



# Risk management and managerial efficiency in Chinese banks: A network DEA framework<sup>☆</sup>

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## ABSTRACT

Risk management in Chinese banks has traditionally been the Cinderella of its internal functions. Political stricture and developmental imperative have often overridden standard practice of risk management resulting in large non-performing loan (NPL) ratios. The training and practice of risk managers remain second class compared with foreign banks operating in China. This paper surveys Chinese bank risk managers and constructs metrics of risk management practice and risk management organisation. The metrics are used as intermediate inputs in a Network DEA framework to produce a measure of income efficiency. A statistical test is carried out to assess the importance of the risk metrics in evaluating bank income efficiency.

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## 1. Introduction

In recent years the Chinese banking system has made enormous strides in reform and deregulation. They have emerged relatively unscathed from the global banking epidemic that has infected the developed economies and the largest of them stand alongside the giants of global banking as first among equals<sup>1</sup>. However, despite the relative strength of the large listed Chinese banks in world banking, lingering doubts remain about the inherent fragility of the banking system in China. The past decade has seen a large volume of academic and professional papers expressing concerns about the safety and soundness of the Chinese banking system and their medium term viability in the face of increasing competition from foreign banks in the post WTO years. The common thread in many reviews of Chinese banking are: the large number of non-performing loans, the

dominance of lending to state-owned enterprises, and the influence of local government and Communist Party officials in lending decisions.

A particular area of concern for the regulatory authorities and strategic investors in the Chinese banks has been the quality of training of risk managers, the organisational culture and the misalignment of incentives associated with bureaucracy rather than commercialism [7]. The process of converting Chinese banks from state dominated bureaucracies to modern profit oriented banking institutions involves not just the training of decision makers in modern banking but also the transformation of the organisation. This transformation has been occurring but on an evolutionary rather than a revolutionary pace. With the encouragement of the regulatory authorities, Chinese banks have in recent years, had to restructure their balance sheet, develop modern risk management methods, improve capitalization, diversify earnings, reduce costs and improve corporate governance and disclosure<sup>2</sup>.

This paper aims to evaluate the performance of the risk management function of Chinese banks in terms of its contribution to profitability. There are four parts to the research. The first part collects qualitative data on risk management practice and risk management organisation through a semi-structured questionnaire. The second part quantifies the qualitative data by constructing a metric of risk management practice, and risk management organisation in Chinese banks, using the foreign banks operating in China as a yardstick of best practice. The metric will measure how good the practice of risk management is in a Chinese bank and how well the risk management function organisation is relative to best practice. The third part uses the

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<sup>1</sup> According to 1000 top bank survey in the July 2009 issue of the Bankers Magazine, the Industrial and Commercial Bank of China is the 8th largest in the world and Bank of China is 11th largest. For a statement of the development of the banking market see Yang and Kuhn [20] Ch 3.

<sup>2</sup> CBRC Annual Report 2006 <http://www.cbrc.gov.cn/english/home/jsp/index.jsp>.

Table 1

| Bank number             | Mnemonic | Bank name  | Number of interviewees |
|-------------------------|----------|--|------------------------|
| 1                       | ICB      | Industrial Bank of China (Joint-stock commercial bank)         | 1                      |
| 2                       | GDB      | Guangdong Development Bank (Jointstock commercial bank)        | 1                      |
| 3                       | CMBCL    | China Merchant Bank Co Ltd (Jointstock commercial bank)        | 2                      |
| 4 (Big-4)               | ABOC     | Agricultural Bank of China (State-owned bank)                  | 1                      |
| 5 (Big-4)               | CCB      | China Construction Bank (State-owned bank)                     | 1                      |
| 6                       | CMB      | China Minsheng Bank (Joint-stock commercial bank)              | 1                      |
| 7                       | HUAXIA   | Huaxia Bank (Joint-stock commercial bank)                      | 1                      |
| 8                       | EVERBRT  | Everbright Bank of China (Joint-stock commercial bank)         | 2                      |
| 9 (Big-4)               | ICBC     | Industrial and Commercial Bank of China (State-owned bank)     | 2                      |
| 10                      | (Big-4)  | BOC Bank of China (State-owned bank)                           | 1                      |
| 11                      | SPD      | Shanghai Pudong Development Bank (Joint-stock commercial bank) | 1                      |
| 12                      | SDB      | Shenzhen Development Bank (Jointstock commercial bank)         | 1                      |
| 13                      | SPAN     | Shenzhen Ping An Bank (City commercial bank)                   | 3                      |
| 14                      | BOB      | Bank of Beijing (City commercial bank)                         | 1                      |
| 15                      | CITIC    | China CITIC Bank (Joint-stock commercial bank)                 | 1                      |
| <i>Foreign agencies</i> |          |  |                        |
| 1                       | Citi     | Citibank (China)   | 2                      |
| 2                       | HSBC     | Hong Kong Shanghai Banking Corporation                         | 1                      |
| 3                       | BEA      | Bank of East Asia (Hong Kong)                                  | 1                      |
| 4                       | EXP      | Experian (China)   | 1                      |

constructed metrics of risk management in a network DEA framework to evaluate bank income efficiency. The fourth part tests the hypothesis that the inclusion of the risk metrics in the network DEA improves the measurement of income efficiency and its link to bank profitability.

The paper is organised in the following way. The next section outlines the results of interviews. Section 3 describes how the interview responses are converted into a relative score compared with two of the major foreign banks operating in China (HSBC and Citibank). Section 4 describes the method of performance evaluation based on Data Envelopment Analysis (DEA) and the use of network DEA to think of risk management and organisation as an intermediate output/input in the process. Section 5 tests the hypothesis that the use of the risk metrics in the network DEA improves the measurement of efficiency and its correlation with bank profitability. Section 6 summarises the results and concludes.

## 2. Qualitative analysis

Twenty five bank executives involved in the area of lending and risk management were interviewed over the period 2007–2008. The banks included three foreign banks, the big 4, nine joint-stock commercial banks and two city commercial banks. The criteria for choosing interviewees were that they were involved in the risk management function and the lending decision with several years experience. The aim was to get middle ranking managers who could explain existing risk management practice and provide subjective evaluation of staffing, training and recruitment issues.

The interviews were conducted in a semi-structured format in which interviewee responses were recorded and respondents recorded their own scores (1–5 Likert scale) with respect to specific questions about risk management functions. Interviews were conducted in Beijing, Shanghai, Tianjin, Dalian, Guangzhou and Shenzhen. Table 1 lists the banks that were involved in the research.

The questionnaire was divided into two areas of the risk management operation. The first area was concerned with the importance of particular characteristics regarding the loan approval decision to specific sectors (large enterprises, Small and Medium size Enterprises (SME) and consumers). The second area covered the organisation, training and staffing of the risk management section of the bank. This section dealt with issues

relating to performance evaluation, training, recruitment, and retention, and work organisation. A shortened version of the questionnaire dealing with the factors that make up the construction of the risk metrics is included in the appendix.

The single largest factor in the granting of a loan was cash flow (70%)<sup>3</sup>, which biases bank lending to established enterprises. Record of repayments (good credit record) was cited by 30% of respondents. A preference for lending to State-owned Enterprises (SOE) (65%) reflects the political reality of state and local government relevance in the lending decision as well as implicit government guarantees. Collateral was not an issue except in the case of lending to SMEs. Less than 20% of interviewees considered collateral and guarantees as important in the lending decision reflecting the dominance of SOEs in the bank's loan portfolio. Collateral was a more important feature for the two foreign banks reflecting the stronger focus of these banks in the SME sector. In the case of mortgage lending, there was no common formula relating loan size to annual income. The most common cited reason for approval of a mortgage was the type of job the borrower had. Government officials, civil servants and employees in large SOEs were viewed as having the safest jobs and lowest risk (65%). Income levels, ability to pay and volatility of income was cited as the second main factor in determining mortgage approval (25%). Loan-to-Value of mortgages does not exceed 80% and typically are in the region 60–65% with normal upper bound of 70%.

The reasons for a loan refusal had a greater variation in the response. The single main reason for a loan refusal to a SOE was weak financial projections (36%) which, was also linked to any history of delinquency (18%). However, the second single factor was state policy. Even if an enterprise is state owned, it may be classified as belonging to a declining industry with weak state guarantees (27%). In contrast, the foreign banks saw independence of SOE management from the state as strength and cited poor management quality as the principal reason for loan refusal to a SOE.

In the case of SMEs, the principal reason for loan refusal was the lack of collateral or third party guarantee (36%). One respondent stated that collateral substituted for post-loan monitoring

<sup>3</sup> The percentages are of the total number of respondents of the domestic banks and not the number of banks surveyed. The number of respondents per bank is shown in Table 2 of the appendix.

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