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China's Banks in the 1980s: Efficiency of Bank Lending to Small and Medium-Sized State-Owned Enterprises*

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1. INTRODUCTION

This paper investigates whether China's banks effectively monitored borrower enterprises in the 1980s; in particular, the monitoring of small and medium-sized state-owned enterprises (SOEs). The aim is to clarify whether monitoring in the 1980s was successful, and whether discipline and corporate governance through bank liability were, through successful monitoring, genuinely effective in that era. Several previous works have found evidence for the success of banks in monitoring large-sized SOEs in the 1980s. We investigate the issue for small and medium-sized SOEs as an aid to policy formation.

Many researchers have pointed out that China's banks have performed poorly and faced trouble (for example, Woo 2002). According to an official announcement by the Chinese government, the proportion of non-performing loans by state-owned commercial banks has declined recently to less than 10% (People's Daily 2006, October 4). Non-performing loans by banks were considered to be the most serious problem in China's economy in the late 1990s and the early 2000s. A 1998 estimate suggested that more than 25 % of loans by China's four major state-owned commercial banks were non-performing, implying that these banks were technically insolvent (Lardy 1998, Chapter 3). More recently, in early 2002, the proportion of non-performing loans by the four major state-owned commercial banks was estimated to be about 35% (Citigroup 2002). These non-performing loans stemmed from the continuing use of the financial system to support SOEs (Brandt and Zhu 2000). The practice of bailing out poorly performing SOEs, rather than supporting those with good performance, has thrown good money after bad. Non-performing loans were a negative consequence of the failure of China's banks to monitor SOEs, and resulted in ineffective discipline of management of firms through bank liability in the 1990s and before.

The references quoted above discuss China's banking and corporate finance system mainly

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in the 1990s. Several recent works have found evidence that, in the 1980s (although not subsequently), the (state-owned) bank lending and corporate finance system was basically efficient. This conclusion was reached by investigating the allocation of funds in the 1980s to SOEs, which are now said to be the main recipients of non-performing loans. In the 1980s, economic reform from 1979 caused bank finance gradually to take the place of state budget appropriation in SOE corporate finance (*bogaidai*). This policy aimed to discipline firm management through bank liability. If China's banks at that time effectively monitored SOEs, they would have been able to identify and lend to better-performing SOEs and motivate the borrower SOEs to repay the loans. This would then have been their policy, by which they could have disciplined the management within SOEs, and led firms in the 1980s to perform better. Recent works appear to have confirmed that this policy was indeed effective.

Cull and Xu (2000) found that, in the 1980s, (state-owned) bank lending flowed to SOEs with higher subsequent productivity than did direct government transfers. They conclude that bank employees assessed SOE credit risks more accurately than bureaucrats, and that in the 1980s banks imposed more severe constraints on SOEs. In another paper, these authors investigate more directly the behavior of banks and bureaucrats in allocating credit to SOEs during this period (Cull and Xu, 2003). This latter work considers the factors determining the sources of finance for investment and working capital in firms, including bank loans and government transfers. The authors present empirical results showing that bank loans were linked positively both to profitability and to some type of enterprise reform in the 1980s, whereas government transfer was not. They view this as evidence that, even in difficult circumstances, the ability of banks to gather and process information efficiently had advantages over direct government credit transfer in China during this period, in which bank employee compensation was linked to loan portfolio income. In their 2000 and 2003 papers, however, Cull and Xu report that the merits of bank finance weakened in the 1990s, because banks increasingly assumed responsibility for bailing out SOEs. Cull and Xu (2000, pp. 20-22) also indicate that the budget constraints on SOEs imposed by banks softened in the course of the 1990s. However, they use firm-level micro data for large SOEs, so that accurate assessment by banks of SOE credit risks in the 1980s may be valid only for large-sized SOEs.

Using aggregate provincial data rather than firm-level micro data, Liu and Li (2001) examined the efficiency of the various sources of total investment in fixed capital, including state-owned bank loans, in China from 1985-1998. They found that growth of provincial output is related positively to growth of state-owned bank loans (and self-raised funds). They conclude that non-state sources of funding, including bank loans, are generally more efficient in promoting output growth.

Watanabe (2002, 2003) focuses on the optimality of the entire capital structure and corporate governance in a firm, rather than the efficiency of individual sources of funds. Watanabe argues that the listing of a company's shares has an adverse influence on its corporate governance and performance (Watanabe 2002, pp.194-198 and pp. 202-205; Watanabe 2003, pp. 55-57). The reasoning is that, when a company became able to procure funds because it was listed on a stock exchange, the ratio of total liability to total assets decreased, and that the discipline of management through bank liability —"governance through bank liability"— disappeared. Also, the stock exchange failed to provide companies with the discipline of firm management; their performance deteriorated as a

result. This argument suggests that bank loans (and contracts with government) partly succeeded in disciplining the management of enterprises prior to listing, largely in the 1980s, since stock exchanges opened in China only in the 1990s. (The Shanghai stock exchange opened in 1990, and the Shenzhen stock exchange in 1991.)

If these findings for large-sized SOES or listed SOEs (which are of course large) hold for all SOEs, including small and medium-sized ones, this would have important implications for the bank reforms currently under way. Successful discipline through bank liability, or corporate governance through bank liability, depends on effective monitoring of enterprises by banks. These reforms can therefore be considered as a trial that attempts to recover lost willingness and ability in China's banking. If state-owned banks were able to improve credit allocation in the 1980s then state-owned commercial banks should do no worse today. It follows that bank reforms or incentive design, for example privatization of state-owned commercial banks, should considerably improve their performance.

To discover how successful the banks' monitoring in the 1980s was, the present work focuses on the efficiency of bank lending to small and medium-sized SOEs in that decade. Little work has been published on this. The data used in this study comprise firm-level micro data from light industry enterprises in Guangxi province for the years 1985 through 1989, which are panel data. Our sample firms are mainly small and medium-sized SOEs.

In addition to using data for small and medium-sized SOEs, the present work has several further differences from the analyses of Cull and Xu (2000, 2003), which is the closest previous work. First, we can here distinguish between *ex ante* monitoring (in other word, screening) and *interim* monitoring in our measurement of monitoring. To explain this point, we now present the conceptual framework for investigating the efficiency of significant bank lending, i.e., monitoring by banks.

We assume three stages of bank monitoring. Aoki (1994, pp. 111-113) classifies the various checking and regulating activities of firms by banks into three stages of monitoring: *ex ante* monitoring, *interim* monitoring, and *ex post* monitoring. The first and second stages, *ex ante* monitoring and *interim* monitoring, are particularly important in the present investigation.[1] *Ex ante* monitoring refers to the bank's assessment of the creditworthiness of the investment projects proposed by a firm, and its screening of them. Such monitoring includes the identification of relatively well-performing SOEs and reducing the problem of adverse selection. *Interim* monitoring refers to a bank continually checking the behavior of managers and the general operation of the firm, particularly the use of funds that have been committed. Monitoring at this stage prevents morally hazardous actions by managers whose interests do not coincide with those of the bank, and forces them to repay the loan. If banks fail in monitoring at this stage, managers do not experience the necessary discipline to repay the loan. It is then likely that managers will waste

1 The third stage, *ex post* monitoring, refers to the verification of performance outcome (the financial state) of the firm, judgment of the long-run viability of the firm in case of financial distress, and the use of that information for possible corrective and punitive action. Action is mostly taken when a firm is in financial distress. Since the data used here do not enable us to establish whether a firm is in financial distress, we do not investigate banks' capability in *ex post* monitoring.

the cash from bank loans, by, for example, investing it in low-return projects or using it for their personal interests, so that bank lending effectively becomes a type of free cash flow, as Jensen (1986) pointed out.[2] We shall refer to the money (debt) that a manager feels it unnecessary to repay as "quasi-free cash flow." In this case, the performance of borrowing firms declines because self-interested managers spend bank lending for other wasteful purposes, and on unprofitable investments. Bank lending may cause firms' performance to change.

The issues to be clarified empirically are as follows.

First, were (state-owned) banks able to separate good credit risks from bad, and thereby identify and lend to relatively well-performing[3] SOEs; and did they do so? In other words, did China's banks succeed in *ex ante* monitoring? To tackle this question, we estimate a bank finance rate function in which several independent variables, including a firm's performance variable, determine the bank finance rate. If China's banks succeeded in *ex ante* monitoring in the 1980s (in other words, if they were able to identify SOEs performing better and correctly allocate credits to these), then a firm's better performance would lead to more bank finance. However, if banks failed to select relatively well-performing SOEs having better projects, bank finance and a firm's performance would show no correlation. Furthermore, if banks not only failed to select relatively well-performing SOEs but also select relatively poor-performing ones (adverse selection), then the lower a firm's performance variable is, the higher is the bank finance rate. The last case would represent the most serious failure by China's banks in *ex ante* monitoring.

Second, could banks exert the discipline on managers of borrower SOEs that is necessary for repayment of the loan, and did they do so? In other words, did China's banks succeed in *interim* monitoring? To tackle this question, we estimate performance functions, specifically a production function and a profitability function. If China's banks succeeded in *interim* monitoring in the 1980s, then bank loans received by an SOE in one of the previous periods would not have had a negative influence on the firm's performance in subsequent periods (for example, the current period). Furthermore, the corporate finance literature (Jensen 1986; Stulz 1990; Hart and Moore 1995) has stressed the role of debt in forcing managers to disgorge free cash flow. This may enable bank loans to act as the debt that disciplines the use of cash flow by managers. In this case, the bank loans received could improve the borrower firm's performance. In contrast, if China's banks did not succeed in *interim* monitoring, SOE managers would not feel it necessary to repay the loan, and bank lending would effectively become a quasi-free cash flow. Bank loans received could then cause firms' performance to deteriorate. Thus, performance in the current period and bank loans received in the previous period would be negatively correlated in our estimates of the performance

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2 Jensen (1986) supposes that (retained) profit is the main source of cash flow, but it is likely that any cash flow having low acquisition cost for managers may act as a kind of free cash flow. This cannot always be called free cash flow since the term ordinarily refers to operating cash flow less capital expenditures and dividends, often not including debt. Bank lending that managers are not necessarily bound to repay falls into this category.

3 In this paper, we measure a firm's performance by both its productivity and profitability, as shown below.

functions. This case was likely to arise in the Chinese economy. Wada (1997) found that managers of SOEs were not effectively motivated to repay loans, and that, in the early 1990s, they actually paid only about one quarter of the interest due.

In summary, we estimate bank finance rates for measuring *ex ante* monitoring and performance functions for measuring *interim* monitoring.[4]

A further difference from the work of Cull and Xu is that the present analysis distinguishes between the will and the ability of banks to monitor borrower enterprises. Almost all previous empirical investigations of monitoring by banks have not distinguished between these, observing only the success or failure of monitoring.

This trial takes account of the actual situation of China's banks in the 1980s.[5] The first phase of financial reform in China established the two-tier banking system in 1984 by which "commercial" banks in a lower tier were under a central bank (the People's Bank of China: PBC) in the upper tier. As a result, (state-owned specialized) "commercial" banks becoming independent from the PBC gained wider discretion in lending than previously. However, even in the later 1980s (the period of the present study), there was not yet an institutional setting allowing the "commercial" banks to behave in a fully commercialized way, and this continued until the Commercial Bank Act in 1994 as the second phase of financial reform. So, although the *bogaidai* policy introduced in the 1980s aimed to discipline firm management through bank liability, it could be that the banks' will to monitor borrowers was inadequate. If banks failed in monitoring, we should therefore investigate whether it was due to insufficient will or ability in monitoring.

Before investigating the monitoring of SOEs by banks, we must clarify the sources of funds by which firms' operations —here investment and daily operation— were financed. The data of Cull and Xu (2000, 2003) provide direct information about the proportions of several financial resources (bank loans and government transfer) in funds for investment or daily operation (working capital) at the micro level, but the present data do not. After preliminary estimation of the investment function and the daily operation (net work rate) function, we investigate the monitoring by banks in China in the 1980s.

The paper is organized as follows. Section 2 describes our empirical models. Section 3 explains the data used and the attributes of our sample firms. Section 4 considers the results of the estimation. Section 5 presents conclusions.

2. EMPIRICAL MODELS

This section explains the empirical models used and the reasons for their use, based on the

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4 Cull and Xu (2000) deal with the discrimination between *ex ante* monitoring and *interim* monitoring in a somewhat ad hoc manner: observing and comparing different results of the same production function by ordinary least squares estimation and firm fixed effects estimation. Cull and Xu (2003) also aim to measure only *ex ante* monitoring (screening).

5 We owe to a suggestion of (one of) anonymous referee(s) finding the importance of distinction between will and ability for monitoring grounded on actual China's situation in the 1980s. We greatly appreciate the suggestion.

rationale presented in the Introduction.

2.1. Investment Function and Daily Operation Function

We first clarify which sources of funds financed the firms' investment and daily operation. To do this, we consider to which financial resources a firm's investment or daily operation was sensitive, by estimating the investment function and the daily operation (net work rate) function.

As an empirical model, we use an investment function of the following form:

$$(I/K)_{it} = \alpha_i + \alpha_t + \beta_1 (Sales/K)_{it} + \beta_2 (Retained\ Prof_{it}/K)_{it} + \beta_3 (Depreciation\ Fund/K)_{it} + \beta_4 (Repair\ Fund/K)_{it} + \beta_5 (State\ Budget\ Appropriation/K)_{it} + \beta_6 (Working\ Capital\ Fund/K)_{it} + \beta_7 (Bank\ Finance/K)_{it} + e_{it}, \quad (1)$$

where I_{it} is the gross investment of firm i at the end of year t, and K_{it} is the fixed capital stock of firm i at the beginning of year t. The relation between I_{it} and K_{it} is

$$I_{it} = K_{i,t+1} - (1\text{-}s)\, K_{it}$$

where s denotes the scrap rate of capital, which we take as 5% per year. Here α_i and α_t respectively denote a firm-specific coefficient and a time-specific coefficient, assumed to be (two-way) fixed effects. $Sales_{it}$ denotes sales made by firm i in year t. In this model, the value of *Sales*/*K* is a control variable representing the investment behavior determined by the sales accelerator principle, as a factor of investment demand.

Retained Profit, Depreciation Fund, Repair Fund, State Budget Appropriation, Working Capital Fund and *Bank Finance* are all financial resource variables. The variables $Retained\ Profit_{it}$, $Depreciation\ Fund_{it}$, $Repair\ Fund_{it}$ $State\ Budget\ Appropriation_{it}$ and $Working\ Capital\ Fund_{it}$ denote retained profit, depreciation fund, repair fund, state budget appropriation, and the accumulated fund in a firm for working capital. These are all internal funds. Before the start of economic reform, SOEs in China were allowed to retain only a tiny part of their profit and depreciation expenses, and were forced to pay most of them to the state. In that era, SOEs therefore depended largely on state budget appropriation to finance their operations, namely investment and daily operation. Since 1979, economic reform has enabled SOEs to retain profits and depreciation expenses, to reserve them in various funds, and to use them for bonus and welfare payments for employees. *Depreciation Fund, Repair Fund*, and *Working Capital Fund* are funds that are formally for replacement investment, repairing equipment and providing working capital, respectively, but could in fact be used more widely. These funds were stocks of accumulated cash flow, but *Retained Profit* is retained profit inflow in an SOE in a particular year. In the 1980s, economic reform in 1979 also caused bank finance gradually to take the place of state budget appropriation in SOE corporate finance (*bogaidai*). *State Budget Appropriation* and *Bank Finance* are the remaining state budget appropriation for SOEs (which decreases), and their increasing bank finance, respectively. (The efficiency of bank lending will be tested later.) $Bank\ Finance_{it}$ [6] is an

6 Strictly, $Bank\ Finance_{it}$ is firm i's settlement of bank finance at the end of year t. It is therefore a stock variable, not bank finance inflow at year t.

explicitly endogenous variable in our empirical models, since $(Bank\ Finance/GK)_{it}$ is a dependent variable in the bank finance rate function considered below. Furthermore, the other independent variables are likely to be correlated with the error term e_{it}. To deal with this problem, the investment function is estimated using the two-stage least-squares (2SLS) method. The instrumental variables used are the one-period lagged values of the independent variables. Consequently, from our sample period 1985-1989, the first year (1985) of observations is lost. Finally, the error term e_{it} is taken to be independently distributed over i and t with zero mean.

We also examine daily operation as a further important issue in firms, and consider what source of funds is important for financing it. We therefore also estimate a daily operation function as follows:

$$\begin{aligned}(M/K)_{it} = {} & \alpha_i + \alpha_t + \gamma_1(Retained\ Profit/K)_{it} + \gamma_2(Depreciation\ Fund/K)_{it} \\ & + \gamma_3(Repair\ Fund/K)_{it} + \gamma_4(State\ Budget\ Appropriation/K)_{it} \\ & + \gamma_5(Working\ Capital\ Fund/K)_{it} + \gamma_6(Bank\ Finance/K)_{it} + \varepsilon_{it}, \qquad (2)\end{aligned}$$

where the notations are as in Equation (1), except that M_{it} denotes intermediate inputs, and the error term is denoted by ε_{it}. We measured the activity of daily operation by the firm's net work rate, so that this function might be named the net work rate function. The intermediate inputs-fixed capital ratio (M/K) is taken to be a good proxy for the net work rate for equipment and machines.

$Sales/K$ is excluded as an independent variable from Equation (2), because the net work rate and sales always move in synchronism.[7] The daily operation function is also estimated by the 2SLS method for the same reason as the investment function in Equation (1), using the lagged values of independent variables as instruments.

2.2. Bank Finance Rate Function

To consider the banks' *ex ante* monitoring, namely screening, as explained in the Introduction, we use a bank finance rate function in which several independent variables determine the bank finance rate $(Bank\ Finance/K)$:

$$\begin{aligned}(Bank\ Finance/GK)_{it} = {} & \alpha_i + \alpha_t + \delta_1 \ln Gross\ Assets_{it} + \delta_2(Retained\ Profit/GK)_{it} \\ & + \delta_3(Depreciation\ Fund/GK)_{it} + \delta_4(Repair\ Fund/GK)_{it} \\ & + \delta_5(State\ Budget\ Appropriation/GK)_{it} + \delta_6(Working\ Capital\ Fund/GK)_{it} \\ & + \delta_7(Predicted\ Performance\ or\ Previous\ Period's\ Performance)_{it} + u_{it}. \qquad (3)\end{aligned}$$

Cull and Xu (2003) also adopt a similar empirical model to examine determinants of bank finance (or direct government transfer), including a firm's performance variable in the previous period as an independent variable.

This is a debt ratio regression model. Here, $\ln Gross\ Assets_{it}$ denotes the logarithmic gross

7 When sales increase, the net work rate also naturally increases. Here, however, estimation of Equation (2) should suggest which resources finance the increasing net work rate.

assets, and is a control variable that indicates the firm's size, measured by assets. The notation for the financial resource variables is the same as in Equation (1). The financial resource variables other than *Bank Finance / GK* are included as independent variables to control the variation of *Bank Finance / GK*, depending on whether bank finance was complementary to other sources of funds or a substitute for them. The effective interest rate seems to be another important determinant of bank loans. It is determined by the nominal interest rate and inflation rate. The former was regulated by government in the 1980s (and after) in China; the latter was a common macro shock for the whole economy.[8] Both of them are time (year)-specific and invariant between firms or between banks at any period. We therefore control the effective interest rate factor by a time-specific fixed effects term, α_t in our bank finance rate function model.

In Equation (3), *Predicted Performance or Previous Period's Performance* is the focus of our present interest. If the performance variable has positive effect on *Bank Finance / GK*, it follows that banks were successful in *ex ante* monitoring, and vice versa. Interpretation of the results of estimation depends on whether *Predicted Performance* or *Previous Period's Performance* is adopted as a firm's performance variable.

Accurate prediction of a firm's performance requires not only the will of banks to monitor firms, but also the ability to monitor adequately and to predict the future performance of a firm from the information available. Therefore, when *Predicted Performance* is a performance variable, it is implied that we measure the existence of both the will and ability of banks to monitor by its estimated positive coefficient (δ_7). Lack of each of these means failure of monitoring (insignificant or negative δ_7).

In contrast, selection by banks of firms that performed well in the previous period does not require the same monitoring capability, demanding only the will to monitor. Performance in the previous period as reported in financial statements is easy for banks to learn in the current period. Whether better performance of a firm leads to more bank finance (positive δ_7), or impaired performance to more bank finance (insignificant or negative δ_7), then depends mainly on the will of banks to monitor firms. In other words, estimation using *Previous Period's Performance* as performance variable tells us whether or not banks had the will to monitor. The analysis of Cull and Xu (2003) also adopts the preceding period's performance variable, which is expected to influence bank finance (or direct government transfer) in the current period in their empirical model. Consequently, Cull and Xu (2003) investigate mainly the will of banks to monitor, not their ability.[9]

Predicted Performance$_{it}$ in the present analysis is a variable that rationally predicts the next performance[10] of a firm in the next period in the linear regression model: *Performance*$_{i,t+1}$ =

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8 Galloping inflation arose in China in the late 1980s. As a result, the effective interest rate was negative during the sample period.

9 Furthermore, Cull and Xu (2003) adopt only profitability as firm's performance measure, whereas we use both profitability and productivity to provide a robustness check of estimates.

10 Future periods' performance forecast by banks need not be limited to the next period. However, the sample period of the data used here is only five years, from 1985 to 1989. We therefore use only performance in the next period. As a robustness check, we also estimate the regression model of bank finance using a firm's performance two years ahead as a quantity to be predicted. This gives results

$f(X_{it}) + e_{it}$, where *Performance* $_{i,t+1}$ is the firm's performance in the next period, and X_{it} stands for several variables in the current period that represent the basis for prediction by banks.[11] We shall take as X_{it} the following variables: numbers of total employees, managers, and engineers, sales, sales-gross assets ratio, sales-working capital ratio, production costs, total wage paid, and working capital-gross assets ratio at current period, their one-period lagged values and industrial dummies. It is confirmed that these have no significant statistical correlation with bank finance rate in the current period.[12] This also resolves any econometrical endogeneity problem arising from the dependence of performance in the next period on bank finance in the current period. The *Previous Period's Performance* used by us is one-period lagged performance of a firm.

We use both profitability and productivity as measures of a firm's performance to check the robustness of estimation results. Profitability is measured by ROA = (profit before tax + interest paid)/gross assets.[13] Productivity is measured by the sum of a firm's individual effect plus residual terms estimated in a Cobb-Douglas type production function with individual-fixed effects.[14]

The bank finance rate function is also estimated by means of the 2SLS method, using as instrumental variables *Predicted Performance*$_{it}$ or *Previous Period's Performance*$_{it}$, and the one-period lagged values of the other independent variables.

2.3. Performance Function: production function and profitability function

Testing of the banks' success or failure in *interim* monitoring, as explained in Section 1, requires a statistical analysis that regresses the performance in the current period as dependent variable to several independent variables, including bank loans received in the previous period. Again, both profitability and productivity are used as measures of the firm's performance. Distinct from the bank finance rate function, we can provide a simple theoretical foundation for empirical models. First, we consider the possibility that the previous period's bank loans received directly influence productivity in the current period:

$$Y = f\,(A\,(bank_{-1},\ldots\ldots),\ K,\ L)$$

where $f(\ )$ is a production function, Y represents net output, $A(\ )$ stands for the productivity term, K represents fixed capital and L represents labor. The setting of $A\,(bank_{-1},\ldots\ldots)$ implies that bank finance could directly influence a borrower firm's productivity through the discipline effect or free

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consistent with those in the text (not reported here).

11 The predicted value of performance is converted into the deviation from mean in that year, so as to control the year-specific shock — which could not be predicted at the current period.

12 Full results of the estimation of the coefficients in the linear regression and probit models are not reported; their explanatory powers, specifically R-squared and quasi R-squared, exceed 40%.

13 Profitability should include interest costs in order to avoid problematic correlation between bank finance and profitability since a larger bank loan implies more interest paid to bank. We owe this consideration also to a suggestion of (one of) anonymous referee(s). Since ROE can also be used in place of ROA, we check the results using ROE and confirm that they are similar to those using ROA (results not shown).

14 Although we do not report the estimates of the production function here, the specification is largely the same as the production function introduced in section 2.3., except that bank finance is excluded as an independent variable.

cash flow. As an empirical test we adopt a Cobb-Douglas type specification as follows:

$$\ln Y_{it} = \alpha_i + \alpha_t + \zeta_1 (Bank\ Finance / GK)_{i,t-1} + \zeta_2 \ln K_{it} + \zeta_3 \ln L_{it} + \eta_{it}, \qquad (4)$$

where $(Bank\ Finance / GK)_{i,t-1}$ represents bank finance in the previous period, and the error term is denoted by η_{it}. Labor input is measured by the number of employees. The positive or negative sign of the parameter ζ_1 indicates the direction of influence of bank finance on the borrower firm's productivity. Cull and Xu (2000) also use similar production more function where bank finance could influence on subsequent productivity of firm.

Next, it is possible that bank loans received in the previous period influence profitability in the current period through a firm's behavior, as well as through its productivity.[15] This can be described theoretically as a possible deviation from profit maximization behavior by the firm's manager:

$$\underset{K,L}{MaxOb} = P + dis\ (K, L, bank_{-1}, X),$$

where the firm's profit is denoted by

$$P = Y - rK - wL = f\ (A\ (bank_{-1}, \ldots\ldots), K, L) - rK - wL$$

and r and w denote (unit) capital cost and wage rate, respectively. The notation $dis(\cdots)$ represents the distortion of the manager's objective function Ob from genuine profit maximization. X is the other factor giving rise to the distortion. We assume that $bank_{-1}\ (\geq 0)$ and $X\ (\geq 0)$ are factors causing the distortion, so that $\frac{\partial dis}{\partial K} = 0$ and $\frac{\partial dis}{\partial L} = 0$ if $bank_{-1} = 0$ and $X = 0$. When $\frac{\partial dis}{\partial K} = 0$ and $\frac{\partial dis}{\partial L} = 0$, there is no deviation from profit maximization for the choice of K and L such that $\frac{\partial P}{\partial K}$ and $\frac{\partial P}{\partial L} = 0$.

Let us consider two cases of deviation from profit maximization for K.

(1) In the case that $\frac{\partial dis}{\partial K} > 0$, the first order condition for K should be satisfied such that:

$$\frac{\partial Ob}{\partial K} = \frac{\partial P}{\partial K} + \frac{\partial dis}{\partial K} = 0 \quad \Leftrightarrow \quad \frac{\partial P}{\partial K} = -\frac{\partial dis}{\partial K} < 0,$$

which implies over-employment of K from the viewpoint of profit maximization. If $bank_{-1}\ (\geq 0)$ is such that, $\frac{\partial dis}{\partial K} > 0$, so that it encourages over-employment of K, then larger $bank_{-1}$ leads to greater over-employment of K: $\frac{\partial dis}{\partial K \partial bank_{-1}} > 0$. Therefore,

$$\frac{\partial P}{\partial K \partial bank_{-1}} = -\frac{\partial dis}{\partial K \partial bank_{-1}} < 0. \qquad (5)$$

Similarly for the other factor, it can be shown that

$$\frac{\partial P}{\partial K \partial X} = -\frac{\partial dis}{\partial K \partial X} < 0.^{16} \qquad (6)$$

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15 Cull and Xu's works do not consider such possibilities.

16 It is possible that the sign of $\frac{\partial P}{\partial K\, \partial bank_{-1}}$ is opposite to that of $\frac{\partial P}{\partial K \partial X}$, which can lead to $\frac{\partial P}{\partial K}$ in some cases.

(2) In the case that $\frac{\partial dis}{\partial K} < 0$, the first order condition for K should be satisfied such that:

$$\frac{\partial P}{\partial K} = -\frac{\partial dis}{\partial K} > 0,$$

which implies under-employment of K from the viewpoint of profit maximization. If $bank_{-1}$ (>0) is such that $\frac{\partial dis}{\partial K} < 0$, so that it encourages under-employment of K, then larger $bank_{-1}$ leads to greater under-employments of K: $\frac{\partial dis}{\partial K \partial bank_{-1}} < 0$. Therefore,

$$\frac{\partial P}{\partial K \partial bank_{-1}} = -\frac{\partial dis}{\partial K \partial bank_{-1}} > 0. \qquad (7)$$

Similarly for the other factor, it can be shown that

$$\frac{\partial P}{\partial K \partial X} = -\frac{\partial dis}{\partial K \partial X} > 0. \qquad (8)$$

The theoretical results of expressions (5)-(8) can be approximated by the empirical model as follows:

$$Profitability = \theta_{KB}\{K \times (Bank\ Finance/GK)_{it-1}\} + \theta_{KX}(K \times X)$$
$$= \{\theta_{KB}(Bank\ Finance/GK)_{it-1} + \theta_{KX}X\}K.$$

For example, if we observe that $\theta_{KB} < 0$ and $\theta_{KX} \leq 0$, then bank loans received encouraged over-employment of capital from the viewpoint of profit maximization, due to the banks' failure in *interim* monitoring, resulting in case (1). In contrast, if $\theta_{KB} > 0$ and $\theta_{KX} \geq 0$ is observed, then under-employment of capital is encouraged by bank loans received (and the other factor), resulting in case (2).

Since X is unobservable, $\theta_K = \theta_{KX}X$ is to be estimated in practice. Consequently, let us write

$$Profitability = \{\theta_K + \theta_{KB}(Bank\ Finance/GK)_{it-1}\}K.$$

The same analysis can be applied to another input L, so that

$$Profitability = \{\theta_L + \theta_{LB}(Bank\ Finance/GK)_{it-1}\}L.$$

These relations imply that bank loans received could distort the manager's behavior such that over-employment or under-employment of inputs arose, which then led to reduced profit.

Whether or not the manager maximizes the firm's profit, the capital cost r and wage rate w should exert a negative influence on the firm's profit. Furthermore, bank finance could influence profitability not only through the firm's behavior but also through its productivity. These factors all lead to the following empirical specification:

$$Profitability_{it} = \alpha_i + \alpha_t + \theta_1(Bank\ Finance/GK)_{it-1} + \{\theta_2 + \theta_3(Bank\ Finance/GK)_{it-1}\}K_{it} + \{\theta_4 + \theta_5(Bank\ Finance/GK)_{it-1}\}L_{it} + \theta_6\ Capital\ Cost_{it} + \theta_7\ Wage\ Rate_{it} + \zeta_{it}. \qquad (9)$$

Here *Profitability* is measured by ROA as defined above.[17] The variable θ_1 represents the influence of bank finance on profitability through the firm's productivity, and should therefore have the same sign as ζ_1 in Equation (4). As explained above, the coefficient of K_{it}, $\theta_2 + \theta_3$ (*Bank*

17 We prefer profitability to profit in the empirical model, to account for scale.

Finance / GK) $_{it-1}$, takes into account the possibility that the firm's manager could over- or under-employ capital and bank loans received could lead to distorted behavior from the viewpoint of profit maximization due to the banks' failure in *interim* monitoring. Interpretation of estimates of θ_2 and θ_3 follows that of θ_{KB} and θ_{KX}. Matters are the same for the coefficient of L_{it}, $\theta_4 + \theta_5$ (*Bank Finance / GK*) $_{it-1}$. The distorted behavior might correspond to managers who spending bank lending on low-return projects or other wasteful interests. If the coefficients of K_{it} and L_{it} are zero, then banks' successful *interim* monitoring prevented distortion of the manager's behavior.

Two factor prices, *Capital Cost* and *Wage Rate* are calculated as depreciation/gross assets and total wage paid/numbers of employees, respectively. Interest paid is not included in the calculation of *Capital Cost*. This is because paid interest is a component of the dependent variable, *Profitability* defined as ROA; inclusion of paid interest into *Capital Cost* could give rise to an endogeneity problem.

In estimating the production function (4) and profitability function (9) below, we aim also to control qualities of inputs by introducing further variables into the empirical models. Where the regression models are to be estimated, the 2SLS method is adopted, using the one-period lagged values of the independent variables as instrumental variables. We therefore use the 1987-1990 data in those estimations.[18]

3. DATA AND ATTRIBUTES OF FIRMS SAMPLED

3.1. Data Used

In this analysis we use firm-level micro data on light industry enterprises in Guangxi province for the years 1985-1989.[19] Our firm-level micro data comprise balanced panel data from 260 SOEs. The data were originally collected by the Light Industry Bureau of Guangxi province, as an almost complete enumeration of the business reports of enterprises under its jurisdiction (*baobiao*). This data includes much detailed information about the corporate finance of enterprises, including their financial resources. Second, light industry was a leading sector in the early post-reform Chinese economy, and was typical of the developing economy of China in this era. Third, although the data come from a single region of China,[20] namely Guangxi province, the situation involving corporate finance and bank lending had much in common across China at the time, so the study should be representative of China as a whole. In particular, state budget appropriation and bank finance were often large financial resources for SOEs, and the importance of the former exceeded that of the latter in this era, as is confirmed below. It was commonly observed across

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18 Originally, 1985-89 firm-level micro data and several data from the 1990s, including the variables appearing in Equations (4) and (9), were available for this study. Since Equations (4) and (9) include a lagged independent variable ((Bank Finance /GK)$_{-1}$), the first year from the sample period of 1985-1990 should be dropped. From the remaining period 1986-1990, the first year of observations is then also lost because of the use of one-period lagged variables as instruments.

19 Some 1990 data were also used.

20 Cull and Xu (2000, 2003) use firm-level micro data on SOEs from four provinces (Shanxi, Jilin, Jiangsu, and Sichuan).

regions that state-owned banks tended to lend more to SOEs than to non-SOEs, because banks had to make up for the decreasing state budget allocation to SOEs. Moreover, the influence of macroeconomic conditions in the whole of China is visible in our sample firms.

All variables in Equations (1) to (3) are measured here by their nominal value, since that is the value by which firms and banks make their financial decisions. In the production and profitability functions (4) and (9), the net output (Y) and independent variables except for *(Bank Finance / GK)*$_{i,t-1}$ and number of employees (L) were deflated to the 1980 price, which is readily available.

3.2. Attributes of Sampled Firms

Table 1 shows descriptive statistics of the relevant variables. The average number of employees in a firm is 253.1 persons, much less than the value of 1580.2 in the sample of Cull and Xu (2003, and 2000, p. 12, Table 2). Only 7 firms in the present sample had more than 1580 employees. The present sample consists mainly of small and medium-sized SOEs, rather than the large ones studied by Cull and Xu (2000, 2003).[21] This discrepancy may give rise to real differences in the

Table 1 Descriptive Statistics (Obs. No. = 1040)

	Mean	Std. Dev.
(a) Size of Firms		
Number of employees: L (persons)	253.110	441.694
Sales (000 RMB)	5061.874	9805.917
Gross assets (000 RMB)	3511.873	6250.651
Fixed capital: K (000 RMB)	2192.041	2656.788
(b) Variables Used in Regression Analysis		
Dependent Variable		
I/K	0.231	0.534
M/K	1.541	2.203
Bank Finance / GK	0.599	0.519
Net output: Y (000 RMB)	2430.882	3605.002
ROA	0.060	0.139
Finacial resouce variables		
Retained Profit / GK	0.021	0.031
Depreciation Fund / GK	0.577	0.263
Repair Fund / GK	0.010	0.006
Sate Budget Appropriation / GK	0.106	0.058
Working Capital Fund / GK	0.013	0.025
Bank Finance / GK	0.599	0.519
Performance variables		
Predicted Value of $ROA_{i,t+1}$ (*Profitability*)	0.051	0.159
$ROA_{i,t-1}$	0.058	0.142
The Predicted Value of $Productivity_{t+1}$	2.334	0.610
$Productivity_{t-1}$	2.161	0.507
Other variables		
Sales / K	2.089	2.236
Wage Rate (RMB)	640.050	322.516
Capital Cost	0.061	0.037
Ratio of Accmulated Capital after 1985 in K	0.316	0.309
Ratio of Managers and Engineers in L	0.144	0.052
Ratio of Bonus in Wage	0.217	0.178

21 The average number of employees is 1580.2 in the sample of Cull and Xu (2003, 2000), and the median is 930, implying that the mean is heavily influenced by the largest firms in their sample. The median of 930 persons is large compared with the SOEs' average number of employees in 1989, which is 418 persons (*China Statistical Yearbook 1990*). Moreover, even the firm located at the 10th size percentile of their sample had 304 employees, which is more than the mean in this work. It follows that large-sized SOEs dominate Cull and Xu's data.

Table 2 Trends of Several Variables (Obs. No. = 260)

	Mean	Std. Dev.
Sate Budget Appropriation / GK		
1985	0.132	0.057
1986	0.107	0.052
1987	0.103	0.056
1988	0.079	0.055
1989	0.076	0.048
Bank Finance / GK		
1985	0.433	0.654
1986	0.620	0.509
1987	0.629	0.627
1988	0.633	0.711
1989	0.682	0.366
ROA		
1985	0.062	0.255
1986	0.050	0.258
1987	0.057	0.328
1988	0.071	0.284
1989	0.027	0.196

inferences that can be drawn. Second, *Depreciation Fund / K*, *State Budget Appropriation / K*, and *Bank Finance / K* are relatively large financial resource variables in Table 1. The depreciation fund, state budget appropriation and bank finance were therefore important financial resources for our sample SOEs. Among the variables, *Bank Finance / K* is particularly large, suggesting that bank finance was very important in providing funds for the firms' operations.

Table 2 presents trends in several variables. The trends in *State Budget Appropriatio / GK* and *Bank Finance / GK* indicate the changing importance of state budget appropriation and bank finance as financial resources for our sample SOEs. The mean value of *State Budget Appropriation / GK* declined yearly from 1985 to 1989, and the mean of *Bank Finance / GK* increased from 43.3% in 1985 to 68.2% thereafter. In the late 1980s, our sample SOEs became ever more dependent on bank financing, while state budget appropriation played a diminishing role. This phenomenon extends beyond Guangxi province (see, for example, Cull and Xu 2000, p. 5; 2003, pp. 535-536); because the changes to the Chinese banking system were proposed at the national level, the present sample of SOEs should be representative of the Chinese experience. Furthermore, in this period, the profitability figure ROA = (profit before tax + interest paid)/gross assets of our sample SOEs also changed consistently with business fluctuations for the entire Chinese economy. The relatively low mean (2.7%) in 1989 was consistent with the national situation at that time, i.e., the 1989 Tiananmen Incident and subsequent economic retrenchment. Also, the relatively high means in 1985-1988 corresponded with the prosperous overall economic condition of China during this period, in which the annual GDP growth rates for the whole of China were high: between 8.8% and 13.5 % (*China Statistical Yearbook* various years).

4. RESULTS OF ESTIMATION

In all cases, our parameter estimation procedure uses a fixed effects panel estimation model. A fixed effects model can be justified by the results of a specification test for the panel estimation model. In almost all of the present panel estimation results, the Hausman test rejects a random

Table 3 Investment Function and Daily Operation: Equations (1) and (2) [1, 2]

Independent Variables	Investment function (1)	Daily operation function (2)
Year dummy variables		
1987	-0.056	0.241
	(-1.32)	(0.88)
1988	-0.035	0.501
	(-0.93)	(1.77)
1989	-0.054	0.420
	(-1.06)	(0.71)
Control variable		
Sales / K	0.080**	
	(4.02)	
Financial resource variables		
Retained Profit / K	0.742	2.494**
	(0.92)	(3.74)
Depreciation Fund / K	0.293**	0.467**
	(4.05)	(3.87)
Repair Fund / K	3.783	14.536*
	(1.53)	(2.40)
State Budget Appropriation / K	0.738**	5.018**
	(2.68)	(4.83)
Working Capital Fund / K	-3.061	7.104**
	(-1.71)	(3.67)
Bank Finance / K	0.528**	0.968**
	(6.65)	(9.07)
Hausman-test (IV) [3]	$\chi^2(10) = 32.75$	$\chi^2(9) = 34.60$
p-value	0.00	0.00
Adj.R^2	0.76	0.80

1 The table presents regression coefficients. The dependent variable is I/K. The Breush-Pagan test rejects the null hypothesis of homoscedasticity. We therefore report in paretheses the t statistics that are based on heteroscedasticity-consistent standard errors presented by White (1980).

2 Since the random effects model is rejected by the Hausman test at the 5 % level as our criterion, fixed effects model is adopted. To save space, however, we omit estimated coefficients of firm-specific dummy variables. We adopt the 2SLS method for estimation of the fixed effects model, using as instruments the one-period lagged values of the independent variables. Observation number of data used is 1040.

3 The Hausman-test (IV) is designed to test the null hypothesis that independent variables are not correlated with the error term.

*, ** Significant at 5% and 1%, respecdtively.

effects model at the 5% level.

4.1. Investment Function and Daily Operation Function

Table 3 shows estimates of the investment function in Equation (1), and the daily operation function in Equation (2).

In the results for both functions, the estimated coefficients of *Depreciation Fund / K*, *State Budget Appropriation / K*, and *Bank Finance / K* are always significant and positive: a firm's investment and daily operation were sensitive to depreciation fund, state budget appropriation, and bank lending. These were important funds for both operations by firms. Based on the higher t-values for the estimated coefficients of *Bank Finance / K*, and the sizes of their estimates and the larger *Bank Finance / K* in Section 3, it is clear that bank finance was particularly important in financing firms' operations. We therefore ask: Was the important (and readily deployed) bank lending allocated and used efficiently? In other words, did banks succeed in monitoring enterprises in the sample period? We next present the estimates of the bank finance rate function and profitability and production functions, as answers to this question.

Table 4 Bank Finance Rate Function: Equation (3) [1, 2]

	Firm's performance = Profitability				Firm's performance = Productivity			
	Predicted Profitability		Previous Profitability		Predicted Profitability		Previous Productivity	
Independent Variables	With Controls	Without Controls	With Controls	Without Controls	With Controls	Without Controls	With Controls	Without Controls
Year dummy variables								
1987	0.065**	0.073**	0.078**	0.099**	0.058**	0.073**	0.055**	0.072**
	(3.48)	(3.61)	(3.18)	(4.35)	(4.05)	(5.58)	(4.57)	(6.52)
1988	0.071*	0.097**	0.085	0.108*	0.063*	0.086**	0.074*	0.099**
	(2.07)	(2.84)	(1.66)	(2.44)	(1.98)	(2.95)	(1.98)	(2.87)
1989	0.088**	0.128**	0.102**	0.130**	0.092**	0.116**	0.095*	0.121**
	(3.68)	(3.79)	(2.76)	(4.05)	(3.68)	(5.06)	(2.45)	(3.33)
Control variables								
ln*Gross Assets*	2.40×10^{-4}		4.55×10^{-4}		1.89×10^{-4}		1.99×10^{-4}	
	(0.58)		(0.77)		(1.40)		(1.56)	
Retained Profit / K	-0.159		-0.172		-0.133		-0.094	
	(-0.09)		(-0.06)		(-0.11)		(-0.12)	
Depreciation Fund / K	0.877**		0.812**		0.920*		1.273**	
	(3.21)		(2.38)		(2.18)		(2.66)	
Repair Fund / K	-2.248		-1.854		-2.791		-2.300	
	(-0.19)		(-0.17)		(-0.12)		(-0.09)	
State Budget Appropriation / K	3.036**		3.993**		1.891*		1.788*	
	(2.72)		(3.77)		(2.03)		(2.13)	
Working Capital Fund / K	0.047		0.040		0.043		0.032	
	(0.06)		(0.07)		(0.06)		(0.08)	
Firm's performance variables								
The Predicted Value of $Profitability_{t+1}$ [3]	-8.429**	-6.580**						
	(-5.74)	(-2.61)						
$Profitability_{t-1}$			-4.069**	-3.235*				
			(-3.37)	(-2.14)				
The Predicted Value of $Profitability_{t+1}$ [4]					-0.290**	-0.191**		
					(-8.18)	(-5.39)		
$Productivity_{t-1}$							-0.198**	-0.135**
							(-5.57)	(-4.73)
Hausman-test (IV) [5]	$\chi^2(10) = 37.99$	$\chi^2(4) = 14.86$	$\chi^2(10) = 40.33$	$\chi^2(4) = 17.74$	$\chi^2(10) = 31.40$	$\chi^2(4) = 20.09$	$\chi^2(10) = 43.90$	$\chi^2(4) = 19.67$
p-value	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Adj.R^2	0.70	0.51	0.67	0.47	0.71	0.53	0.69	0.51

1 The table presents regression coefficients. The dependent variable is *Bank Finance/GK*. The Breush-Pagan test rejects the null hypothesis of homoscedasticity. We therefore report in paretheses the t statistics that are based on heteroscedasticity-consistent standard errors presented by White (1980).

2 See footnote 2 for Table 3.

3 The profitability is measured by ROA = (profit before tax + interest paid)/gross assets, and its predicted value in the next period is estimated by the linear regression model.

4 The productivity is measured by the sum of a firm's individual effect and residual terms estimated in a Cobb-Douglas type production function with individual-fixed effects, and its predicted value in the next period is estimated in the same way as the predicted profitability.

5 See footnote 3 for Table 3.

*, ** Significant at 5% and 1%, respecdtively.

4.2. Bank Finance Rate Function

Table 4 reports estimates of the bank finance rate function in Equation (3). For the robustness check, models without control variables are also estimated.

Table 4 shows clear negative effects of a firm's performance variables on *Bank Finance /GK*. This could indicate not only that banks failed to select the better-performing SOEs, but that adverse selection was likely to occur. It is therefore very likely that banks failed in *ex ante* monitoring; that is, they failed in the screening process at the first stage.

Whether profitability or productivity is used as a firm's performance measure, the performance variables in the previous period ($Profitability_{t-1}$ or $Productivity_{t-1}$) have significantly negative estimated coefficients in all models in Table 4. This implies that banks were highly likely to lack the will even to monitor small and medium-sized SOEs as borrowers. Inadequacy of the will of banks to monitor could cause significantly negative estimated coefficients of the predicted values of performance variables (The Predicted Value of $Profitability_{t+1}$ and The Predicted Value of $Productivity_{t+1}$). Lack of monitoring will led to failure by China's banks in *ex ante* monitoring, regardless of their monitoring capability.

4.3. Performance Function: production function and profitability function

Tables 5 and 6 set out estimates of the production and profitability functions in Equations (4) and (9).

The results of estimation confirm that larger bank loans reduced the performance of small and

Table 5 Production Function: Equation (4) [1, 2]

Independent Variables	Homogeneous Inputs Quality	Adjusted Inputs Quality
Year dummy variables		
1988	0.265**	0.293*
	(2.72)	(2.34)
1989	0.231*	0.280**
	(2.03)	(2.70)
1990	0.100	0.115
	(1.45)	(1.84)
Bank finance variable		
$(Bank\ Finance/GK)_{t-1}$	-1.665*	-2.717**
	(-2.40)	(-3.75)
Inputs variables		
$\ln K$	0.199**	0.162**
	(6.00)	(4.31)
Ratio of Accumulated Capital after 1985 in K		1.007**
		(4.41)
$\ln L$	0.752**	0.674**
	(11.23)	(8.81)
Ratio of Managers and Engineers in L		7.916**
		(14.33)
Hausman-test (IV) [3]	$\chi^2(6) = 29.43$	$\chi^2(8) = 25.59$
p-value	0.00	0.00
Adj.R^2	0.94	0.98

1 The table presents regression coefficients. The dependent variable is $\ln Y$ (logarithmic net output).
The Breush-Pagan test rejects the null hypothesis of homoscedasticity. We therefore report in paretheses the t statistics that are based on heteroscedasticity-consistent standard errors presented by White (1980).

2 See footnote 2 for Table 3.

3 See footnote 3 for Table 3.

*, ** Significant at 5% and 1%, respecdtively.

Table 6 Profitability Function: Equation (9) [1, 2]

Independent Variables	Without Bonus Ratio	With Bonus Ratio
Year dummy variables		
1988	0.001	0.001
	(0.35)	(0.40)
1989	-0.015	-0.016*
	(-1.83)	(-2.10)
1990	-0.013**	-0.013**
	(-3.35)	(-3.19)
Bank finance variables		
$(Bank\ Finance/GK)_{t-1}$	-0.009**	-0.009*
	(-2.62)	(-1.99)
K	-4.10×10^{-6} *	-3.02×10^{-6} *
	(-2.06)	(-2.00)
$(Bank\ Finance/GK)_{t-1}\times K$	-2.93×10^{-6} *	-3.76×10^{-6} **
	(-2.50)	(-2.71)
L	1.82×10^{-7}	-8.04×10^{-6}
	(0.44)	(-0.37)
$(Bank\ Finance/GK)_{t-1}\times L$	-2.35×10^{-5} **	-2.01×10^{-5} *
	(-2.89)	(-2.49)
Control variables		
Capital Cost	-0.323*	-0.276
	(-2.46)	(-1.23)
Wage Rate	-0.015*	-0.022**
	(-2.09)	(-3.30)
Ratio of Bonus in Wage		0.418**
		(2.70)
Ratio of Accumulated Capital after 1985 in K	0.083	0.092*
	(1.69)	(2.23)
Ratio of Managers and Engineers in L	0.610**	0.788**
	(5.93)	(5.71)
Hausman-test (IV) [3]	$\chi^2(12) = 66.77$	$\chi^2(13) = 54.12$
p-value	0.00	0.00
Adj.R^2	0.72	0.74

1 The table presents regression coefficients. The dependent variable is *Profitability* defined as ROA.
The Breush-Pagan test rejects the null hypothesis of homoscedasticity.We therefore report in paretheses the t statistics that are based on heteroscedasticity-consistent standard errors presented by White (1980).

2 See footnote 2 for Table 3.

3 See footnote 3 for Table 3.

*, ** Significant at 5% and 1%, respecdtively.

medium-sized SOEs. First, the negative and statistically insignificant estimated coefficients of $(Bank\ Finance/GK)_{i,t-1}$, in both Equations (4) and (9), indicate the negative influence of bank finance on borrower firm's productivity. Second, the estimated coefficient K is significantly negative and L is statistically insignificant, and the coefficients of $(Bank\ Finance/GK)_{t-1}\times K$ and $(Bank\ Finance/GK)_{t-1}\times L$ are both significantly negative in Table 6. This suggests that bank loans received encouraged firm's managers not to maximize profit and encouraged over-employment of capital and labor, due to banks' failure in monitoring, leading to lax bank lending to SOEs. Third, these results do not change even if qualities of inputs and a possible wage-effect are controlled for by introducing additional variables into the empirical models. In Tables 5 and 6, a higher *Ratio of Accumulated Capital after 1985 in K* and *Ratio of Managers and Engineers in L* are assumed to result in higher qualities of capital and labor. In Table 6, *Ratio of Bonus in Wage* is introduced to account for any effect that higher wages could raise employees' motivation for work, leading to higher profitability. This variable is used because such a motivating effect in SOEs in the sample period is common as bonuses paid to employees.

These results clearly indicate that banks were unable also to hold managers of SOEs given credit to their promises to repay the loan; the banks proved incapable at *interim* monitoring, and

Table 7 Bank Finance Rate Function Dividing Sample Firms into Larger and Smaller Sized-SOEs: Equation (3) [1]

	Firm's performance = Profitability		Firm's performance = Productivity	
Independent Variables	Predicted Profitability	Previous Profitability	Predicted Productivity	Previous Productivity
Year dummy variables				
1987	0.070**	0.076**	0.064**	0.057**
	(3.67)	(3.04)	(4.56)	(5.21)
1988	0.072*	0.085	0.069	0.077
	(2.24)	(1.76)	(1.76)	(1.92)
1989	0.081**	0.090*	0.082**	0.083**
	(3.30)	(2.39)	(4.17)	(2.75)
Control variables				
ln*Gross Assets*	2.77×10^{-4}	5.05×10^{-4}	2.38×10^{-4}	2.70×10^{-4}
	(0.60)	(0.71)	(1.40)	(1.56)
Retained Profit / K	-0.141	-0.196	-0.134	-0.103
	(-0.09)	(-0.06)	(-0.10)	(-0.10)
Depreciation Fund / K	0.825**	0.763*	1.020*	1.402*
	(3.33)	(2.11)	(2.24)	(2.44)
Repair Fund / K	-2.010	-1.775	-2.597	-2.072
	(-0.21)	(-0.19)	(-0.10)	(-0.11)
State Budget Appropriation / K	2.691**	4.476**	1.896*	1.647*
	(2.64)	(4.14)	(2.13)	(2.12)
Working Capital Fund / K	0.046	0.045	0.037	0.032
	(0.06)	(0.07)	(0.06)	(0.09)
Firm's performance variables				
Predicted Value of *Profitability* $_{t+1}$	-9.492**			
× *Smaller Sized-Firm Dummy*	(-5.66)			
Predicted Value of *Profitability* $_{t+1}$	-3.061*			
× *Larger Sized-Firm Dummy*	(-2.45)			
Profitability $_{t-1}$		-4.768**		
× *Smaller Sized-Firm Dummy*		(-3.83)		
Profitability $_{t-1}$		2.506*		
× *Larger Sized-Firm Dummy*		(2.34)		
The Predicted Value of *Productivity* $_{t+1}$			-0.295**	
× *Smaller Sized-Firm Dummy*			(-7.59)	
Predicted Value of *Productivity* $_{t+1}$			-0.089**	
× *Larger Sized-Firm Dummy*			(-3.53)	
Productivity $_{t-1}$				-0.197**
× *Smaller Sized-Firm Dummy*				(-5.58)
Productivity $_{t-1}$				0.108**
× *Larger Sized-Firm Dummy*				(2.61)
Hausman-test (IV) [7]	$\chi^2(11) = 44.68$	$\chi^2(11) = 45.50$	$\chi^2(11) = 34.55$	$\chi^2(11) = 49.27$
p-value	0.00	0.00	0.00	0.00
Adj.R^2	0.71	0.73	0.73	0.76

1 See footnotes for Table 4.

bank finance became a quasi-free cash flow.

4.4. Check: larger and smaller sized-SOEs

Here, we look at differences in estimates between larger and smaller SOEs in our sample. Our sample includes 39 firms (156 observations) with more than 1000 employees on average over the sample period. We construct a larger sized-firm dummy variable and another the remainder, corresponding to smaller firms, and re-estimate Equations (3), (4) and (9). The estimates are shown in Tables 7-9.[22]

The estimates in Tables 8 and 9 find no large difference between larger and smaller sized-SOEs in the effects of bank loans on productivity and profitability. In Table 7, however, the estimated coefficients of performance variables in the previous period × *Larger Sized-Firm Dummy*

22 In re-estimating the production and profitability functions, we report estimates of models, adjusting the quality of inputs and also with the bonus ratio, since the consequent results are more reliable.

Table 8 Production Function Dividing Sample Firms into Larger and Smaller Sized-SOEs: Equation (4) [1]

Independent Variables	Adjusted Inputs Quality
Year dummy variables	
1988	0.287**
	(2.60)
1989	0.285*
	(2.53)
1990	0.125
	(1.92)
Bank finance variables	
(*Bank Finance / GK*)$_{t-1}$	-2.750**
× *Smaller Sized-Firm Dummy*	(-4.30)
(*Bank Finance / GK*)$_{t-1}$	-2.004*
× *Larger Sized-Firm Dummy*	(-2.48)
Inputs variables	
ln*K*	0.167**
	(3.96)
Ratio of Accumulated Capital after 1985 in K	1.017**
	(4.51)
ln*L*	0.646**
	(7.99)
Ratio of Managers and Engineers in L	9.012**
	(15.11)
Hausman-test (IV)	$\chi^2(9) = 43.03$
p-value	0.00
Adj.R^2	0.99

1 See footnotes for Table 5.

Table 9 Profitability Function Dividing Sample Firms into Larger and Smaller Sized-SOEs: Equation (9) [1]

Independent Variables	With Bonus Ratio
Year dummy variables	
1988	0.001
	(0.39)
1989	-0.018*
	(-2.09)
1990	-0.014**
	(-2.96)
Bank finance variables	
(*Bank Finance / GK*)$_{t-1}$	-0.008*
× *Smaller Sized-Firm Dummy*	(-2.26)
(*Bank Finance / GK*)$_{t-1}$	-0.007*
× *Larger Sized-Firm Dummy*	(-2.18)
K	-2.71×10^{-6} *
	(-2.04)
(*Bank Finance / GK*)$_{t-1}\times K$	-4.66×10^{-6} **
× *Smaller Sized-Firm Dummy*	(-2.90)
(*Bank Finance / GK*)$_{t-1}\times K$	-4.00×10^{-6} *
× *Larger Sized-Firm Dummy*	(-2.45)
L	-4.94×10^{-6}
	(-0.42)
(*Bank Finance /GK*)$_{t-1}\times L$	-1.90×10^{-5} **
× *Smaller Sized-Firm Dummy*	(-2.98)
(*Bank Finance /GK*)$_{t-1}\times L$	-1.26×10^{-5} *
× *Larger Sized-Firm Dummy*	(-1.99)
Control variables	
Capital Cost	-0.300
	(-1.82)
Wage Rate	-0.024**
	(-3.58)
Ratio of Bonus in Wage	0.444**
	(2.86)
Ratio of Accumulated Capital after 1985 in K	0.095*
	(2.15)
Ratio of Managers and Engineers in L	0.892**
	(5.74)
Hausman-test (IV) [5]	$\chi^2(16) = 70.88$
p-value	0.00
Adj.R^2	0.78

1 See notes of Table 6.

(*Profitability*$_{t-1}$ × *Larger Sized-Firm Dummy* and *Productivity*$_{t-1}$ × *Larger Sized-Firm Dummy*) are significantly positive, whereas those of performance variables in previous period × *Smaller Sized-Firm Dummy* are significantly negative. This implies that banks were very likely to have the will to monitor the larger-sized SOEs as borrowers in the present sample, but less will to monitor smaller-sized SOEs (to whom loans are in general proportionately smaller). In Tables 8 and 9, we notice also that both the estimated coefficients of the predicted values of performance variables × *Smaller Sized-Firm Dummy* (The Predicted Value of *Profitability*$_{t+1}$ × *Smaller Sized-Firm Dummy* and The Predicted Value of *Productivity*$_{t+1}$ × *Smaller Sized-Firm Dummy*) and those of the predicted values of performance variables × *Larger Sized-Firm Dummy* are significantly negative. This tells us that, in the 1980s, banks in China did not have the capability to monitor larger sized-SOEs even though they had the will. It is reasonable to suppose, from these inferences, that banks suffered the lack of both will and capability to monitor smaller sized-SOEs. The results

of estimation for smaller sized-SOEs should dominate the results of empirical models using the sample uncategorized by size in Table 4, because they numerically dominate the sample.

5. CONCLUSIONS

This section summarizes the main findings of this work and draws inference from them.

First, in the 1980s China banks failed in both *ex ante* and *interim* monitoring of small and medium-sized SOEs. In those days banks selected weaker-performing borrower SOEs in the screening process (adverse selection), and bank lending became in practice a quasi-free cash flow, since banks could not hold the borrower SOEs that received credit to their promises to repay. Successful monitoring of large-sized SOEs by banks, which has been found in previous works, cannot be extended to the small and medium-sized SOEs in our sample.

Second, study of *ex ante* monitoring by estimating the bank finance rate function tells us that the failure in monitoring was due to the banks' lack of will to monitor. It is very likely that banks' will to monitor borrowers was wrecked by their inadequately commercial behavior in the 1980s.

Third, banks had the will to monitor only larger-sized SOEs with more than 1000 employees in our sample. We propose three reasons why the will to monitor exists for larger SOEs but not for smaller SOEs. First reason is simply that loans to larger SOEs were larger amount, and therefore could be more important to the banks. Second reason is that the intent of *bogaidai* policy in aiming to discipline firm management through bank liability could more strongly influence bank lending to larger SOEs closer to central government. The final reason is that banks could have to assume bailout responsibilities for smaller sized-SOEs, for which the state budget was decreasing more rapidly than for larger sized-ones.[23]

The present observations have implications for policy. Weak will of banks to monitor firms receiving loans, in China today, might be less serious than in the 1980s because of the increased commercialism of banks stemming from the bank reforms that took place after our sample period. It is important to set up institutions and environments able to resist political pressure from various levels of government to direct bank lending as governments wish. In particular, discipline from capital markets is likely to force banks to be efficient, including at monitoring. For that purpose, it may be effective to implement further privatization of state-owned banks through increasing the share of their publicly held stock, beyond the current situation in which some state-owned banks have begun to go public, in part on stock exchanges. Discipline from competition in financial service markets may also be effective. Specifically, raising private, joint-stock, and local banks as competitors to state-owned banks should be encouraged.

Banks had the will but not the ability to monitor the larger of the (small and medium-sized) in the present sample. However, abundant evidence for successful monitoring of large sized-SOEs, as in Cull and Xu (2000, 2003), implies that banks were likely to have adequate ability to monitor veritable large-sized SOEs, including those whose average number of employees (1580.2 persons,

23 Cull and Xu (2000) apply a similar explanation to all bank lending in China in the 1990s.

see Section 3) is much more than 1000 persons, which is the measure of "larger-sized firms" in our sample. If so, we must consider what relations between banks and those large-sized SOEs, and what surrounding environment, enabled banks to monitor them adequately. Much relevant information might be gleaned by looking at regular communication between banks and large-sized SOEs.

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ABSTRACT

To study the efficiency of banks in monitoring small and medium-sized state-owned enterprises (SOEs) in China in the 1980s, we estimate coefficients in various empirical equations for bank finance, firm's performance and other indicators, using a sample of small and medium-sized SOEs in Guangxi province from 1985 to 1989. We distinguish between the will and ability of banks to monitor borrowers. The results show that banks failed in both the first and second stages of monitoring to those SOEs: the screening process and enforcing repayment of loans. This failure was directly due to inadequate will of the banks to monitor SOEs.