaqueness of the policy system, not much has been known by outsiders about the objectives of policy makers vis-a-vis the corporate sector. Our economic results support the hypothesis that, during the past decade, the Chinese government increasingly promoted state capitalism, thereby changing the Chinese growth model that had relied on private competition. The estimations also yield evidence of other changes in credit supply, related to stated government objectives.

Based on simplistic models of lender-borrower relationships, it might be tempting to interpret the evidence of binding credit constraints as the influence of bankers over the entrepreneurs. In our view this interpretation is, especially in the case of China, most likely false. Rather, the estimated credit supply parameters reflect the Chinese government's policy regarding its corporate sector. We interpret the presence of binding credit supply constraints as evidence that even Chinese SEO:s can face hard budget constraints (Khwaja and Mian 2005). If the budget constraints were entirely soft, then the balance sheet structure of SEO:s would be irrelevant and their borrowing would not be capital constrained.

This link between loose credit supply conditions and soft budget constraints opens the worrying possibility that the loosening of credit supply constraints by state firms in China during the past decade indicates a corruption of the credit channel. According to a pessimistic interpretation (Shleifer and Vishny 1994), softening of budget constraints in firms may reflect private rent seeking by government officials. It should be emphasized, however, that such views remain speculative as our empirical analysis does not yield direct evidence on the matter. In part the loosening of the credit supply constraints may also reflect countercyclical policies by the government. However, this cannot be the sole reason, since the trend started long before there were any crisis signs in the international economy.

The estimation results should be seen as a small step in understanding how credit conditions affect the macro economy in China and elsewhere. We would call for further analysis of credit availability for other areas of the economy such as small firms and households. An important research agenda concerns the effects of credit supply on economic behavior, such as consumption and investment. Our novel estimation methodology shows promise in this regard.
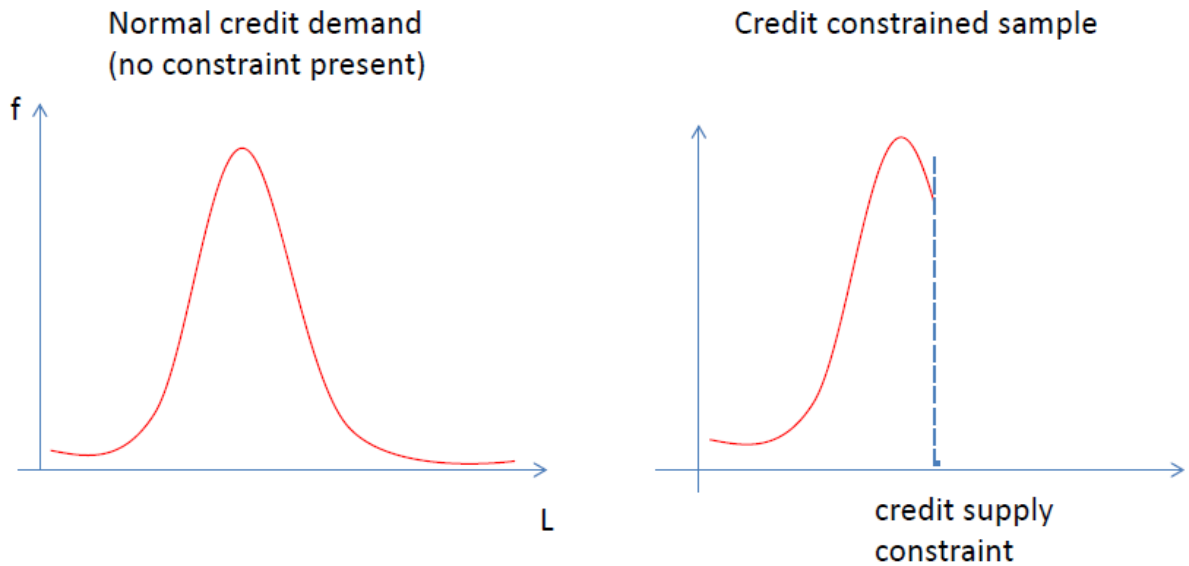
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Figures and tables

Figure 1   Illustration of the method

Note. L denotes lending stock, and f frequency. The leftmost coordinate system displays a normal borrower distribution without credit supply constraints; the rightmost system the normal borrower distribution truncated by a credit supply constraint.

Figure 2   Shanghai and Shenzen stock market indexes
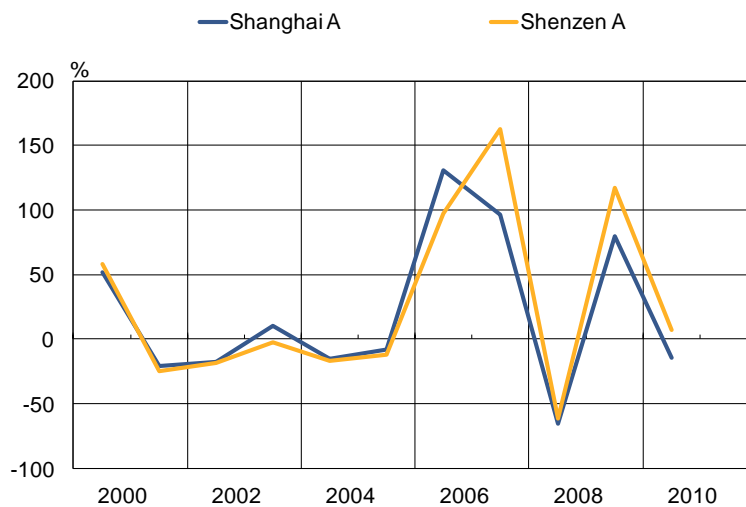
Note. Shanghai and Shenzen stock market indexes, annual % -change; data source Bloomberg.

Figure 3   Histograms of debt in the interval in the neighborhood of mean equity 2006 and 2010 (11<equity<13)
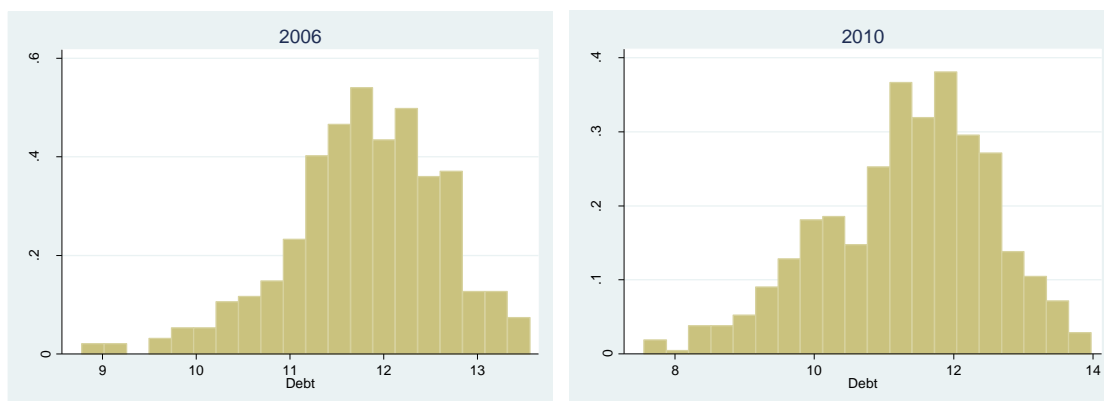
Note. All variables in natural logarithms of thousands USD; Data source Wind Information co.

Figure 4   Loan growth, the interest rate channel and average utilization rates
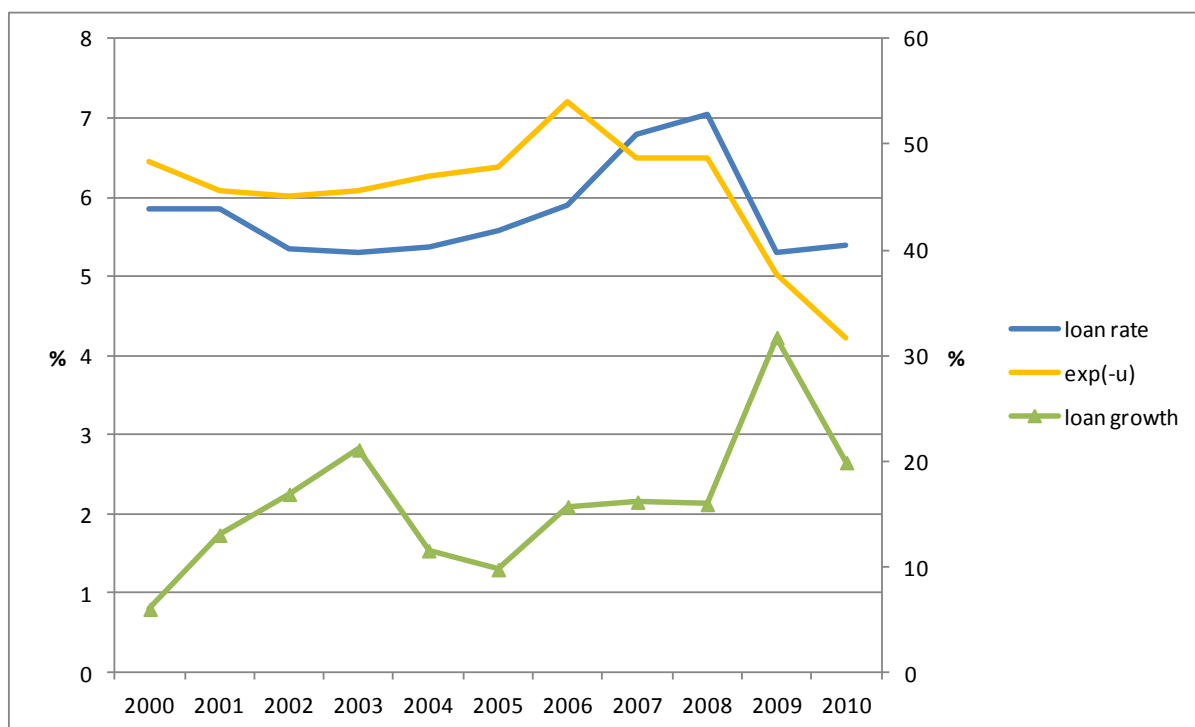
Note. Loan growth includes households and firms. Loan rate is the official reference rate for lending. exp(-u) is the sample average utilization rate in the listed company sample.

Sources: Bloomberg for loan growth, CEIC for loan rate, and models in Table 3 for exp(-u) .

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Table 1   Descriptive statistics

Year	Public firms			Private firms		
	Debt	Equity	debt/equity	Debt	Equity	debt/equity
2000	43665	58579	44 %	39057	46060	46 %
2001	45891	59155	44 %	37918	44621	46 %
2002	53738	65371	46 %	44790	49437	48 %
2003	62178	70844	47 %	45299	47808	49 %
2004	71468	74729	49 %	41990	42227	50 %
2005	79099	75921	51 %	44055	40856	52 %
2006	87194	81663	52 %	33609	31790	52 %
2007	90346	90737	50 %	29131	30695	49 %
2008	99607	102944	50 %	32598	40638	45 %
2009	115152	122448	49 %	37667	58063	42 %
2010	132936	156956	48 %	42003	105531	33 %

Note. Public firms identified by ownership share. Sample averages in thousands of USD; data source Wind Information co.

Table 2   Sample structure

Year	east	2. industry	3. industry	government
2000	62 %	68 %	29 %	81 %
2001	61 %	68 %	28 %	81 %
2002	61 %	68 %	28 %	81 %
2003	62 %	69 %	27 %	80 %
2004	63 %	69 %	27 %	78 %
2005	63 %	69 %	26 %	77 %
2006	65 %	69 %	27 %	74 %
2007	67 %	70 %	26 %	69 %
2008	66 %	70 %	26 %	69 %
2009	67 %	70 %	26 %	69 %
2010	67 %	70 %	26 %	69 %

Note. Sample proportion. East refers to eastern provinces, 2 and 3 industry to second and third industries, and government to companies in which the government has largest ownership share. Standard definitions and details available from the authors. Data source Wind Information co.

Table 3   Stochastic frontier estimates of loan supply parameters

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Frontier											
equity	0.704***	0.701***	0.731***	0.763***	0.770***	0.778***	0.848***	0.887***	0.967***	0.972***	1.001***
	[33.52]	[35.70]	[36.19]	[38.97]	[39.92]	[39.92]	[49.32]	[58.61]	[58.93]	[55.98]	[48.44]
government	-0.107	-0.014	-0.001	0.129	0.292***	0.286***	0.298***	0.300***	0.363***	0.577***	1.019***
	[1.17]	[0.16]	[0.01]	[1.64]	[3.93]	[3.88]	[4.62]	[5.64]	[6.74]	[10.31]	[16.36]
east	0.254***	0.209***	0.161***	0.118**	0.067	0.049	0.011	0.007	-0.057	-0.094**	-0.170***
	[5.16]	[4.31]	[3.35]	[2.48]	[1.35]	[0.96]	[0.24]	[0.16]	[1.28]	[1.98]	[3.15]
2. industry	-0.124	-0.058	0.063	0.176	0.175	0.19	0.343***	0.281***	0.415***	0.278**	0.467***
	[0.98]	[0.48]	[0.54]	[1.53]	[1.47]	[1.56]	[2.95]	[2.70]	[3.92]	[2.47]	[3.67]
3. industry	-0.224*	-0.089	0.014	0.117	0.071	0.07	0.167	0.106	0.267**	0.154	0.417***
	[1.70]	[0.70]	[0.12]	[0.96]	[0.57]	[0.55]	[1.38]	[0.97]	[2.39]	[1.30]	[3.12]
constant	3.614***	3.615***	3.245***	2.919***	2.786***	2.773***	1.222***	1.437***	0.425*	0.378	-0.415
	[12.60]	[13.39]	[11.93]	[11.19]	[10.78]	[10.33]	[2.78]	[7.10]	[1.94]	[1.58]	[1.38]
Other statistics											
Observations	1109	1198	1209	1285	1373	1403	1546	1789	1793	1788	1794
log likelihood	-1297.48	-1436.63	-1446.08	-1570.56	-1760.85	-1838.51	-1994.88	-2266.41	-2325.96	-2438.31	-2692.5
chi2	1219.31	1379.44	1398.17	1608.66	1783.09	1789.25	2982.86	4453.72	4381.07	3905.75	2772.42
skew	-2.07	-4.23	-3.28	-6.41	-4.92	-3.63	0.77	-4.15	-5.44	-5.39	-7.66
LR	6.21	15.1	10.67	33.31	22.9	15.67	0	20.02	29.14	32.82	58.97
iterations	2	3	3	3	3	3	15	3	3	3	3

Absolute value of z statistics in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

Note. Models estimated separately for each cross section. chi2 is the Wald chi-squared test for the null that all parameters in the frontier are zero except the constant. skew is a z test for the null that there is no negative skew in the residuals. LR is a one-sided likelihood ratio test that u has zero variance.

Table 4   Utilization rates for credit supply constraints

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
government	72 %	49 %	47 %	46 %	50 %	51 %	58 %	52 %	52 %	35 %	25 %
private	47 %	45 %	45 %	46 %	46 %	47 %	53 %	48 %	48 %	39 %	34 %
all	48 %	46 %	45 %	46 %	47 %	48 %	54 %	49 %	49 %	38 %	32 %

Note: Sample averages, calculated from models in Table 3. The estimates of year 2006 are suspect due to skew issues in the estimated model (see text).

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Annex: Main tasks set out in the 10th and 11th five year plans

10th plan	-- Achieve an average annual economic growth rate of about 7 percent.

10th plan	-- Achieve an average annual economic growth rate of about 7 percent. -- Achieve a GDP of 12,500 billion yuan by 2005, calculated at 2000 prices, and per capita GDP of 9,400 yuan. -- Increase the number of urban employees and the number of surplus rural laborers transferred to the cities to 40 million each, thereby controlling registered urban unemployment rates at about 5 percent. -- Keep prices stable, and to maintain the balance between international revenue and expenditure. -- Optimize and upgrade the industrial structure, and strengthen China's international competitiveness. -- Achieve growth for the primary, secondary and tertiary industries at the rates of 13, 51 and 36 percent respectively of GDP, with those employed by these industries accounting for 44, 23 and 33 percent of the total number of employees in the country. -- Improve the national economy and social IT levels. -- Kick-start the operations of more infrastructure facilities. -- Bring the development disparity between regions under effective control, and raise levels of urbanization. -- Raise research and development funding to more than 1.5 percent of GDP, and strengthen sci-tech innovation capabilities, thereby speeding up technological progress. -- Increase gross enrolment rates in junior high schools, senior high schools and higher education institutions to over 90 percent, 60 percent and 15 percent respectively. -- Reduce natural population growth rate to less than nine per thousand, and capping population at no more than 1.33 billion by 2005. -- On the environmental front, to increase forest coverage to 18.2 percent, and the urban green rate to 35 percent. The total amount of major urban and rural pollutants discharged will be reduced by 10 percent as compared with 2000, and more measures would be taken to protect and save natural resources.

11th plan	-- GDP up 7.5 percent annually from 18.2 trillion yuan in 2005 to 26.1 trillion yuan in 2010;
	-- Per capita GDP up 6.6 percent annually from 13,985 yuan in 2005 to 19,270 yuan in 2010.
	-- Share of service industry's value added to GDP up from 40.3 percent in 2005 to 43.3 percent in 2010;
	-- Share of employment in service industry up from 31.3 percent to 35.3 percent in 2010;
	-- Share of R&D spending out of total GDP up from 1.3 percent in 2005 to 2 percent in 2010;
	-- Urbanization rate up from 43 percent in 2005 to 47 percent in 2010.
	-- Population up from 1.30756 billion in 2005 to 1.36000 billion in 2010;
	-- Energy consumption per unit of GDP down 20 percent in five years;
	-- Water consumption per unit of industrial added value down 30 percent in five years;
	-- Coefficient of effective use of water for irrigation up from 0.45 percent in 2005 to 0.5 percent in 2010;
	-- Rate of comprehensive use of solid industrial waste up from 55.8 percent in 2005 to 60 percent in 2010;
	-- Total acreage of cultivated land down from 122 million hectares in 2005 to 120 million in 2010;
	-- Total discharge of major pollutants down 10 percent in five years;
	-- Forest coverage up from 18.2 percent in 2005 to 20 percent in 2010.
	-- Term of education per capita up from 8.5 years in 2005 to nine years in 2010;
	-- Coverage of urban basic old-age pension up from 174 million people in 2005 to 223 million people in 2010;
	-- Coverage of the new rural cooperative medical care system up from 23.5 percent in 2005 to over 80 percent in 2010;
	-- New jobs created for urban residents reaching 45 million in five years;
	-- Number of rural laborers transferred to non-agriculture sectors reaching 45 million in five years;
	-- Urban registered unemployment rate up from 4.2 percent in 2005 to 5 percent in 2010;
	-- Per capita disposable income of urban residents up 5 percent annually in five years, from 10,493 yuan in 2005 to 13,390 yuan in2010;
	-- Per capita net income of rural residents up 5 percent annually in five years, from 3,255 yuan in 2005 to 4,150 yuan in 2010.

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