Biased Lending and Non-performing Loans in China's Banking Sector

DING LU, SHANDRE M. THANGAVELU and QING HU

This article uses a panel data set of public listing companies in China empirically to explore the relationship between banks' lending behaviour and non-performing loans. Our results show that state-owned enterprises (SOEs) got more loans than other firms, other things being equal, and SOEs with high default risks were able to borrow more than the low-risk SOEs and non-SOEs. This suggests that Chinese banks had a systemic lending bias in favour of SOEs, particularly those with high default risks, during the period under investigation. The causes and implications of this behaviour are discussed.

I. INTRODUCTION

China's banking sector has been well known for its huge burden of low-quality assets. Studies by Xu [*1998*] and Lardy [*1998*] claimed that China's four major state banks, namely, the Bank of China (BOC), the Agricultural Bank of China (ABC), the China Construction Bank (CCB), and the Industrial & Commercial Bank of China (ICBC), were technically insolvent by the late 1990s.[1] It was estimated that by 1997, 35 per cent of state owned enterprises had debts greater than assets. Despite the fact that the Chinese government had set up asset management companies to take about 1.4 trillion yuan (US$ 169 billion) of bad debts off the state banks' accounts, China's Central Bank Governor, Dai Xianlong, disclosed in February 2001 that the Chinese banks' non-performing loans (NPL) ratio was alarmingly high – a quarter of the state banks' loans were still overdue. In 2003, the non-performing loans (NPLs) of these 'big four' banks were officially estimated

Ding Lu, Shandre M. Thangavelu and Qing Hu, Department of Economics, National University of Singapore. Correspondence Address: Shandre M. Thangavelu, Department of Economics, National University of Singapore, 10 Kent Ridge Crescent, Singapore 119260. E-mail: ecssmt@nus.edu.sg

A preliminary version of the article was presented at the Canadian Economic Association Conference held in Montreal, Canada, 31 May to 3 June 2001. The authors are grateful to Eric Santor, Woodrow Johnson, and two anonymous referees for their helpful comments. Qing Hu acknowledges financial support provided by the National University of Singapore.

The Journal of Development Studies, Vol.41, No.6, August 2005, pp.1071 – 1091
ISSN 0022-0388 print/1743-9140 online
DOI: 10.1080/00220380500155361

to be 2.4 trillion yuan (US$290 billion), or 23 per cent of total loans, but the unofficial estimate from the credit-rating agencies suggested the figure to be close to 3.5 trillion yuan.[2]

So far little empirical study has been conducted to quantify the contributions of different sources to bank inefficiency in the Chinese economy. The lack of such analysis is partially due to the complexity of the issue itself. A rising NPL ratio in banking assets could indicate deterioration of bank management or escalation of government-imposed policy lending. Unfortunately, detailed data of the exact scale of policy-lending in NPLs are usually unavailable. To make the analysis more difficult, the institutional environment of China's banking sector has undergone a series of drastic reforms.

Before the mid-1990s, the Chinese banking system had been a legacy of the centrally planned command economy. This has been disassembled and phased out in the economic reforms over the past two decades. It was not until 1995 that a People's Bank of China Law and a Commercial Bank Law, which laid the basis of a modern central banking system, were promulgated. Since then the People's Bank of China (PBOC) has developed institutions and techniques to substitute instruments of a fractional reserves system for the direct credit allotment. To prepare the major state banks to become fully-fledged commercial banks, three policy-loan banks were set up in 1994 to shoulder the burdens of providing 'policy loans'.[3] Meanwhile, the introduction of the 'asset-liability management method' into the banks' accounting systems was a key step towards the commercialisation and financial independence of the major state banks. A nationwide inter-bank market started operation in 1996. This emergence and growth of banks and financial institutions with plural ownership structures have reduced the four major state-owned commercial banks' share of total bank credits from over 75 per cent in the early 1990s to around 56 per cent in recent years.[4]

Banking reforms made further significant progress in 1998–99. To beef up its surveillance over the commercial banks, the PBOC introduced an accounting standard at the end of 1998 to classify banking loans into five categories according to their financial risks, namely: 'passed', 'special mention', 'substandard', 'doubtful', and 'loss' [*CCER, 2000: 10*]. Since then the banks' bad loan provisions have accordingly been increased and more reliable accounting for NPLs has become possible. To help banks to get rid of the NPLs accumulated over past years, the Chinese government established four state-sponsored asset management companies in 1998–99 to take over 1.4 trillion yuan of bad debts from the banks. In addition, the government injected 270 billion yuan into the four major banks to strengthen their capital bases [*Ong, 2004*]. In addition, a series of regulatory measures were enacted to improve bank governance. From 1 January, 1998, the PBOC abandoned

the credit quota plan to allow state-owned commercial banks to make their lending decisions. To ameliorate provincial governments' interference in bank lending, the PBOC consolidated its 30 provincial branches into nine regional centres [*Zeng et al., 1999; Standard Chartered, 2001*].

This article attempts to study empirically the Chinese banks' lending behaviour and its role in accumulating non-performing loans. With financial data collected from the public listing companies in China's stock market, this study takes the research strategy to infer banks' lending behaviour from firms' debt financing. This research strategy addresses the key difficulties in the assessment of lending behaviour of the Chinese banks. First, the data covers the period 1994–99, after the setting up of the three policy-loan banks. This removes a major part of policy-lending influence on bank behaviour. Second, the firm-level data enable us to identify the degree of state ownership of these listed companies so that a robust analysis on differences in bank financing for SOEs and non-SOEs is possible. This allows us empirically to observe whether bank financing was biased. Finally, the study is exclusively focused on the part of the banks' lending that was least distorted by government-orchestrated policy lending. To become a public listed company, a firm must meet minimum profitability qualifications and accounting standards set by the stock exchange regulators. Public listed companies are thus perceived as one of the best borrowers and credit worthy groups, which are highly targeted by the banks. The initial lending to the public listing companies mostly represents banks' commercial and economic behaviour. Subsequent loans lent to these companies also reflect the business judgment of the bank loan officers. Therefore, in our firm-level data we could observe a consistent lending behaviour throughout the sample period.

The lending behaviour of banks is examined in the borrowing ratio model that captures the relationship between firms' borrowing ratios and their default risk, collateral, state-ownership, firm size, and industrial policy. Our findings reveal that the banks lend more to SOEs than to non-SOEs and the default risk has less impact on loans to SOEs. We also find evidence that the systematic lending bias is largely induced by the expectation of government's bailout of troubled SOEs, a moral hazard that results in low-quality loans.

The article is organised as follows: Section II provides analysis of bank behaviour in China. Section III describes data and models. The empirical results are given in Section IV. Section V concludes the article.

II. THE MODEL: THEORY AND HYPOTHESES

The Causes of the Non-performing Loan Problem

Soft budget constraint of state banks is widely cited as a major cause of China's non-performing loan problem [*Yuan, 2000; CASS, 1999; Zhang,*

1999; Li, 1999; Xu, 1998]. Lack of hard budget constraint in banks themselves leads to the failure of the banks to impose hard financial constraint on the borrowers, causing the development and accumulation of non-performing loans.

Soft budget constraint is a popular jargon first introduced by Kornai [*1980*]. It refers to the case when the firm is not seriously concerned with financial losses and always expects to be bailed out by the government or a third party. Government's paternalist policy towards businesses (particularly the SOE businesses) provides the basis for soft budget constraint. As described earlier, the reforms around the mid-1990s started to transform major state banks in China into commercial banks. Meanwhile, banks and financial institutions with plural ownership structures quickly expanded their market shares. In this transition, however, it is not unusual that the central government explicitly or implicitly press or encourage banks to extend credit beyond the commercially prudent level in order to achieve a targeted economic growth rate [*Zhang, 1999*]. The discrepancy between the realised credit supply and the equilibrium credit supply constitutes banks' loan losses. Local governments have also from time to time pressed the banks to lend money to the loss-making SOEs in order to avoid rising unemployment. Besides, government officials' rent seeking behaviour may make government interference in banks' lending decisions even more problematic.

Government intervention in bank lending could take place either before the lending decision is made (*ex ante*) or after the transaction is completed (*ex post*). With regard to *ex ante* intervention, until 1994, the Chinese banks were obliged to make policy-loans, which were granted out of policy or political considerations. Chinese Academy of Social Sciences (CASS) [*1998*] estimated that policy loans accounted for 35 per cent of total loans made by the state banks in the first half of the 1990s, and policy loans are well known for their lower quality compared to commercial loans [*CASS, 1999; Xu and Lu, 2001*]. Due to the discreet nature of the intervention, *ex ante* government intervention makes it difficult to measure the banks' performance. As a result, the Chinese state banks constantly use policy lending as an excuse for their poor records of lending decisions [*Zhang, 1999; Xie, 1994*].

The Chinese government has also intervened in the credit market *ex post* by bailing out troubled SOEs or state banks. The government bailout can take various forms, such as the restructuring of ailing SOEs, the takeover of non-performing loans, and deliberate delays in closure of insolvent financial institutions. Such bailout activities may reduce the banks' incentive to improve lending efficiency, leading to moral-hazard type of risky lending [*Xu and Lu, 2001; Xie, 2001*].

Banks' low quality lending may also arise from the problem of 'insider control', which refers to a situation where the managers obtain critical control right of the firm and extract substantial benefit from it by pursuing non-productive projects at the expense of shareholders' interests. The term also describes the capture of substantial control rights by the managers or the workers of a formerly state-owned enterprise in the process of its corporatisation [*Aoki, 1995*]. Li [*1999*] explains why excessive insider (manager) control of a firm aggravates consequences of soft budget constraints. When the manager is protected from downside risk of investment, it will be to the insider's advantage to obstruct liquidation of an existing asset or propose inefficient projects. In China's state banks, the insider control problem occurs in the situation when bank managers are granted the critical control right of bank funds, but are not taking full responsibility for the consequences of their decisions [*Zhang, 1999*]. This has happened since 1994 as the state banks have been granted increasing autonomy in lending decision-making while the government, as the de facto owner, has exercised less direct control over management. Xu and Lu [*2001*] showed theoretically that non-performing loans would build up over time if bank managers' consumption is unrelated to loan quality.

Controversies and Testable Hypotheses

There are two major controversies regarding China's banking sector performance and reform process. The first concern is about the significance of the banks' lending bias in favour of SOEs. There are good reasons to believe that soft budget constraints on both banks and SOEs have led to inefficient lending and credit misallocation that favour the SOEs. The banks would prefer lending to SOEs either out of government policy priority or due to implicit government guarantees. Such guarantees are crucial to banks' lending decision, since banks lack the legal recourse to enforce loan contracts in the event of loan default due to the underdeveloped legal institutions. In addition, the state banks have established stronger long-term customer relationship with the SOEs than with private businesses, which makes it transaction-cost effective for these banks to channel more loans to the former.

Empirical evidence for such a lending bias is, however, limited. A study by CASS [*1998*] shows that SOEs account for only one-third of GDP, but account for two thirds of total domestic loans. However, it is hard to find evidence of any systematic lending bias at the expense of loan quality at the macro-level data. Based on survey data, Cull and Xu [*2000*] found that there was a positive relationship between SOEs' productivity and the share of investment financed by the banks, but no such relationship exists between SOEs' productivity and the share of investment financed by the government. The finding suggests that 'the benefits derived from the incentives of bank

employees to identify good credit risks and increased information about the quality of SOEs generated through the reform process outweighed difficulties brought about by increased bailout responsibilities' (for SOEs). However, as the positive association between bank finance and productivity diminished somewhat in the 1990s, the authors concluded that banks' bailout responsibilities 'grew more severe' [*Cull and Xu, 2000: 23*].

The second controversy regards the government decision in 1998 to hive off 1.4 trillion yuan of banks' bad debts by setting up four state-sponsored asset management companies and to inject new capital funds into the banking system. These measures aimed to give state banks a fresh start to operate more like commercial banks. However, such a wholesale bailout drew immediate criticisms from some economists who feared a resurgence of an even more severe NPL problem, since the expectation for future bailout may aggravate the moral hazard about lending risks among the banks [*Lardy, 1998; Crockett, 1999; Xu and Lu, 2001*]. According to Mitchell [*1997*] and Roland [*2000*], with expectation for repeated bailouts, banks may 'gamble for resurrection' by lending even more recklessly to SOEs. However, 1998–99 also witnessed a series of reforms to improve banking management and SOE corporate governance, including the introduction of a new accounting standard to better account for banks' non-performing loans. It is therefore not obvious whether the government's efforts to clear up the banks' balance sheet have been successful.

Based on the above controversies on the performance of the Chinese banks and on the causes of non-performing loans, the article proposes the following testable hypotheses:

Hypothesis 1 (H1): Bank lending was systematically biased towards SOEs.
Hypothesis 2 (H2): Governments implicit guarantees influence banks' lending decisions.
Hypothesis (H3): Bank lending bias towards SOEs became more pronounced in 1998–99.
Hypothesis 4 (H4): Banks were willing to take higher risks for loans lent to SOEs.

The Borrowing Ratio Model

To test bank lending bias, we need to examine whether SOEs are able to borrow more than non-SOEs, given that they have the same risk characteristics. It makes sense to presume that demand for bank loans is mainly a function of the borrower's financial needs and borrowing cost (interest rate) while supply of bank loans is mainly a function of lending risk (or lending safeguard) and lending returns (interest rate). More specifically, suppose that firm i's demand for bank loans at time t is:

$$L_{it}^{d} = f(GEA_{it}, REA_{it}, GS_{it}, PDP_{it}, I_t) \tag{1}$$

Or (by assuming a linear function):

$$L_{it}^{d} = \beta_0 + \beta_1 GEA_{it} + \beta_2 REA_{it} + \beta_3 GS_{it} + \beta_4 PDP_{it} + \beta_5 I_t \tag{1'}$$

where I_t is interest rate while gross earnings/total assets (GEA_{it}), retained earnings/total assets (REA_{it}), and growth rate of sales (GS_{it}) are proxies for the firm's needs for borrowing.[5] A firm with high earning to asset ratio should be rich in cash and hence has lower needs for borrowing, other things being equal. We, therefore, expect their coefficients of GEA_{it} and REA_{it}, β_1 and β_2, to be negative. For the same reason, higher sales growth implies faster revenue increase and hence may reduce the firm's needs for borrowing so we expect the sign for the coefficient of GS_{it}, β_3, to be negative. PDP_{it} refers to 'Projected Default Probability' (defined in Section III), a proxy for the firm's default risk. A low-risk borrower usually needs less credit than a high-risk borrower, because the former would have more avenues to raise funds. Therefore, β_4 is expected to be positive. Borrowing cost should have negative incentive for borrowing, so the coefficient of interest rate (I_t), β_5, should be negative. Throughout the empirical tests, the dependent variable we have used is the borrowing ratio (L_{it}), defined as the ratio of corporate borrowing over total assets. Corporate borrowing is the sum of (current year) short-term and long-term bank loans and long-term debt with a remaining maturity of not more than one year.

On the supply side, the amount of loans the bank is willing to lend to firm i at time period t is:

$$L_{it}^{s} = f(FA_{it}, SIZ_{it}, SO_{it}, TAX_{it}, GS_{it}, PDP_{it}, I_t) \tag{2}$$

Or:

$$\begin{aligned} L_{it}^{s} = {} & \gamma_0 + \gamma_1 FA_{it} + \gamma_2 SIZ_{it} + \gamma_3 GS_{it} + \gamma_4 SO_{it} + \gamma_5 TAX_{it} \\ & + \gamma_6 PDP_{it} + \gamma_7 PDP_{it}^{2} + \gamma_8 I_t \end{aligned} \tag{2'}$$

where all variables on the right-hand-side except for interest rate (I_t) are the about bank's lending risk (or lending safeguards). The ratio of fixed assets over total assets (FA_{it}) is a proxy for collateral. Since collateral reduces loan risk, we expect the coefficient of FA_{it}, γ_1, to be positive. The value of firms' total assets (SIZ_{it}), a proxy for firm size, and growth rate of sales (GS_{it}), a proxy for firm's business prospect, all increase loan security so their coefficients, γ_2, and γ_3, are both expected to be positive. The ratio of state-

owned shares in total shares is given as SO_{it} and its coefficient, γ_4, would be positive if there is lending bias to SOEs as suggested by hypothesis H1. State-owned shares are defined as the sum of government shares and legal entity shares.[6] The sales-related tax rate (TAX_{it}) is a proxy for the industrial policy.[7] Firms prioritised by government's industrial policy may enjoy government's implicit guarantee or support for their borrowing, so the banks should be more willing to lend to them. Hence, we expect the coefficient of TAX_{it}, γ_4, to be negative (by hypothesis H2). We presumed a non-linear relationship between lending and the default risk (PDP_{it}) for the following reasons: given an interest-rate level, usually the bank would be willing to meet a borrower's demand for credit if its default risk is within an acceptable range. Beyond that range, the higher borrower's risk must be compensated by interest premiums.[8] It is, therefore, possible to observe a non-linear relationship between the borrower's risk and loan amount: The borrowing ratio rises with the borrower's risk to a certain level and begins to drop after the borrower's risk exceeds some critical value. Finally, higher lending returns (I_t) encourages lending, so γ_8 should be positive.

At equilibrium, the market clears when the interest rate equates quantity demanded (L_{it}^{d}) and quantity supplied (L_{it}^{s}). For the period under investigation, however, interest rates were uniformly set by the central bank. Therefore, the amount of loans was either bounded by quantity supplied (when the interest rate was below equilibrium level and there was excess demand) or bounded by quantity demanded (when interest was above equilibrium level and there was excess supply). Suppose that, of the total firm population, there is a proportion, $\omega \in [0, 1]$, of firms that could borrow the amount of loans they want at the official interest rate while the remainder of the firms could not. A randomly selected firm would have the following expected borrowing ratio:

$$\begin{aligned}\hat{L}_{it} &= \omega(\beta_0 + \beta_1 GEA_{it} + \beta_2 REA_{it} + \beta_3 GS_{it} + \beta_4 PDP_{it} + \beta_5 I_t) \\ &\quad + (1-\omega)(\gamma_0 + \gamma_1 FA_{it} + \gamma_2 SIZ_{it} + \gamma_3 GS_{it} + \gamma_4 SO_{it} + \gamma_5 TAX_{it} + \gamma_6 PDP_{it} \\ &\quad + \gamma_7 PDP_{it}^2 + \gamma_8 I_t) = [\omega(\beta_0 + \beta_5 I_t) + (1-\omega)(\gamma_0 + \gamma_8 I_t)] + \omega\beta_1 GEA_{it} \\ &\quad + \omega\beta_2 REA_{it} + (1-\omega)(\gamma_1 FA_{it} + \gamma_2 SIZ_{it}) \\ &\quad + [\omega\beta_3 + (1-\omega)\gamma_3] GS_{it} + (1-\omega)\gamma_4 SO_{it} + (1-\omega)\gamma_5 TAX_{it} \\ &\quad + [\omega\beta_4 + (1-\omega)\gamma_6] PDP_{it} + (1-\omega)\gamma_7 PDP_{it}^2 \end{aligned} \tag{3}$$

Defining $\alpha_0 = [\omega(\beta_0 + \beta_5 I_t) + (1\text{-}\omega)(\gamma_0 + \gamma_8 I_t)]$, in which I_t is exogenously given, $\alpha_1 = \omega\beta_1$, $\alpha_2 = \omega\beta_2$, $\alpha_3 = (1\text{-}\omega)\gamma_1$, $\alpha_4 = (1\text{-}\omega)\gamma_2$, $\alpha_5 = \omega\beta_3 + (1\text{-}\omega)\gamma_3$, $\alpha_6 = (1\text{-}\omega)\gamma_4$, $\alpha_7 = (1\text{-}\omega)\gamma_5$, $\alpha_8 = [\omega\beta_4 + (1\text{-}\omega)\gamma_6]$, and $\alpha_9 = (1\text{-}\omega)\gamma_7$, we can simplify (3) to a testable model:

$$\hat{L}_{it} = \alpha_0 + \alpha_1 GEA_{it} + \alpha_2 REA_{it} + \alpha_3 FA_{it} + \alpha_4 SIZ_{it} + \alpha_5 GS_{it} + \alpha_6 SO_{it} + \alpha_7 TAX_{it} + \alpha_8 PDP_{it} + \alpha_9 PDP_{it}^2 + \varphi_i + v_{it} \quad (4)$$

where ϕ_i represents a random effect that is varying over cross-section units and invariant over time for a given cross-section unit and v_{it} is residual. To test robustness, we replace the terms with PDP_{it} in (4) with three dummy variables, low-risk (R_L), median-risk (R_M), and high-risk (R_H), mimicking the discrete credit rating practised by the banks:

$$\hat{L}_{it} = \alpha_0 + \alpha_1 GEA_{it} + \alpha_2 REA_{it} + \alpha_3 FA_{it} + \alpha_4 SIZ_{it} + \alpha_5 GS_{it} + \alpha_6 SO_{it} + \alpha_7 TAX_{it} + \phi_1 R_{M_{it}} + \phi_2 R_{H_{it}} + \rho_i + \epsilon_{it} \quad (4')$$

where ρ_i represents a random effect that is varying over cross-section units and invariant over time for a given cross section unit and ε_{it} is residual. Table 1 lists the variable used in our empirical analysis.

III. DATA AND MODEL

Data

The data is from *Genius Database*,[9] which compiles the financial data of all public listing companies in China. The data is compiled from the annual financial reports of these companies. The total number of listed companies increased from 275 in 1994 to 815 in 1999. Excluding those with missing data, we have a sample of 268 companies with full data for the period 1994–99, of which 104 are listed in the Shenzhen Stock Exchange and 164 are listed in the Shanghai Stock Exchange.

Credit Rating

Ideally, a bank's perspective for a firm's default risk should be the bank's credit rating of firms, which is not available to the public. To construct a proxy for the firm's (bank-perceived) default risk, we construct a binary logistic model (Logit model) to produce a predicted default probability (PDP) for each firm and for each year. This type of model is quite popular in the literature of predicting financial distress, bankruptcy or default.[10] A binary logistic model of predicted default probability can be described as follows: let X_i denote a vector of predictors for the i^{th} observation; let θ be a vector of unknown parameters. A logistic probability function of default for any given X_i and θ is given by:

$$P(X_i, \theta) = [1 + \exp(-\theta' X_i)]^{-1} \quad (5)$$

The unknown parameters θ are estimated by the maximum likelihood method. The logarithm of the likelihood function is given by:

$$l(\theta) = \sum_{i \in F1} \log P(X_i, \theta) + \sum_{i \in F2} \log(1 - P(X_i, \theta)) \quad (6)$$

where F1 is the set of default firms and F2 is the set of non-default firms.

Once the estimators for θ are obtained, the predicted default probability can be computed. The performance of a Logit model can be evaluated by the prediction accuracy given a cut-off value of P. The cut-off value of P is usually set at 0.5; but it is allowed to change from 0 to 1.

In this study, a default event is identified if a firm loses money in two years in a row. Let E_{it} be the event of default or non-default for firm i at time t. E_{it} equals to 1 if firm i suffers a loss in time $t-1$ and $t-2$. We assume that a firm has difficulties in making repayment when two consecutive years of losses are incurred.[11] Thus, in our model, if a firm never makes a loss in two consecutive years during the sample period, E_{it} equals to 0 for any given i and t. The notion of financial distress if a firm suffers two-year losses is also used in Coats and Fant [*1993*]. In fact, most of the defaulted firms defined in our study lose money in a successive three-year period. China's stock market watchdog, China Security Regulatory Commission, defines a firm as an 'ST firm'[12] if it has experienced three-year losses in a row. In this case, the daily price fluctuation of an 'ST' stock is restricted to a special limit of 5 per cent rather than a normal limit of 10 per cent.

For the construction of a default prediction model, there is no consensus in the literature on the appropriate predictors. In most of the applications of the default probability model, the predictors X_i include accounting ratios, such as returns on capital, current ratio, etc. However, the predictors vary considerably in different studies [*Altman, 1968; Altman, Haleman and Narayanan, 1977; Ohlson, 1980; Platt and Platt, 1991*]. For our purpose, we used 20 variables, among which 15 variables are key ratios or supplemental ratios used in S&P corporate bond rating. By using backward stepwise regression technique, we identified five variables that are of the best predictive power. These five variables are total debt/EBITDA (DE),[13] total debt/market value of capitalisation (DMC), working capital/total assets (WCA), log sales (LS), and log equity (LEQ).[14] We use the average value of $t-1$ and $t-2$ years' data of these variables to estimate the Logit model that projects the default probability in year t.

The estimation results of the Logit model with default probability are given in Table 2. The signs of most coefficients are as expected: high debt burdens (DE and DMC) raise the likelihood of default; high working capital ratio may be a sign of operational inefficiency or pileup of inventory; and large sales

TABLE 1
VARIABLE DESCRIPTION

Variable name	Description	Expected sign of coefficient
L	Borrowing ratio = (Current-year loan from banks + debt about to mature within one year) / total assets	
S1	SOE dummy = 1 if state-owned share/total share > 0.5, 0 otherwise	> 0
SO	State ownership ratio = state-owned share/total share	$\alpha_6 = (1-\omega)\gamma_4 > 0$
PDP	Projected default probability	$\alpha_8 > 0$, $\alpha_9 < 0$
R_L	1 if the firm's risk level is low, 0 otherwise	N/A
R_M	1 if the firm's risk level is moderate, 0 otherwise	$\phi_1 > 0$
R_H	1 if the firm's risk level is high, 0 otherwise	ϕ_2 uncertain
FA	Fix asset ratio = fixed assets/total assets	$\alpha_3 = (1-\omega)\gamma_1 > 0$
TAX	Tax burden = sales-related tax payment/sales	$\alpha_7 = (1-\omega)\gamma_5 < 0$
SIZ	Firm size = log (total assets)	$\alpha_4 = (1-\omega)\gamma_2 > 0$
GEA	Gross earning ratio = gross earnings/total assets	$\alpha_1 = \omega\beta_1 < 0$
REA	Retained earning ratio = retained earnings/total assets	$\alpha_2 = \omega\beta_2 < 0$
GS	Growth rate of sales	$\omega\beta_3 + (1-\omega)\gamma_3$ uncertain

revenue increases cash flows. Only that of LEQ is not of the expected sign and somewhat puzzling.[15]

With a cut-off value of 0.045, our model classifies correctly 28 out of 43 default cases and 535 out of 803 non-default cases. The classification accuracy is 65.1 per cent for the non-default cases, 66.6 per cent for default cases. The overall prediction accuracy is 66.5 per cent. Raising the cut-off value increases the overall prediction performance but reduces prediction performance for default cases. Lowering the cut-off value reduces the overall prediction performance but increases prediction performance for default cases. Thus, in the choice of the cut-off value, we must consider the trade-off between prediction accuracy for the non-default cases and that for the default cases.

Based on the PDP produced by the Logit model, we classified the firms into three risk levels: low-risk (R_L), median-risk (R_M), and high-risk (R_H). $R_L = 1$ if PDP $\leqslant 0.031$, or 0 otherwise; $R_M = 1$ if $0.031 <$ PDP $\leqslant 0.052$, or 0 otherwise; $R_H = 1$ if PDP > 0.052, or 0 otherwise. This classification divides

the sample evenly into three subgroups (see Table 3) and allows us to test robustness of the borrowing model.

The preliminary analysis of the data is given in Table 3 and Table 4. Table 3 displays the debt-financing pattern of sample firms grouped by the rating categories. It shows that firms with higher default risk (which is partially projected by past-year accumulated indebtedness in the Logit model) have higher borrowing ratios on average in the current stage. Median borrowing ratio rises from 20 per cent for R_L firms to 32 per cent for R_H firms. The maximum borrowing ratio for R_H firms is as high as 153 per cent, which indicates that some of the R_H firms have debts worth more than their total assets. Table 4 displays the debt financing for SOEs and non-SOEs. Both average and median borrowing ratios of SOEs are more than two percentage points higher than that of non-SOEs.

IV. LENDING BIAS: EMPIRICAL EVIDENCE

The estimation results for the borrowing ratio model (4) are shown in Table 5. All coefficients are highly significant. The estimation reveals that sales growth has negative impact on firms' borrowing and the impact is the

TABLE 2
ESTIMATION RESULTS OF THE LOGIT MODEL
FOR DEFAULT PROBABILITY PREDICTION

Variable	Coefficient	Std. Err.	Z	P > |z|
DE	0.0031	0.0021	1.51	0.1320
DMC	4.7789	1.2985	3.68	0.0000
WCA	1.0701	1.1667	0.92	0.3590
LS	− 1.4258	0.4136	− 3.45	0.0010
LEQ	0.7233	0.5525	1.31	0.1900
Constant	1.7098	4.1414	0.41	0.6800

TABLE 3
DEBT FINANCING FOR THE FIRMS GROUPED BY RATING CATEGORIES

Risk level	R_L	R_M	R_H
Max	0.6424	0.9225	1.5304
Min	0.0000	0.0002	0.0038
Mean	0.2011	0.2733	0.3282
Median	0.1913	0.2594	0.3064
Standard deviation	0.1221	0.1303	0.1891
Number of cases	412	422	408
% of all cases	33.2%	34.0%	32.9%

TABLE 4
BORROWING RATIOS OF SOES AND NON-SOES

Firm groups	SOE	Non-SOEs
Frequency	912	308
Max	1.5304	0.8500
Min	0.0000	0.0010
Mean	0.2748	0.2470
Median	0.2663	0.2433
Standard deviation	0.1634	0.1423

TABLE 5
ESTIMATION RESULTS OF BORROWING RATIO MODEL (1)*

Dependent variable = Borrowing ratio	Coefficient	Std. Err.	Z	P > |z|
Fixed asset ratio	0.0420	0.0263	1.59	0.1110
Tax burden	− 0.6081	0.1829	− 3.32	0.0010
State ownership ratio	0.0978	0.0364	2.69	0.0070
Size	0.0419	0.0059	7.14	0.0000
Retained earning ratio	− 0.6296	0.1051	− 5.99	0.0000
Gross earning ratio	− 0.2967	0.0278	− 10.67	0.0000
Sales growth rate	− 0.0150	0.0080	− 1.87	0.0610
Projected default prob.	0.9301	0.1617	5.75	0.0000
Squared PDP	− 2.0965	0.4619	− 4.54	0.0000
Constant	− 0.6510	0.1269	− 5.13	0.0000
R-square		No. of obs		1123
Within	0.1684	No. of groups		262
Between	0.3269	Wald chi2		254.31
Overall	0.2998	Prob > chi2		0.0000
Baltagi-Wu LBI	1.9331	Durbin-Watson	1.3100	

*A GLS random-effect model regression process is applied with a two-step procedure described in Greene [*2000*] to rectify autocorrelation and heteroscedasticity in panel data. A GLS fixed-effect regression was run for comparison and the resulting fitness is not as good as that of a GLS random-effect regression.

smallest among the variables. The signs of the other coefficients meet our hypotheses reasonably well. The signs of coefficients for projected default probability (PDP) and its squared value are in line with the findings of Machauer and Weber [*1998*], indicating a non-linear curve as mentioned earlier.

These results provide strong support for our hypothesis. In particular, the positive and significant coefficient for state ownership ratio indicates that for every percentage point rise in state ownership ratio there is nearly 0.1 percentage point increase of borrowing ratio. This impact is even greater than that of the proxy for collateral (0.0420 for fixed asset ratio). The results grant

strong support to H1 that bank lending was biased towards SOEs. The estimated coefficient for tax burden, which reflects government's industrial policy, has significantly negative impact (− 0.6081), which is greater than that of state ownership in absolute value. This supports H2 that government implicit guarantees positively influence banks' lending decisions.

To test H3 ('bank lending bias towards SOEs became more severe in 1998–99'), we estimated the above model with a dummy assigned to years 1998 and 1999. The results are displayed in Table 6. The estimated coefficient for 'dummy × State ownership ratio' is 0.0316 and statistically significant at 1 per cent level of significance, suggesting a structural change for 1998–99 and thus granting support to H3.

To test the robustness of the above findings, we estimated the regressions leaving out one of the independent variables each time and found the estimates of the remaining variables stable and significant. We then re-estimated the regression for model (4) by replacing PDP and PDP^2 with the five independent variables in the Logit model, the results confirmed the signs and significances of the estimated coefficients in the model.[16] We also estimated model (4'), which is based on discrete risk levels to check robustness. The results are reported in Table 7. R_L is excluded from the model to avoid the perfect multicollinearity among the intercept and the risk variables. Thus, the coefficient of R_i should be interpreted as the differences between the effects of R_i and R_L on borrowing ratio for all $i \neq L$.

TABLE 6
ESTIMATION RESULTS OF BORROWING RATIO MODEL (4) WITH DUMMY 98–99

Dependent variable = Borrowing ratio	Coefficient	Std. Err.	Z	P > |z|
Fixed asset ratio	0.0441	0.0262	1.68	0.0920
Tax burden	− 0.6274	0.1823	− 3.44	0.0010
State ownership ratio	0.0986	0.0363	2.72	0.0070
Size	0.0371	0.0060	6.22	0.0000
Retained earning ratio	− 0.6278	0.1044	− 6.01	0.0000
Gross earning ratio	− 0.2768	0.0281	− 9.86	0.0000
1998–99 dummy × state ownership ratio	0.0316	0.0081	3.91	0.0000
Sales growth rate	− 0.0150	0.0080	− 1.89	0.0590
Projected default prob.	1.0496	0.1631	6.43	0.0000
Squared PDP	− 2.2955	0.4608	− 4.98	0.0000
Constant	− 0.5690	0.1283	− 4.44	0.0000
R-square		No. of obs		1123
within	0.1906	No. of groups		262
between	0.3376	Wald chi2		274.06
overall	0.3095	Prob > chi2		0.0000
Baltagi-Wu LBI	1.9557	Durbin-Watson	1.3449	

All the estimates of the redefined model remain significant with similar values with their counterparts in initial estimated model. The estimates of coefficients for both R_M and R_H are positively and statistically significant at 1 per cent. The results suggest that borrowing ratio increases with risk levels so that lending is biased towards the higher-risk firms. This is understandable from the demand-side for borrowing but not very clear from the supply-side of bank lending, unless that we can find evidence of H4, that is, that banks were willing to take higher risks for loans lent to SOEs.

To test H4, we included two variables, 'SOE dummy × PDP' and 'SOE dummy × squared PDP' to model (4) and the estimated results are reported in Table 8. Here, we observe that the estimated coefficient for 'SOE dummy × PDP' is statistically significant at 1 per cent, while that for 'SOE dummy × squared PDP' is not statistically significant. Figure 1 displays the different impacts of PDP on borrowing ratio for SOEs and non-SOEs. The much higher curve for SOEs supports H4 that banks were willing to take higher risks for loans lent to SOEs. It is also worth noting that the insignificance of the coefficient for 'SOE dummy × squared PDP' indicates that the curve for SOEs is more likely to be straight and linear – an evidence that SOEs at the higher-risk end are likely to get more loans.

We also tested H4 by checking if there is any structural change in model (4) for SOEs. This was undertaken by including 'SOE dummy × R_i' into model (4). The results in Table 9 show that, with SOE effect controlled, the

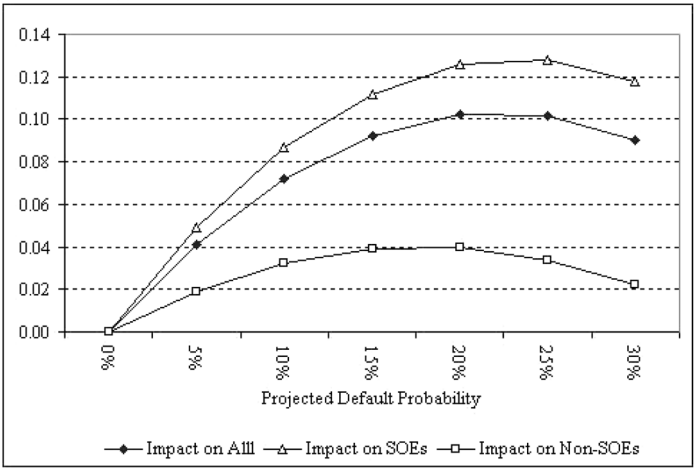
TABLE 7
ESTIMATION RESULTS OF BORROWING RATIO MODEL (4') WITH DUMMY 98–99

Dependent variable = Borrowing ratio	Coefficient	Std. Err.	Z	P > |z|
Fixed asset ratio	0.0496	0.0261	1.90	0.0570
Tax burden	− 0.5848	0.1812	− 3.23	0.0010
State ownership ratio	0.1001	0.0361	2.77	0.0060
Size	0.0387	0.0060	6.48	0.0000
Retained earning ratio	− 0.6217	0.1041	− 5.97	0.0000
Gross earning ratio	− 0.2784	0.0278	− 10.00	0.0000
1998 − 99 dummy × state ownership ratio	0.0317	0.0081	3.93	0.0000
Sales growth rate	− 0.0095	0.0076	− 1.25	0.2130
R_M	0.0366	0.0071	5.15	0.0000
R_H	0.0657	0.0093	7.10	0.0000
Constant	− 0.5943	0.1283	− 4.63	0.0000
R-square		No. of obs		1123
Within	0.1933	No. of groups		262
Between	0.3447	Wald chi2		283.07
Overall	0.3179	Prob > chi2		0.0000
Baltagi-Wu LBI	1.9479	Durbin-Watson	1.3302	

TABLE 8
ESTIMATION RESULTS OF BORROWING RATIO MODEL (4) WITH SOE EFFECT

Dependent variable = borrowing ratio	Coefficient	Std. Err.	Z	P > |z|
Fixed asset ratio	0.0439	0.0260	1.69	0.0920
Tax burden	− 0.5885	0.1828	− 3.22	0.0010
Size	0.0445	0.0058	7.69	0.0000
Retained earning ratio	− 0.6461	0.1052	− 6.14	0.0000
Gross earning ratio	− 0.2998	0.0281	− 10.69	0.0000
Sales growth rate	− 0.0117	0.0079	− 1.48	0.1390
PDP	0.4457	0.2581	1.73	0.0840
Squared PDP	− 1.2416	0.9215	− 1.35	0.1780
SOE dummy × PDP	0.6559	0.2394	2.74	0.0060
SOE dummy × squared PDP	− 1.1233	0.9273	− 1.21	0.2260
Constant	− 0.6465	0.1222	− 5.29	0.0000
R-square		No. of obs		1149
Within	0.1744	No. of groups		264
Between	0.3291	Wald chi2		265.99
Overall	0.3060	Prob > chi2		0.0000
Baltagi-Wu LBI	1.8955	Durbin-Watson	1.2771	

FIGURE 1
IMPACT OF DEFAULT RISK ON BORROWING RATIO



Note: PDP is over 30% for only 14 out of 846 observations. This accounts for less than 2% of all observations. We thus cut off the PDP axis at 30%.

TABLE 9
TESTING HIGH-RISK SOES' IMPACT ON BORROWING RATIO

Dependent variable = Borrowing ratio	Coef.	Std. Err.	Z	P > |z|
Fixed asset ratio	0.0488	0.0260	1.88	0.0600
Tax burden	− 0.5528	0.1821	− 3.04	0.0020
Size	0.0465	0.0058	8.01	0.0000
Retained earning ratio	− 0.6455	0.1048	− 6.16	0.0000
Gross earning ratio	− 0.3011	0.0279	− 10.79	0.0000
Sales growth rate	− 0.0082	0.0076	− 1.08	0.2820
R_M	0.0154	0.0114	1.35	0.1770
R_H	0.0334	0.0137	2.44	0.0150
SOE dummy × R_M	0.0274	0.0121	2.27	0.0230
SOE dummy × R_H	0.0352	0.0145	2.43	0.0150
Constant	− 0.6814	0.1223	− 5.57	0.0000
R-square		No. of obs		1149
Within	0.1763	No. of groups		264
Between	0.3347	Wald chi2		272.35
Overall	0.3154	Prob > chi2		0.0000
Baltagi-Wu LBI	1.8947	Durbin-Watson	1.2746	

coefficients for R_M and R_H become smaller and less significant (at 20 per cent and 5 per cent respectively). The coefficients for 'SOE dummy × R_M' and 'SOE dummy × R_H' are positive (0.0274 and 0.0352 respectively) and both statistically significant at 5 per cent level. The results are evidence that the SOE status did help firms with higher default risks to borrow more than those with lower risks or those without SOE status.

V. CONCLUDING REMARKS

In this study, based on a panel data of public listing companies, we attempt to observe a consistent type of lending behaviour in China's banking sector throughout the sample period. Our empirical results support the hypothesis that bank lending is biased towards SOEs, other things being equal. The results thus provide evidence that Chinese banks have a systematic lending bias in favour of SOEs. Despite the fact that most public listing non-SOEs were transformed from former SOEs, the impact of difference in state-owned share ratios on firms' borrowing ratios is robust in our results. It fully testifies that bank lending bias is unfavourable even to those SOE-transformed firms, which currently have smaller shares of state ownership.

Our study also shows that the high-risk SOEs were able to borrow more bank loans than low-risk SOEs and non-SOEs. This result may have been driven by two competing hypothetical explanations as mentioned in Section II. One assumes that government has *ex ante* intervention to direct bank

lending in favour of high-risk SOEs. Or in other words, the banks bailed out high-risk SOEs mainly at the government's request. The other proposes that lending in favour of high-risk SOEs was banks' rational business choice upon the expectation of implicit government guarantees for those loans – a moral hazard behaviour induced by *ex post* government bailout for banks. With this expectation, banks were willing to provide liquidity to keep afloat firms in financial distress, despite the fact that the latter's cash flow was already trickling to zero, or had even become negative. By keeping them from going bankrupt, the banks could avoid a straightforward default of the debts owed by these firms, holding on to the hope of a government-sponsored *ex post* bailout or takeover. Such 'gambling for resurrection' behaviour is well discussed in literature on banking reform in transition economies [*Mitchell, 1997; Roland, 2000: 308–309*].

The unfolding of events since the mid-1990s suggests that the second explanation may be more plausible. On the one hand, as discussed in Section I, a series of banking reforms were carried out to restructure the major state banks to be more like full-fledged commercial banks, especially by substantially reducing their burdens of providing 'policy loans'. On the other hand, when he was designated premier in 1997, Zhu Rongji vowed to solve the SOE problem in three years. Under his leadership, great efforts were made to harden budget constraints of SOEs in 1997–2000, highlighted by the official policies of 'encouraging mergers and consolidation, standardising and streamlining bankruptcy procedures, downsizing SOEs to raise efficiency, replacement and reemployment projects for laid-off workers'. The number of laid-off SOE employees amounted to 6.10 million in 1998 and nearly doubled to 11.74 million in 1999 [*Zeng et al. 1999, 2000*]. All these developments made it very unlikely that government would intensify *ex ante* bailout by pressing commercial banks to pump in more credits to keep the severely loss-making SOEs afloat. Intensifying *ex ante* bailout would have defeated the government's own will to harden SOEs' budget constraints.

It is, therefore, more comprehensible that the banks' more generous lending to high-risk SOEs was driven by moral-hazard behaviour, especially in the backdrop of the 1.7-trillion-yuan (*ex post*) bailout for the four big banks in the period 1998–99. Meanwhile, on finding that bank lending bias towards SOEs became more severe in this period contradicts the *ex ante* bailout hypothesis, but lends support to the hypothesis of reckless lending induced by possible future *ex post* bailout plans.

Such *ex post* bailout *did* happen again. In January 2004, the PBOC injected US$ 45 billion of China's foreign reserves to boost the capital-adequacy ratios of China Construction Bank (CCB) and Bank of China (BOC), two of the four big state-owned commercial banks. A major purpose of this 'indirect bailout' was to refresh the banks' balance sheet with the injected funds so that

they could soon list their shares on the stock market and be able to make new, supposedly more profitable, lending.[17]

In an efficient market, assistance to financially troubled firms can only be arranged through a mutually beneficial agreement between the bank and the borrowing firm in the event of default. The pre-condition for such arrangement is adequate legal protection for creditors, which China still lacks. Without such protection, the banks should have resorted to credit-cut-off as deterrence to the worst-risk firms' irresponsible borrowing. Stiglitz and Weis [*1983*] argue that an effective threat of denying credit might have important incentive effects on borrowers' behaviour, causing borrowers to take less risky projects. Such a sub-optimal scenario, unfortunately, did not emerge in China during the late 1990s, plausibly due to expectation for *ex post* government bailout, according to our results. Reckless lending was aggravated during 1998–99 when the Chinese government took over a huge number of bad loans from the major state banks through its four state-sponsored asset management companies. Our tests for structural changes suggest that, despite government efforts to improve banking management, 1998–99 witnessed more pronounced lending bias, slacker credit rationing to worse than average-risk firms and continuous credit liquidity to keep afloat firms in deep financial distress.

With non-performing loan ratio in China's banking sector standing at nearly a quarter of banks' assets, just removing the bad debt from bank account is not enough. Although, in time of transition, there could be good reasons for the government to take over bad loans to give banking business a fresh start, such interventions must follow carefully specified legal procedures and must not cultivate expectations by lenders and borrowers for implicit government guarantees for future loans. Firm government commitments to enforce hard budget constraints on both SOEs and state banks are badly needed to prevent the formation of a new vicious cycle of non-performing loan accumulation.

NOTES

1 *China Daily*, 4 October 1998, Beijing.
2 'Reforming China's Banks: Don't Bank on a Bail-out' *The Economist,* 4 December 2003.
3 The three policy-loan banks are: the National Development Bank, the Agriculture Development Bank of China, and the Export & Import Bank of China.
4 CCER [*2000: 12*] and remarks by Liu Mingkang, PBOC governor, at a news conference on 1 December 2003 (xinhuanet.com, 2 December 2003).
5 The correlation between GEA and REA varies from 0.0619 (in 1999) to 0.4114 (in 1996).
6 In China's stock exchange regime, there are five types of shares: (1) government shares, which are retained in the state institutions and government departments, are not tradable; (2) legal entity shares, which can only be held by other state-owned enterprises, are not listed in the two official exchanges; (3) employee shares are non-tradable until the firm allows their convertibility; (4) ordinary domestic individual shares, or A shares, can only be purchased

and traded by private Chinese citizens in the two official exchanges; and (5) foreign individual shares, which are denominated in foreign currencies, can be purchased and traded in exchanges in China (B shares), in Hong Kong (H shares) or in NYSE (N shares).

7 See Lu [*2002*] for detailed discussions on the sales-related taxes as one of the major means adopted by the Chinese government to support the prioritised industries designated by industrial policy.

8 By using Germany credit file data, Machauer and Weber [*1998*] show empirically that the credit line increase with borrowers' risk, indicating that banks tend to meet the borrowing needs that increase with the borrower's risk within a certain range.

9 Genius Database is maintained by Genius Information Technology Co. Ltd, which is one of the largest information companies who specialise in the production and distribution of Chinese stock market information.

10 See Altman and Saunders [*1998*] for a review of credit risk measurement and prediction. Although other popular credit risk measurement schemes are available, such as the discriminant analysis model, the probit model and VAR (Value at risk) model (for example, KMV model), we chose Logit model mainly because of its well-known convenience.

11 Of the 846 observations used in Logit model estimation, there are 43 occurrences of a firm with two consecutive years of losses. None of the firms in the sample involves more than one occurrence of such events.

12 ST means 'specially treated'.

13 EBITDA represents earnings from continuing operations before interest, taxes, depreciation, and amortisation.

14 The 'total debt' in DE and DMC refers to total unpaid debt owed by the bank while the 'borrowing' in L refers to current year bank loans and debt about to mature within one year. For years 1994–99, the correlation between L and DE varies from – 0.02 to 0.27 while that between L and DMC varies from 0.60 to 0.69.

15 It is possible that companies with larger equity may be less cautious in using their funds. Since this issue is beyond the scope of this research project, we leave this puzzle for future research.

16 The results of these robustness tests are available upon request.

17 'Recapitalising China's banks', *The Economist* (UK), 8 January 2004.

REFERENCES

Altman, E.I., 1968, 'Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy', *Journal of Finance*, Vol.23, No.4, pp.589–609.

Altman, E.I., and Saunders, A., 1998, 'Credit Risk Measurement: Developments over the Last 20 Years', *Journal of Banking and Finance,* Vol.21, pp.1721–42.

Altman, E.I., and Haleman, R.G., and P. Narayanan, 1977, 'ZETA Analysis: A New Model to Identify Bankruptcy Risk of Corporations', *Journal of Banking and Finance,* Vol.1, pp.29–54.

Aoki, M., 1995, 'Controlling Insider Control: Issues of Corporate Governance in Transition Economies', in M. Aoki and H.-K. Kim (eds.), *Corporate Governance in Transitional Economies*, pp.3–29, Washington, DC: World Bank.

China Center for Economic Research (CCER), 2000, 'China's Financial System Reform: Retrospect and Prospect, CCER Working Paper Series, No.C2000005.

Chinese Academy of Social Sciences (CASS) 1998, 'Macro Situations, Financial Risk and External Shock', *Economics Research Journal* (Jin Ji Yan Jiu), No.3, pp.3–14.

Chinese Academy of Social Sciences (CASS), 1999, 'Investment, Cyclic Fluctuation and Institutional Retrenchment Effect', *Economic Research Journal* (Jin Ji Yan Jiu), No.3, pp.16–25.

Coats, P., and K. Fant, 1993, 'Recognizing Financial Distress Patterns Using a Neural Network Tool', *Financial Management* Vol.22, No.3, pp.142–55.

Crocket, A., 1999, 'Summary Remarks. In Strengthening the Banking System in China: Issues and Experience', a Joint BIS/PBC conference held in Beijing, China, 1–2 March 1999, BIS Policy Papers, No.7, Oct. 1999, pp.337–40.

Cull, R. and L.C. Xu, 2000, 'Bureaucrats, State Banks, and the Efficiency of Credit Allocation: The Experience of Chinese State-owned Enterprises', *Journal of Comparative Economics,* 28, pp.1–31.

Greene, W.H., 2000, *Econometric Analysis*, Upper Saddle River: Prentice Hall.

Konai, J., 1980, *Economics of Shortage*, North-Holland: Elsevier.

Lardy, N.R., 1998, 'China and the Asia Financial Contagion', *Foreign Affair*s, July/Aug. 1998.

Li, D., 1999, 'Insider Control, Corporate Governance and the Soft Budget Constraint: Theory, Evidence and Policy Implications', in Baizhu Chen, Ji. Kimball Dierick and Yi Fang (eds.), *Financial Market Reform in China: Progress, Problems and Prospects*, Boulder Colorado: West View Press.

Lu, D., 2002, 'Revamping the Industrial Policies', in S.-J. Wei, G.J. Wen, and H. Zhou (eds.), *The Globalization of the Chinese Economy*, Cheltenham: Edward Elgar.

Machauer, A. and M. Weber, 1998, 'Bank Behavior Based on Internal Credit Ratings of Borrowers', *Journal of Banking and Finance,* Vol.22, pp.1355–83.

Mitchell, J. 1997, 'Strategic Creditor Passivity, Regulation, and Bank Bailouts', *LSE/Centre for Economic Performance Discussion Paper*, 1780, London.

Ohlson, J.A. 1980, 'Financial Ratios and the Probabilistic Prediction of Bankruptcy', *Journal of Accounting Research*, Vol.18, No.1, pp.109–30.

Ong, L., 2004, 'China's Banking System a Ticking Time Bomb'. Asia Times Online, 13 Jan. 2004.

Platt, H.D. and M. Platt, 1991, 'A Note on the Use of Industry-relative Ratios in Bankruptcy Prediction', *Journal of Banking and Finance*, Vol.15, pp.1183–94.

Roland, G., 2000, *Transition and Economics: Politics, Markets, and Reforms*. Cambridge and Massachusetts: The MIT Press.

Standard Chartered 2001, China's Banking System in Transition, Business Intelligence No.6 – China (www.tdctrade.com/econforum).

Stigliz, J.E. and A. Weiss, 1983, 'Incentive Effects of Terminations, Applications to the Credit and Labor Markets', *American Economic Review*, Vol.73, No.5, pp.912–27.

Xie, P., 1994, 'On State Specialised Banks Reform', *Economic Research Journal* (Jing Rong Yan Jiu), Feb. 1994.

Xie, P., 2001, 'The Debate on the Reform of China's Rural Credit Cooperatives System', *Journal of Financial Research* (Jin Rong Yan Jiu), Vol.1, pp.1–13.

Xu, G. and Lu, L. 2001, 'Incomplete Contract and Moral Hazard: China's Financial Reform in 1990s', *Journal of Financial Research* (Jin Rong Yan Jiu) Vol.2, pp.28–41.

Xu, X. 1998, 'Bank Crises: Possibility and Prevention', *Reform* (Gai Ge) Vol.2, pp.19–23.

Yuan, Gangming 2000, 'An Empirical Analysis of Non-performing Loans in China's SOEs', *Economic Research Journal* (Jin Ji Yan Jiu) Vol.5, pp.12–20.

Zhang, J. 1999, 'Non-performing Loans of State-owned Banks in Transition Economy', *Journal of Financial Research*, May 1999.

Zeng, P. *et al.* (eds.), 1999, *Report on China's National Economic and Social Development for 1998*, Beijing: China Planning Publisher.

Zeng, P. et al. (eds.), 2000, Report on China's National Economic and Social Development for 1999, Beijing: China Planning Publisher.