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STATE AID AND COMPETITION IN BANKING:

THE CASE OF CHINA IN THE LATE NINETIES

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Abstract

Many contributions to the literature on competition in banking use the Panzar and Rosse test (1987). This test encompasses a variety of market outcomes assuming firms maximize profits. However, when applied to the banking industry, this assumption may not be always valid as banks sometimes may carry social objectives or aim to be systemic players so as to be "too big to fail". This then motivates different objective functions, departing from profit maximization. We present a reduced form model where banks can pursue other goals than profit maximization. This allows us to test for behavioral changes of banks over time. Our model provides a framework to evaluate whether moral hazard issues may plague banks receiving state aid, which concerns greatly the recent debate on government intervention in financial markets during the global financial crisis in 2008. To test the impact of state aid, we examine a natural experiment in the banking sector in China in the 1990s. We cannot reject that the possibility of receiving state aid triggers moral hazard prone conduct.

1 Introduction

The recent history of banking in Europe and the United States has witnessed abundant government interventions to a degree previously unseen. The cause of course was the global financial crisis of 2008, where governments had to provide state aids to rescue the impaired financial system.

In the European Union, the EC had laid down somewhat earlier the rules for granting state aid, as the result of the modernization of competition policy in 2005. More in particular, an "effects based doctrine" entered into the scene. This new approach to evaluate and guide state aid essentially encompasses the older views on state aid as correcting market failures, with newer theories that point to political failures due to captive governments engaging in strategic actions that distort competition. For a more detailed discussion of the "effects based approach", see e.g. Friederiszick, Röller and Verouden (2006).

A crucial element in this theory of effects is the maintenance of a fair level playing field between competitors that have received state aid and those that have not. If the effects of granting aid are too distortive for competition, it is unlikely that DG Competition (the (supranational) competition authority) will grant approval to the member states for the intended operations.

With a financial crisis of serious magnitude, it is however highly unlikely that the approval for state aid will be withheld, since absent the rescuing of the impaired financial institution, systemic instability will result. In trying to counter the moral hazard problems that arise when a financial institution becomes "systemic" and hence is "too big to fail", occasionally national governments can refuse to grant state aid or the supranational authorities can decline the request made by member states. But in the majority of the cases, there is no refusal to the intervention *"tout court"*, but *remedies* are imposed upon the beneficiaries of the state aid after the rescuing has taken place.

In general the remedies will try to impose conditions that change the conduct of the beneficiary. In particular, they will aim at restoring the viability of the institution in order to avoid that state aid needs to continue and they will try to compensate for the distortions in the competitive level playing field.

But a few facts on the impacts of state aid are known. Recent work by Glowicka (2008) investigates among other things the success of state aid policies in terms of restoring the viability of the recipients. Hashi, Hajdukovic and Luci (2005) inquire into the distortions that state aid may have on the international competitive position of manufacturing sectors.

In view of the effects based approach, it has no doubt that documenting the effects and effectiveness of state aid is important. But in trying to isolate the effects of state aid from other uncontrolled events, one always needs to rely on the occurrence of a true "natural experiment" in the data. Absent the presence of a natural experiment, it is hard to properly identify the impact of state aid.

In the matter of state aid maybe even more than in other policy domains, one easily can develop arguments that indicate that state aid is endogenous and hence that the conditions for having a "natural experiment" are not fulfilled. For example, state aid might work in gaining international competitiveness, but if national champions are targeted, it is unclear what the true impact of state aid was in achieving international success.

Especially in view of the "too big to fail" argumentation, systemic banks can be pretty sure of attracting capital injections or guarantees by governments. And given this is known to the public, the survival of the bank might be guaranteed. This then hardly can be attributed to the restructuring remedies imposed within the state aid rescue schemes.

Another way to phrase the appropriate research question is to note that some argue that after the turmoil has passed, decision makers quickly return to business as usual, and hardly take structural measures to avoid future debacles. If that is the case, the desirability of this type of government intervention can be questioned seriously. Hence, and not only on a conceptual level, the issue remains whether the imposed remedies have an effect in discontinuing unwanted behavior.

Until now, this issue to our knowledge has not been addressed. To fill this gap, we present a reduced form model allowing us to test the behavioral changes of banks. We thus can test whether moral hazard issues plague banks that receive state aid, which concerns greatly the recent debate on government intervention for financial institutions during the global financial crisis in 2008. In particular, our model is based on Panzar and Rosse (1987) but allows banks to departure from profit maximization.

Banks indeed may not be always profit-maximizing institutions. For instance, the 1977 Community Reinvestment Act in the U.S. and its following legislative and regulative changes encourage commercial banks and savings associations to take social responsibilities, which give rise to home improvement and refinance small business, and community development lending (Avery, Bostic, and Canner (2000)). In Europe, some banks may serve the political objectives of governments or interest groups (see e.g. Sapienza (2004)). In addition, banks may also aim to be systemic players so as to be "too big to fail" and thus to gain additional competitive advantage over their smaller rivals and lower their funding cost (Baker and McArthur (2009)).

To test for the impact of state aid, we examine a natural experiment in the banking sector in China in the 1990s. More specifically, we look at the effect of insolvent, state-owned banks receiving capital injections in 1998 by the Chinese central government and at the non-performing loans (NPLs) disposal in 1999. In contrast, another group of banks, the joint-stock commercial banks in China were allowed to fail in 1998 but the central government assumed responsibilities vis-a-vis debts. Such provisions for debts *ceased* in the following year with another joint-stock commercial bank failure[1]. Our results show that while state-owned bank continued to perform as before if not worse, joint-stock commercial banks have improved in terms of more

[1] Here we refer to the failure of Hainan Development Bank (HDB) in 1998 and a joint-stock-commercial-bank-like institution, Guangdong International Trust and Investment Company (GITIC) in 1999.

limited credit granting. Our evidence thus indicates that state aid brings about moral hazard issues.

In the next section, a methodological framework is developed starting from the well known Panzar-Rosse test, see Panzar and Rosse (1987). In the third section, this framework is applied to data from the Chinese banking industry in the period between 1996 and 2003. A fourth section concludes.

2 A Reduced form Model for Testing Behavioral Changes

In this section, a short reiteration on the Panzar –Rosse Model proceeds an extension of their seminal work.

The Panzar-Rosse test indicates that the sum of revenue elasticity with respect to input price changes (or H statistic) must be non positive when a monopolist maximizes his profits. The maintained assumption thus is monopoly profit maximization.

The rejection of the test can occur due to departures from monopoly. Panzar and Rosse relax the monopoly part of the maintained assumption to test for different hypothesis regarding market structures. They show how the H statistic becomes positive for monopolistic competition, conjectural variations oligopoly and long run perfect competition.

The present paper argues that still other departures from the maintained assumption are encompassed by the Panzar-Rosse Model. Should one have strong indications that the data are generated within a monopoly environment, similar testing by estimating revenue elasticities and computing H statistics allows to discriminate between differences in the objective function of the monopolist.

In some environments, like the one Chinese banks operated in, in the late nineties, a pronounced interest from a policy perspective may lie in the discrimination between differences in conduct regarding the targets aimed at rather than differences in market structure or conduct vis-à-vis rivals.

The theoretical value for the H statistic under different assumptions regarding the objective function is straightforward to derive, and hence the discussion here is limited to providing the intuition. The relevant departures from profit maximization considered here are revenue maximization and output maximization.

With revenue maximization, the bank tries to collect as much revenues from the granting of loans. Although it is not the purpose of this contribution to seek the motives for departing from profit maximization, revenue maximization to some extent follows from the pursuit of a Too Big To Fail (TBTF) strategy. Since loans make deposits, the size of the institution in monetary terms then is the largest.

Since in the case of revenue maximization, the output level (number of loans) is picked where the demand curve's own price elasticity equals one, the monopoly outcome (when costs are zero) is replicated. In any event, since the cost side does not enter the objective function, changes in input prices will not affect the optimal choice of output level and hence the revenue elasticity. Therefore, the H statistic under revenue maximization will be exactly equal to zero.

With output maximization, this becomes different. Again, no detailed explanation why output figures as an objective rather than profits is given. But again one can note that a bank with many loans probably has many clients, and hence that many will be affected when the bank fails. So TBTF also can justify output maximization. But in addition, output maximization implies that as many clients as possible will be served at the lowest possible loan rates. This is typical for state owned enterprises which serve the political goal of making as many clients as possible.

Output maximization will lead the bank to pick the output level for which the market price still covers costs. Input prices if raised by one per cent in a constant returns to scale environment also will raise average cost by one per cent. As a consequence, the output level needs to decrease in order to raise the market price. Since output is in the inelastic range of the demand curve, revenues will increase at least by one per cent and H will exceed one. The analogy here can be made with the Long Run Competitive Equilibrium case described in the seminal Panzar-Rosse article.

The present article thus maintains that the competitive conduct is unchanged as the result of state intervention and that Chinese banks operate in quasi independent submarkets, so as to test for changes in the objective function as the result of state aid.

3 The Chinese Banking System and State Aid

3.1 A Brief Introduction to the Chinese Banking Industry: State-owned Banks vs. Joint Stock Commercial Banks

Until 1978, the Chinese financial system followed a mono-bank model, where the central bank, People's Bank of China (PBOC), combined the roles of central and commercial banking. All banks were part of the administrative hierarchy of either PBOC or the Ministry of Finance to satisfy a centralized planning economy, with no incentive to compete with one another (Berger, Hasan, and Zhou (2009)).

The financial reforms since 1978, aimed at changing the operations and structure of China's banking system, replaced the mono-bank by a two-tiered banking system. Big Four state-owned banks, also known as Big Four specialized banks, overtook the lending functions from the PBOC to serve their designated sector of economy. In particular, The Bank of China (BOC), China Construction Bank (CCB), Agricultural Bank of China (ABC), and Industrial and Commercial Bank of China (ICBC) were

responsible for lending concerning foreign trade and exchange, construction, agriculture, and industrial and commercial activities, respectively.

The Big Four state-owned banks extended loans mainly to state-owned enterprises (SOEs), as the reformers in China believed the two-tiered banking system might serve SOEs better and thus increase their overall productivity (Chen, Skully and Brown (2005)). Although these state-owned banks were allowed to compete in all sectors in 1985, competition among them was very limited as they served mainly as policy-lending "conduits" for the government and lacked incentives to compete (Berger, Hasan, and Zhou (2009)). The enactment of the China Commercial Bank Law in 1995 providing a legal frame work for standardizing the operation of commercial banks started to promote lending based on a commercial basis among these state-owned banks, but their ownerships and incentives for management were not changed yet. Moreover, the intended market-oriented reform was hampered by a legacy loan classification system and the lack of a free-market interest rate regime (Xu (2005)).

The year of 2003 saw a further series of financial reforms aimed at introducing modern corporate governance mechanism into state-owned banks. In 2005 and 2006, three of four state-owned banks (CCB, BOC and ICBC) went public and started to serve the share-holders' interests.

Around the mid-1990s, 11 joint-stock commercial banks had also been established in response to the emerging need for financing projects from the non-state-owned sector[2]. Some joint-stock commercial banks had state-owned shares, such as Bank of Communications and China Everbright Bank, or shares from SOEs or local government, such as China Merchants Bank, CITIC Industrial Bank and the local development banks. The others mainly had non-state-owned shares, such as China Minsheng Banking Corporation.

It is plausible to assume that these joint-stock commercial banks were in a monopoly position within specific sub-markets. More specifically, the competition among them was not supported by a flexible-interest-rates regime until recently (Chen, Skully and Brown (2002)). In addition, given the thirsty non-state owned sector whose need for finance by far exceeded the capacity of these joint-stock commercial banks newly-established in the mid-1990s, competition among these banks might not be necessary. Indeed, the joint-stock commercial banks expanded very fast after establishment. For instance, the total assets of these banks increased by approximately 1.5 times by the end of 2002 compared to the beginning of mid-1990s (PBOC (1995, 2003)). Compared to state-owned banks, the joint-stock commercial banks were still relatively small. The total assets of state-owned banks by the end of 2002 were more than 4.5 times those of the joint-stock commercial banks.

During 2005 and early 2006, three of the four state-owned banks announced plans to partially privatize and take on minority foreign ownership (Berger, Hasan, and Zhou (2009)). Meanwhile the foreign financial institutions were also allowed to take a stake in joint-stock commercial banks. However, the central government has a strong restriction on foreign ownership--- a relatively low ownership limit of 25 percent (Rajan and Gopalan (2009)). While it hardly is disputable that the foreign investors

[2] One exception is Bank of Communication, which was established in 1987.

are profit-oriented, the major indigenous stakeholders probably still lacked the commercial culture.

3.2 State-Aid in China

Non performing loans (NPLs) had gradually become a serious issue for state-owned banks due to their continuous lending towards SOEs, which had little incentive to repay. According to Dai Xianglong, the former governor of the People's Bank of China, NPLs as a share of their total loans increased from 20 percent by the end of 1994 to 22 percent by the end of 1995, and then to 25 percent by the end of 1997. Some warned that the major banks in China were in the danger of insolvency and crisis by then (World Bank (1997)).

In addition, the state-owned banks as a group had also a negative net worth and thus were insolvent by Western accounting standards. For example, the total net worth of these banks by the end of 1995, including paid-in capital, surpluses, and retained profits, stood at only RMB 269 billion, while the 1995 NPLs of state-owned banks was about RMB 867 billion (22 percent of total loans) (Tung (2002)).To solve this problem, the Chinese government injected RMB 270 billion ($33 billion) of capital into the four state-owned banks in 1998. Since the injected capital was far from enough compared to the total amount of NPLs, the government established in 1999 four asset management corporations (AMCs) to purchase RMB 1.4 trillion ($170 billion) of NPLs from the four state-owned banks. No state-owned banks therefore went bankruptcy under the state-aid scheme.

The Chinese government also stepped in when the joint-stock banks faced a problem. But a very important case showing that this did not automatically guarantee the continuation of the bank concerns the bankruptcy of Hainan Development Bank (HDB). In 1995, merged by Hainan Funan Trust and Investment Company with four ailing trust companies, HDB started operations as the media put it, "one of the few purely profit-driven banks" in China. Its purpose was to finance the development of the province. Hainan's provincial government put in RMB 320 million and became a major stockholder, holding a 30 percent stake.

Altogether, 47 shareholders held stock for a total equity value of RMB 1.7 billion. HDB first experienced tremendous expansion but the bank's loan quality had not been very good, which turned out to be NPLs after the bubble in the property market busted (Chi (1998)). The worst time came soon after its merger with 28 credit unions in Hainan province, which suffered from NPLs but enjoyed a capital injection from the central government, right before the Asian Financial Crisis. HDB not only failed to pull the credit unions back from the brink, but with small cash reserves, it also sank into a severe payment crisis. In June 1998, the closure of HDB was finally announced and the central government assumed the responsibilities of its outstanding debts (Berger, Iftekhar, and Zhou (1999)).

Things even changed further in 1999. The central government then ceased to assume the main payment responsibilities as creditors expected in a following closure of Guangdong International Trust and Investment Corporation (GITIC). Although being an investment company as its name referred, GITIC was actually a deposit taking institution and took deposits from around 25,000 local depositors (Gamble (1999)).

Established in 1980, GITIC was owned by Guangdong government and was able to enlarge its assets an estimated 100 times by 1995. However, its stunning expansion brought serious problems of asset quality and its outstanding debts exceeded its assets before bankruptcy.

To sum up, it is clear that the central government took different measures towards state-owned and joint-stock commercial banks in question, even though both of them were insolvent. While the central government bailed out the state-owned banks, they let the joint-stock commercial banks fail. Therefore state-owned and joint-stock commercial banks can serve as a reference group to each other in identifying the impact of state aid on bank behavioural changes.

4 Empirical Results on the Impact of State Aid on Conduct in the Chinese Banking Industry

4.1 Empirical Model

To test the behavioral changes of banks in China, we take the baseline model from Panzar and Rosse (1987), stated as follows:

$$\ln(R_{i,t}) = \alpha + \beta' \ln(P_{i,j,t}) + \gamma' Con_{i,k,t} + \varepsilon \quad (1)$$

where $R_{i,t}$ is the interest income of bank i in year t, $P_{i,j,t}$ is the vector of j different input prices for bank i in year t, $Con_{i,k,t}$ is the vector of k controlling variables that may affect the interest income for bank i in year t, α is the constant term, β' and γ' are the vectors of coefficients to be estimated, and ε is the error term. $\sum \beta'$, the sum of coefficients of input prices is the H statistic proposed by Panzar and Rosse (1987). In our model, the null hypothesis of a profit maximizer cannot be rejected if the H statistic is non positive; the null hypothesis of a revenue maximizer cannot be rejected if the H statistic equals zero; and the null hypothesis of an output maximizer cannot be rejected if the H statistic exceeds one.

4.2 Data Description

We use the Chinese banking data from Bankscope over the period of 1996-2003. Our sample includes two state-owned banks, BOC and ICBC, and six joint-stock commercial banks, Bank of Communication, China Everbright Bank, China Minsheng Banking Corporation, Guangdong Development Bank, Shanghai Pudong Development Bank, and Shenzhen Development Bank. Our data is unbalanced because the observation of Guangdong Development Bank in 1996 is missing with Bankscope.

[Insert Table 1 Here]

Table 1 presents the summary statistics for the pooled bank data, highlighting the difference between state-owned and joint-stock commercial banks. Revenue refers to

the total interest income of banks. On average, state-owned banks gained significantly more revenue compared to joint-stock banks over our sample period. Annual Funding Rate is calculated by interest expenses to total funds. Our sample shows that on average state-owned banks paid significantly more to get funding than their counterparts. Price of Physical Capital Expenditure equals total operating expenses to fixed assets. As Table 1 shows, joint-stock banks carried a significantly higher price of physical capital expenditure, which may be due to the fact that state-owned banks were often subsidized by the central government (Berger, Iftekhar, and Zhou (2009)). The controlling variables include Asset Composition, which equals non-earning assets to total assets, Risk Preferences, which equals equity to total assets or capital adequacy ratio, and Other Role of Banks, which equals other income to interest income. These variables are typically introduced into the model specifications as controlling variables in the banking competition literature (see e.g. Bikker, Spierdijk, and Finnie (2007)). In general, state-owned and joint-stock commercial banks shows to have no significant differences with respect to those controlling variables.

*4.3 Empirical Result*s

4.3.1 State-owned vs. Joint-stock Commercial Banks: a First Glance

Before moving into the test for the behavioral changes of banks in China, it is interesting to have a look first at whether state-owned and joint-stock banks differed before and after the state-aid over the 1998-1999 period.

[Insert Table 2 Here]

Table 2 reports the maximum likelihood estimates for the pooled panel model of regression (1) with additional interaction terms. More specifically, Column 2(a) introduces an interaction term between the Post-1999 dummy and the State-owned dummy, together with the input prices. Post-1999 dummy equals 1 for any year later than 1999 (including the year of 1999), and 0 otherwise. State-owned dummy equals 1 if a bank is state-owned, and 0 otherwise.

Including the interaction term allows us to distinguish the "difference-in-differences" for state-owned and joint-stock commercial banks before and after the state-aid period (Wooldridge (2003)). While input prices such as Annual Funding Rate and Price of Physical Capital Expenditure show a significant positive pass-through to a bank's revenue, the dummies and their interaction is also significant. In particular, Column 2(a) shows that both state-owned and joint-stock banks made more revenue after the state aid, but state-owned banks on average enjoyed higher revenue. However, such difference of the revenue between state-owned and joint-stock commercial banks shrunk after the state-aid.

In Column 2(b), we add controlling variables such as Asset Composition, Risk Preferences, and Other Role of Banks. The major difference between Column 2(a) and 2(b) is that while the coefficients of Asset Composition and Risk Preferences are statistically significant, the interaction term becomes insignificant. This may be because the variation of controlling variables actually to some extent characterizes the difference between state-owned and joint-stock commercial banks and also that between before and after the state aid.

In Column 2(c), we allow the interactions between Post-1999 and State-owned dummies with the input prices, without controlling variables. Our results show that the interaction term between Post-1999 and State-owned becomes insignificant. Although the interactions between the dummies and input prices show to have statistically insignificant coefficients, the joint significance of either interaction term of the two dummies with Annual Funding Rate and the corresponding dummy cannot be rejected at 5% level. The joint significance may be a reason why the interaction term between State-owned and Post-1999, or the variable that captures the "difference-in-differences", becomes insignificant.

4.3.2 The Impact of State Aid on Behavioral Changes in the Chinese Banking Industry

[Insert Table 3 Here]

Table 3 presents the regression results based on which our H statistic is calculated. More specifically, the left panel of Table 3 (Column 3(a), (b), (c), and (d)) reports the pooled sample analyses of input price pass-through into revenue. The right panel reports the results for two sub-samples, state-owned and joint-stock commercial banks, respectively. Column 3(a), 3(c), 3(e), and 3(g) report maximum likelihood estimates for the pooled panel model. Column 3(b), 3(d), and 3(h) report OLS estimates for the fixed effects panel model with robust standard errors. As the cross-sectional number of the sub-sample of state-owned banks is very small relative to the number of years, Column 3(f) reports maximum likelihood estimates for the pooled panel model, but controlling for bank dummies. Asset Composition, Risk Preferences, and Other Role of Banks, are introduced into Column 3(c) and 3(d).

[Insert Table 4 Here]

Table 4 reports the H statistic calculated based on the specifications in Table 3. Three out of four H statistics calculated from specifications of the full sample of banks show a significant decreasing trend after the state aid period of 1999. For instance, specification 3(a) and 3(c) in Table 4 imply that before 1999, one cannot reject that banks in China were output-maximized. And that one equally cannot reject that they became revenue-maximized after 1999. In a similar way, specification 3(b) shows that before 1999 banks in China in general were possibly output-maximized, and after 1999 these banks clearly became revenue-maximized. The H statistic from specification 3(d) doesn't allow us to draw a clear conclusion on whether behavioral changes happened because of state-aid. Results of specification 3(d) should be taken with care because the inclusion of controlling variables seems to take away the effects of state-aid, as Table 2 reveals. It is not surprising given the fact that the Chinese government aimed to improve the viability of banks by state aid and thus improved financial ratios were also the result of such aid.

Can we therefore draw the conclusion now that the state aid program in China indeed has altered bank behaviors? In our analyses, the tests rely on the variation of revenue that is explained by the variation of input prices. Since the number of joint-stock commercial banks in our sample outweighs that of state-owned banks, it is possible that the results are simply driven by the behavioral change among joint-stock commercial banks. To test this, we split the sample into two groups, state-owned banks and joint-stock commercial banks. A sample split allows us to control for

instance within-sample bank specific factors by including bank dummies into the specification. In particular, specification 3(e) and 3(f) in Table 3 show that the objectives of state-owned banks had not been changed after the state-aid. The increased H statistic after 1999 for state-owned banks in specification 3(e) implies that their objectives to maximize output even became more pronounced after state aid. In contrast to that of state-owned banks, the H statistic of joint-stock commercial banks decreases in both specification 3(g) and 3(h). In particular, specification 3(h) shows that though the revenue-maximized objective cannot be rejected for joint-stock commercial banks for both before and after state aid, the H statistic even becomes negative. 3(g) shows that the null hypothesis that joint-stock commercial banks were maximizing output cannot be rejected for the subsample before 1999, but clearly is rejected for post-1999 observations. This is a sharp indication that joint-stock commercial banks have changed their objectives after the period of state aid.

[Insert Table 5 and 6 Here]

One may argue that the fact that joint-stock commercial banks might have been alerted dated back to 1998, because though the central government assumed all debts from HDB, it still let HDB fail. In contrast in the same year the government injected capital to the state-owned banks. We therefore split our sample into two groups, pre-1998 and post-1998, and test the behavioral changes of banks again. The results of regressions and behavioral change tests are reported in Table 5 and Table 6, respectively. Compared to those from Table 3 and 4, our results from Table 5 and Table 6 remain robust in the sense that we do find the significant different behavioral change patterns for state-owned and joint-stock commercial banks. For instance, while specification 5(e) in Table 6 shows that state-owned banks switched from revenue to output maximizing after receiving state aid, specification 5(h) shows that joint-stock commercial banks on the contrary switched from output (constrained by input, or deposits) to profit maximizing.

4.3.2 Discussion

Why did state-owned and joint-stock commercial banks have significant different behavioral change patterns after the state aid in China? One explanation is that state aid in general brings about moral hazard issues. More specifically, state aid in China to state-owned banks seems to confirm these banks' beliefs that they were "too big to fail", at least in the short run. China's central government tried to install a commercial culture aiming at long term viability for these banks, which in the end may have come about, see a recent interview with Jiang Jianqing in Mc Kinsey Quarterly, 2009. Mr. Jiang Jianqing, President of ICBC, explains how he reduced the non performing loan ratio from 47,5% in June 1999 to a mere 1,7 % on new loans, recently. Certainly in the first years after the state aid was received, the commercial culture aiming at long term viability remained an unaccomplished goal and it is an interesting research question in its own to find out what then ultimately triggered the change.

In contrast, as joint-stock commercial banks received little state aid, they altered away from output-maximized objectives much faster. This may be due to the fact that joint-stock commercial banks realized that the central government would never back them up any more if things went wrong, indicating the importance of a *first time last time principle* in fighting moral hazard.

4 Conclusion and Extensions for Future Research

State aid for the financial sector is heavily criticized, for a variety of reasons. State aid could distort the level playing field between the financial institutions that receive state aid and those who don't. But unlike most industrial companies, banks have many linkages between each other by the mere fact that they hold many deposits with their competitors. In that respect, the failure of one bank is not necessarily good news for the rivals. And the rescue of a competitor with state aid might be good news, as long as the recipient does not use the aid to distort the level playing field.

Another line of criticism talks to the future viability and the guarantee that state aid will not occur frequently. This issue of course is related to the first one since a bank that needs frequent rescue probably plays according to different and maybe unfair rules to competitors. At the same time however, the future viability of the rescued banks is important for avoiding recurrent government intervention, with potentially high costs to the taxpayer. If it is the case that after the turmoil has passed, decision makers quickly return to business as usual, and hardly take structural measures to avoid future debacles, such state aid policies are unlikely to pass the first time, last time test.

And smart governments that learn from this may implement mixed strategies, not always rescuing impaired banks. Such drastic measures however also have serious societal costs. Hence it is appropriate to investigate the effect state aid and the associated remedies that are imposed have really.

The present study was a first attempt in this direction. The conclusion that can be reached calls for the cautious use of state aid. And especially for a close and lasting follow up on the corporate governance of banks. Using Chinese data generated by a natural experiment following state aid to its banking industry, we find that the assurance state aid will be received indeed brings about moral hazard issues.

The theoretical model should be further extended in order to gain an even more complete insight into the testable predictions on bank behavioral changes. For instance, possible dynamic entry deterring strategies of banks may be considered. Or if these players try to enter a new market. It is plausible to act as an output maximizing player in short run even for a profit seeking bank if it enters a new market and tries to gain as much as possible the market share. In addition, since imperfect competition in the deposit market may affect the loan granting possibility of a bank (Bracoud (2002)), a structural model of deposit competition which could act as a constraint on loan lending may also be incorporated.

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Table 1 Summary statistics of the Chinese Banks:1996-2003

This table presents the summary statistics for the pool bank data, highlighting the difference between state-owned and joint-stock commercial banks. ** stands for the means of two sub-samples, state-owned and joint-stock commercial banks, are significantly different at 5%; and * stands for such difference is significant at 10%

	Obs	Mean			Stan. Dev.	Min	Max
		State-owned	Joint-stock	Full Sample			
Revenue	63	26.160**	1.048**	7.426	17.065	.034	95.874
Annual funding rate	63	.061*	.028*	.036	.044	.012	.301
Price of physical capital expenditure	63	.879**	1.241**	1.149	.598	.370	3.183
Asset composition	63	.069	.060	.063	.046	.008	.225
Risk preferences	63	.050	.050	.050	.025	.019	.168
Other role of banks	63	.051	.068	.064	.067	.003	.367

Table 2 State-owned Banks and Joint-stock Commercial Banks: a First Glance

This table compares the difference between state-owned banks and other commercial banks in their revenue making, including pass-through from input prices, including Annual funding rate and Price of physical capital expenditure, state-owned and post-1999 dummy, and other controlling variables. Column 2(a), 2(b), and 2(c) report maximum likelihood estimates for the pooled panel model. *p*-value is reported between brackets.

	Pooled 2(a)	Pooled 2(b)	Pooled 2(c)
Annual funding rate	.656**	.477**	1.016**
	(.000)	(.001)	(.016)
Annual funding rate x Post-1999			−.676
			(.146)
Annual funding rate x State-owned			−.079
			(.850)
Price of physical capital expenditure	.725**	.306*	.567**
	(.000)	(.085)	(.015)
Price of physical capital expenditure x Post-1999			.523
			(.143)
Price of physical capital expenditure x State-owned			−.215
			(.796)
Post-1999 (Dummy)	1.023**	.516**	−1.346
	(.000)	(.010)	(.415)
State-owned (Dummy)	3.774**	3.601**	3.238**
	(.000)	(.000)	(.020)
Post-1999 x State-owned	−.797**	−.497	−.544
	(.034)	(.120)	(.268)
Controlling variables			
Asset composition		.007	
		(.948)	
Risk preferences		−.468**	
		(.003)	
Other role of banks		2.576**	
		(.024)	
Obs	63	63	63

Table 3 Pass-Trough from Input Prices to Loan Revenues, Pre 1999 v.s Post 1999

This table presents the pass-through from input prices, including Annual funding rate and Price of physical capital expenditure to loan revenues. Column 3(a), 3(c), 3(e), and 3(g) report maximum likelihood estimates for the pooled panel model. Column 3(b), 3(d), and 3(h) report OLS estimates for the fixed effects panel model with robust standard errors. Column 3(f) report maximum likelihood estimates for pooled panel model, also including bank dummies. *p*-value is reported between brackets.

	Pooled	Pooled	Pooled	Pooled	State-Owned	State-Owned	Joint-stock	Joint-stock
	3(a)	3(b)	3(c)	3(d)	3(e)	3(f)	3(g)	3(h)
Annual funding rate	2.733**	1.037**	2.900**	.807**	.809**	.751**	2.301**	.747
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.227)
Annual funding rate x Post-1999	-1.613*	-1.336**	-1.980**	-.604**	.003	-.369**	-1.725**	-2.027**
	(.059)	(.000)	(.033)	(.001)	(.980)	(.000)	(.026)	(.009)
Price of physical capital expenditure	.243	.008	-.247	-.600**	1.059**	.217	.856**	-.011
	(.628)	(.972)	(.684)	(.014)	(.000)	(.231)	(.001)	(.960)
Price of physical capital expenditure x Post-1999	.092	.587**	.664	.918**	.567*	.154	.374	.750**
	(.911)	(.030)	(.447)	(.003)	(.090)	(.404)	(.381)	(.002)
Post-1999 (Dummy)	-3.643	-4.005**	-4.722	-1.644**	.606	-1.040**	-4.357	-6.819**
	(.240)	(.000)	(.151)	(.006)	(.218)	(.004)	(.108)	(.009)
Controlling variables								
Asset composition			.088	-.185				
			(.723)	(.178)				
Risk preferences			.229	-.694**				
			(.636)	(.001)				
Other role of banks			5.475*	3.138**				
			(.086)	(.002)				
Bank Dummies		Yes		Yes		Yes		Yes
R-squared		.954		.975				.867
Obs	63	63	63	63	16	16	47	47

Table 4 Test on the Change of Chinese Banks' Objectives: Pre-1999 v.s Post-1999

This table reports the tests for Chinese banks objectives before and after 1999. The H statistic is calculated from the estimated coefficients from Table 3. The null hypothesis of a profit maximizer cannot be rejected if H statistic<0; the null hypothesis of a revenue maximizer cannot be rejected if H statistic=0; and the null hypothesis of an output maximizer cannot be rejected if H>1. *p*-value is reported for two-sided tests.

		Pre-1999	Post-1999	Pre-1999	Post-1999
		Specification 3(a)		Specification 3(b)	
	H statistic	2.97	1.45	1.04	.29
	Interval of 95%	[1.49, 4.45]	[-.48, 3.39]	[.62, 1.46]	[-.39 .98]
Pooled	*p*-value (Null: H=0)	(.000)	(.142)	(.000)	(.394)
Banks	*p*-value (Null: H=1)	(.009)	(.646)	(.830)	(.046)
	Profit-Maximizer H<0	Reject	Reject	Reject	Reject
	Revenue-Maximizer H=0	Reject	Cannot reject	Reject	Cannot reject
	Output-Maximizer H>1	Cannot reject	Reject	Reject	Reject
		Specification 3(c)		Specification 3(d)	
	H statistic	2.65	1.33	.20	.52
	Interval of 95%	[1.00, 4.30]	[-.63, 3.31]	[-.30, .71]	[-.01, 1.04]
Pooled	*p*-value (Null: H=0)	(.002)	(.185)	(.421)	(.053)
Banks	*p*-value (Null: H=1)	(.050)	(.738)	(.003)	(.952)
	Profit-Maximizer H<0	Reject	Reject	Reject	Reject
	Revenue-Maximizer H=0	Reject	Cannot Reject	Cannot reject	Cannot Reject
	Output-Maximizer H>1	Cannot Reject	Reject	Reject	Reject
		Specification 3(e)		Specification 3(f)	
	H statistic	1.86	2.43	.96	.75
State-	Interval of 95%	[1.43, 2.29]	[1.82, 3.05]	[.61, 1.31]	[.15, 1.34]
owned	*p*-value (Null: H=0)	(.000)	(.000)	(.000)	(.013)
banks	*p*-value (Null: H=1)	(.000)	(.000)	(.861)	(.417)
	Profit-Maximizer H<0	Reject	Reject	Reject	Reject
	Revenue-Maximizer H=0	Reject	Reject	Reject	Reject
	Output-Maximizer H>1	Cannot Reject	Cannot Reject	Reject	Reject
		Specification 3(g)		Specification 3(h)	
	H statistic	3.15	1.80	.736	-.54
Joint-stock	Interval of 95%	[1.79, 4.52]	[.76, 2.85]	[-.37, 1.84]	[-1.26, .18]
Commercial	*p*-value (Null: H=0)	(.000)	(.006)	(.188)	(.139)
Banks	*p*-value (Null: H=1)	(.002)	(.130)	(.634)	(.000)
	Profit-Maximizer H<0	Reject	Reject	Reject	Reject
	Revenue-Maximizer H=0	Reject	Reject	Cannot Reject	Cannot Reject
	Output-Maximizer H>1	Cannot Reject	Reject	Reject	Reject

Table 5 Pass-Trough from Input Prices to Loan Revenues, Pre 1998 v.s Post 1998: Robustness Check

This table presents the pass-through from input prices, including Annual funding rate and Price of physical capital expenditure to loan revenues. Column 5(a), 5(c), 5(e), and 5(g) report maximum likelihood estimates for the pooled panel model. Column 5(b), 5(d), and 5(h) report OLS estimates for the fixed effects panel model with robust standard errors. Column 5(f) report maximum likelihood estimates for pooled panel model, also including bank dummies. *p*-value is reported between brackets.

	Pooled	Pooled	Pooled	Pooled	State-Owned	State-Owned	Joint-stock	Joint-stock
	5(a)	5(b)	5(c)	5(d)	5(e)	5(f)	5(g)	5(h)
Annual funding rate	2.990**	1.238**	3.307**	1.071**	.994**	.693**	3.975**	1.923**
	(.000)	(.000)	(.000)	(.000)	(.001)	(.000)	(.000)	(.024)
Annual funding rate x Post-1999	-2.134**	-1.604**	-2.560**	-.910**	-.540*	-.365**	-4.056**	-3.000**
	(.007)	(.000)	(.005)	(.000)	(.088)	(.005)	(.000)	(.001)
Price of physical capital expenditure	.243	.058	-.339	-.522**	.412	.406	1.055**	.206
	(.687)	(.773)	(.620)	(.013)	(.679)	(.311)	(.001)	(.177)
Price of physical capital expenditure x Post-1999	-.043	.330	.382	.501*	.628	-.213	.058	.327
	(.957)	(.166)	(.640)	(.054)	(.539)	(.613)	(.885)	(.108)
Post-1999 (Dummy)	-5.124*	-4.714**	-6.286**	-2.461**	-1.208*	-1.175**	-11.896**	-9.518**
	(.054)	(.000)	(.035)	(.001)	(.065)	(.000)	(.000)	(.001)
Controlling variables								
Asset composition			-.041	-.282*				
			(.873)	(.055)				
Risk preferences			.182	-.606**				
			(.713)	(.004)				
Other role of banks			5.986*	2.429**				
			(.057)	(.015)				
Bank Dummies		Yes		Yes		Yes		Yes
R-squared		.955		.975				.886
Obs	63	63	63	63	16	16	47	47

Table 6 Test on the Change of Chinese Banks' Objectives: Pre-1998 v.s Post-1998: Robustness Check

This table reports the tests for Chinese banks objectives before and after 1999. The H statistic is calculated from the estimated coefficients from Table 5. The hull hypothesis of a profit maximizer cannot be rejected if H statistic<0; the hull hypothesis of a revenue maximizer cannot be rejected if H statistic=0; and the hull hypothesis of an output maximizer cannot be rejected if H>1. *p*-value is reported for two-sided tests.

		Pre-1998	Post-1998	Pre-1998	Post-1998
		Specification 5(a)		Specification 5(b)	
	H statistic	3.23	1.05	1.29	.021
	Interval of 95%	[1.46, 5.00]	[-.40, 2.51]	[.87, 1.71]	[-.47, .51]
Pooled	*p*-value (Null: H=0)	(.000)	(.157)	(.000)	(.933)
Banks	*p*-value (Null: H=1)	(.013)	(.941)	(.164)	(.000)
	Profit-Maximizer H<0	Reject	Reject	Reject	Reject
	Revenue-Maximizer H=0	Reject	Cannot reject	Reject	Cannot reject
	Output-Maximizer H>1	Cannot Reject	Reject	Reject	Reject
		Specification 5(c)		Specification 5(d)	
	H statistic	2.96	.78	.549	.140
	Interval of 95%	[1.06, 4.87]	[-.73, 2.30]	[.11, .98]	[-.28, .56]
Pooled	*p*-value (Null: H=0)	(.002)	(.309)	(.014)	(.507)
Banks	*p*-value (Null: H=1)	(.043)	(.786)	(.043)	(.000)
	Profit-Maximizer H<0	Reject	Reject	Reject	Reject
	Revenue-Maximizer H=0	Reject	Cannot Reject	Reject	Cannot Reject
	Output-Maximizer H>1	Cannot Reject	Reject	Reject	Reject
		Specification 5(e)		Specification 5(f)	
	H statistic	1.40	1.49	1.09	.52
State-	Interval of 95%	[-.010, 2.82]	[.93, 2.05]	[.524, 1.67]	[.21, .82]
owned	*p*-value (Null: H=0)	(.052)	(.000)	(.000)	(.001)
banks	*p*-value (Null: H=1)	(.574)	(.082)	(.735)	(.002)
	Profit-Maximizer H<0	Reject	Reject	Reject	Reject
	Revenue-Maximizer H=0	Cannot Reject	Reject	Reject	Reject
	Output-Maximizer H>1	Reject	Cannot Reject	Reject	Reject
		Specification 5(g)		Specification 5(h)	
	H statistic	5.03	1.03	2.12	-.54
Joint-stock	Interval of 95%	[3.20, 6.85]	[.27, 1.79]	[.40, 3.85]	[-.93, -.14]
Commercial	*p*-value (Null: H=0)	(.000)	(.008)	(.017)	(.008)
Banks	*p*-value (Null: H=1)	(.000)	(.932)	(.191)	(.000)
	Profit-Maximizer H<0	Reject	Reject	Reject	Cannot Reject
	Revenue-Maximizer H=0	Reject	Reject	Reject	Reject
	Output-Maximizer H>1	Cannot Reject	Reject	Reject	Reject