



Contents lists available at ScienceDirect

Global Finance Journal

journal homepage: [www.elsevier.com/locate/gfj](http://www.elsevier.com/locate/gfj)

# Risk, competition and efficiency in banking: Evidence from China

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## ARTICLE INFO

### JEL classifications:

B22  
C14  
G21

### Keywords:

Competition  
Risk  
Efficiency  
Chinese banking

## ABSTRACT

This paper tests the interrelationships among risk, competition, and efficiency in the Chinese banking industry between 2003 and 2013, with an efficiency-adjusted Lerner index and stability inefficiency as the indicators of competition and insolvency risk. The results show that Chinese commercial banks with higher efficiency have higher credit risk and insolvency risk, but lower liquidity risk and capital risk. Greater competition decreases credit risk and insolvency risk, but increases liquidity risk. Credit risk and insolvency risk are significantly and positively related to efficiency, while liquidity risk and capital risk are significantly and negatively related. Finally, lower liquidity risk decreases competition.

## 1. Introduction

China's economic development has attracted great attention from the rest of the world. During the period 2003–2013, China had an annual GDP growth rate of over 10.2%. The Chinese banking sector has undergone sustainable and healthy development through several rounds of banking reforms initiated by the government since 1978. The main purpose of these reforms has been to increase competition, enhance stability, and improve the performance of the Chinese banking sector; and indeed, competition has increased significantly. State-owned commercial banks (SOCBs) still dominate the industry. However, according to statistics from the China Banking Regulatory Commission (CBRC, 2013), their share of total banking sector assets decreased between 2003 and 2013, to a low point of 43.3%. On the other hand, joint-stock commercial banks (JSCBs) and city commercial banks (CCBs) kept growing; in 2013 they held 17.8% and 10.03% of total banking sector assets, respectively. Fig. 1 shows the assets of SOCBs, JSCBs, CCBs, and total banking institutions in China over the period 2003–2013.

Over the same period, the Chinese banking industry also reduced its credit risk undertaken. Ratios of loans in default during 2011–2013 were at 1%, lower than the figures for 2008–2010.<sup>1</sup> The industry also reduced its capital risk. CBRC statistics show that, by the end of 2013, the average capital adequacy ratio of Chinese banks was 12.2%, up by 1.6% from the previous year. In addition, the liquidity ratio of Chinese commercial banks was 44% by the end of 2013. Although this ratio was lower than the figure for 2012, which was 45.8%, it was higher than those for 2010 and 2011, at 42.2% and 43.2%, respectively.

Few studies investigate competitive conditions in the Chinese banking sector (Fu, 2009; Masood & Sergi, 2011; Park, 2013; Tan,

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<sup>1</sup> There is a common skepticism, and many analysts have accused Chinese authorities of underreporting bank risk as a way to artificially support confidence. We cross-check the data reported by CBRC against data collected from Bankscope. The information from Bankscope is taken by Bureau Van Dijk from a combination of annual reports, information providers, and regulatory sources. More than 200 validation controls are applied to the data, which are checked entity by entity and reviewed regularly. The data in the current paper come not only from CBRC, but also from Bankscope and World Bank databases.

<https://doi.org/10.1016/j.gfj.2017.12.001>

Received 6 December 2017; Accepted 7 December 2017

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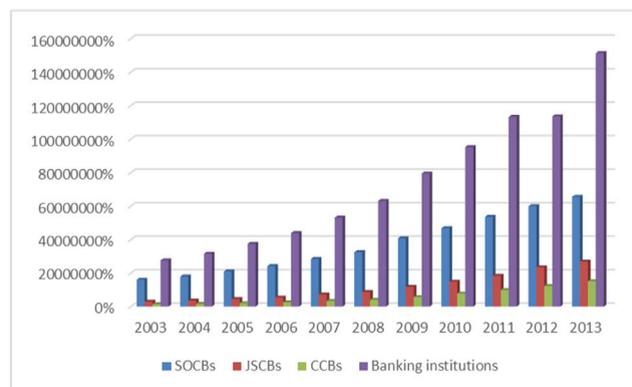


Fig. 1. Summary of the assets of SOCBs, JSCBs, CCBs and total banking institutions in China over the period 2003–2013. Source: Annual reports of CBRC (China Banking Regulatory Commission); figures in RMB 100 million.

2014; Tan & Floros, 2013a; Yuan, 2006). More importantly, although a few studies examine the effect of competition on banks' risk taking (Fu, Lin, & Molyneux, 2014; Schaeck & Cihak, 2014; Soedarmono, Machrouh, & Tarazi, 2013), three studies use data from the Chinese banking industry (Tan, 2014; Tan & Floros, 2013b, 2014). These papers mainly focus on credit risk or insolvency risk, and do not consider other types of risk such as capital risk and liquidity risk. The impact of competition on capital risk and liquidity risk has policy implications for Chinese banking regulators, but the current empirical literature does not provide a clear estimate of this impact for China. There are also few empirical studies examining the performance of Chinese commercial banks (Sun, Harimaya, & Yamori, 2013; Tan, 2014; Tan & Floros, 2013b). To our knowledge, there is no empirical study examining the effect of competition and different types of risk on efficiency in the Chinese banking industry.

We use a sample of Chinese commercial banks (SOCBs, JSCBs, and CCBs) to test the interrelationships among efficiency, risk, and competition. Our study controls for a number of variables that are thought to influence those factors: bank-specific variables (size, profitability, and diversification); industry-specific variables (banking sector development and stock market development); and macroeconomic variables (inflation and annual GDP). Data come from three sources, the China Banking Regulatory Commission (CBRC), Bankscope, and the World Bank database. We use nonparametric Data Envelopment Analysis (DEA) to measure efficiency; accounting ratios as well as a translog function to measure different types of risk; and the efficiency-adjusted Lerner index to measure competition. To test the interrelationships among efficiency, competition, and risk, we use the well-known statistical (econometric) Granger-causality test.

This paper is the first to investigate technical efficiency and pure technical efficiency as well as scale efficiency, reflecting both inside and outside factors influencing bank performance. In other words, we investigate the source of inefficiencies (either from bank management of inputs and outputs or from scale of operation) and their interrelationships with different types of risk and competition (which have important policy implications). This is also the first paper to test competition in the Chinese banking industry using the more accurate efficiency-adjusted Lerner index rather than the traditional Lerner index (Amidu & Wolfe, 2013), and to test the robustness of the reported results using alternative indicators of competition and risk as well as different econometric techniques.

The remainder of the paper is organized as follows: Section 2 reviews the literature on the interrelationships among risk, efficiency, and competition in the banking industry, while Section 3 describes the data, the institutional background, and the methods. Section 4 discusses the empirical results. A robustness check is provided in Section 5, and Section 6 summarizes and concludes the paper.

## 2. Literature review

### 2.1. The impacts of competition and efficiency on risk in the banking industry

The competition-fragility hypothesis argues that banks can withstand shocks and decrease risk taking because in a less competitive environment they can earn higher profits through monopoly rents. In a pioneer investigation of the relationship between competition and stability in the banking sector, Keeley (1990) found that monopoly rents are eroded by an increase in competition, and this led to an increase in bank failures in the United States in the 1980s. Higher competition increases the number of marginal loan applicants who receive financing, so the quality of the loan portfolio is more likely to deteriorate and bank fragility increases. The competition-stability view suggests that in a less competitive banking market, banks charge higher interest rates, which will increase the probability of default on loan repayments (Boyd & DeNicolo, 2005).

There are two main hypotheses about the impact of efficiency on risk in the banking industry, the bad management hypothesis and the moral hazard hypothesis. The bad management hypothesis (Berger & DeYoung, 1997; Williams, 2004) states that lower efficiency raises costs because banks do not monitor credit adequately and do not control expenses efficiently. The result is increases in banks' risk because of credit, operational, market, and reputational problems. The moral hazard hypothesis (Jeitschko & Jeung, 2005) suggests that managers of inefficient banks tend to take higher risks because of informational friction and agency problems.

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