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The Impact of Foreign Bank Penetration on the Domestic Banking Sector: New Evidence from China

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Abstract

This study proposes a foreign bank branch networks index (FBBNI) to capture bank-level exposure to competition from foreign banks in terms of geographical proximity. The index takes account of the rapidly expanding branch networks of both foreign and domestic banks in China. Based on data from a sample of three types of Chinese commercial banks from 2002 to 2011, we find that exposure to the branch networks of foreign banks is associated with improved profitability at domestic banks, higher efficiency, and increased non-interest income, consistent with knowledge transfer from foreign banks. These relationships are most pronounced for joint-stock domestic banks (JCBs) presumably because their ownership structure fosters knowledge transfer.

Key words: foreign exposure; bank performance, Chinese banking

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1. Introduction

Rapid economic expansion in China has been accompanied by a series of reforms to the financial system, targeting the banking sector in particular. By the end of 2012, China had one of the largest banking sectors in the world in terms of total assets. Recent developments include the listing of major commercial banks on the stock market, liberalisation of interest rates, relaxation of geographic restrictions on city commercial banks, and the opening-up of the domestic market to foreign competition. In order to comply with its World Trade Organisation (WTO) commitments, the Chinese government progressively removed regulatory obstacles after 2001, to allow foreign banks access to the banking market. Since the end of 2006, foreign banks have been allowed to engage in both local- and foreign-currency business with all categories of customers in all cities. By the end of 2012, there were 42 locally incorporated subsidiaries of foreign banks and 412 foreign bank branches in operation (CBRC, 2012). Due to these changes in government policy, China provides a clear case in which domestic banks which have operated in isolation from the rest of the world, within a few years, become directly exposed to the practices of foreign banks. The existence of this recent and clear-cut transition stage makes it easier for the effects of exposure to foreign banks to be measured.

On the one hand, the entry of foreign banks increases competition, threatening the profits of domestic banks (Claessens et al. 2001). On the other hand, foreign banks can bring advanced technology, new products and expertise to the domestic market (Unite and Sullivan, 2003), and competition can stimulate improvements in efficiency at domestic banks (Berger et al. 2009; Manlagñit, 2011). Furthermore, the Chinese banking sector includes several categories of banking institution, each with a distinct ownership structure and operations in separate market segments

(Dong et al., 2013). The expansion of foreign banks could have a different impact on each category of domestic bank. This feature adds interest to the question of the impact of foreign banks in China.

To measure the extent of domestic banks' exposure to foreign banks, earlier studies mainly reply on aggregate measures, such as the assets of foreign banks as a percentage of total assets in the domestic banking sector (e.g. Claessens et al., 2001; Kim and Lee, 2004; Unite and Sullivan, 2003; Shen et al., 2009). Such measures fail to reflect bank-specific exposure in terms of geographic proximity to foreign banks. Geographic proximity is important because it helps to facilitate knowledge diffusion, ease communication, and mobilise labour and technology transfer (Decressin and Fatas, 1995; Chuang, 2001; Adams, 2002; Audretsch and Feldman, 2004). It also determines the level of competition. Xu (2011) proposes a foreign exposure index to take account of geographic proximity, but the index does not properly reflect exposure via branch networks. The influence of foreign banks on domestic competitors could be significantly exerted through branch networks. To address this problem, we propose a foreign bank branch networks index (FBBNI), based on detailed branch location data of foreign and domestic banks. The influence of foreign banks on a given domestic bank is measured by the total number of foreign bank branches operating in cities in which the domestic bank has at least one bank. The potential for foreign influence via branches has become more important in recent years because of the rapid expansion of branch networks of city commercial banks (CCBs) and foreign banks in China.

By using the new measure, we examine the impact of the penetration of foreign bank branch networks on the performance of Chinese commercial banks. To perform our analysis, we

construct a sample of 107 Chinese commercial banks over the period of 2002 to 2011. We regress the FBBNI on five performance measures, namely return on assets, non-interest income ratio, cost-to-income ratio, loan-loss reserves ratio, and a general performance index. We find that an increased presence of foreign banks helps to improve the performance of domestic banks in China, and the effect is stronger for state-owned and joint-stock banks than for city commercial banks. The effect is also stronger for domestic banks which receive foreign strategic investment, and stronger after the opening-up of the Chinese banking market in 2006. Our specific finding that domestic profitability is positively affected by foreign exposure differs from the findings of some previous studies, which use cruder aggregate measures of foreign bank penetration, and which report a negative association between profitability and exposure to foreign banks. The results remain consistent in robustness checks using two-step Generalised Method of Moments (GMM) estimation.

This study contributes to the literature in several ways. First, the FBBNI is an improved measure of the exposure of domestic banks to foreign banks, and we therefore believe that our results regarding the impact of foreign banks are more accurate than those of previous studies. Second, the paper shows that the impact of foreign bank penetration depends on the type of domestic bank, where banks are distinguished by ownership and by the nature of their operations. Previous studies tend to ignore the fact that different types of banks may have different objectives and operate in separate market segments (e.g. Shen et al. 2009; Xu, 2011; Seo et al. 2013). Finally, the paper extends the limited studies of the Chinese banking sector by providing a picture of the expansion of foreign bank branches in China after its accession to the WTO, and during the recent global financial crisis.

The rest of the paper is organised as follows. Section 2 provides background information on the Chinese banking sector and the expansion of foreign banks. Section 3 reviews the literature on foreign bank entry. Section 4 describes our research method and data. Section 5 discusses the empirical results, and the last section concludes the paper.

2. Institutional background

2.1. Ownership of Chinese banks

Since the early 1980s, the Chinese government has gradually implemented a series of reforms in order to transform the country's centralised policy-driven banking system into a decentralised, fully functional profit-oriented system. A gradual process of change has created a banking system with multiple categories of institutions and agencies, operating in separate markets with generally clearly delineated functions (Martin, 2012). Commercial banking operations in China are mainly conducted by three types of banks: five large state-owned commercial banks (SOCBs), joint-stock commercial banks (JSCBs), and city commercial banks (CCBs). The four largest SOCBs were established in the early 1980s and are directly owned and controlled by the state. They are often obliged to conduct projects which assist in fulfilling social-welfare objectives, and to lend to favoured state-owned industrial enterprises (Fu and Heffernan, 2009). JSCBs emerged in 1986 when the Bank of Communications was established, and they expanded rapidly throughout the 1990s.¹ JSCBs have a different ownership structure from SOCBs. They have mixed ownership which includes the state, state-owned enterprises (SOEs), private enterprises, and individual investors. Most of the controlling shareholders of JSCBs are market-oriented SOEs which invest in JSCBs purely for financial returns (Jia, 2009). Therefore JSCBs are

less vulnerable to political intervention than SOCBs, and operate on a pure commercial basis focusing on profit maximisation. JSCBs are allowed to provide a wide range of products and services, and some of them have advantages in specific business areas. For example, Minsheng Bank is strong in trade-financing services; China Merchants Bank focuses on retail-banking services.

In the mid-1990s, many large cities consolidated their urban cooperatives into CCBs, to promote local economic development. These banks were generally set up with a less concentrated ownership structure. The ownership is mainly distributed among local government agencies, SOEs, urban enterprises, and individuals. This plurality of shareholders may significantly reduce government intervention and result in better performance (Ferri, 2009). The scope of the CCBs' business was initially restricted to the cities where they were founded. In 2005 the Bank of Shanghai made the first move to change this situation, by establishing a branch in Ningbo, after obtaining approval from the China Banking Regulatory Commission (CBRC). Since then, many other CCBs have followed this move, establishing branches across provinces and cities. By the end of 2010, 78 CCBs had removed the word 'City' from their name to reflect their intention of going national. However, CCBs maintain much smaller branch networks than SOCBs and JSCBs. Most CCBs still have a strong local focus, and provide financial services to small and medium-sized enterprises in their municipalities. Finally, in order to improve financial services in the countryside and boost rural development, a large number of rural commercial banks (RCBs) have been created since 2001. The structure of the Chinese banking system is summarised in Figure 1.

[Insert Figure 1 about here]

2.2. The performance of foreign banks in China

The Chinese banking sector was first opened to foreign banks in 1979, but various entry barriers and restrictions on their business were imposed until 2006 (Ma, 2006). Since 1996, the Chinese authorities have encouraged foreign strategic investment in domestic banks.² In 2003, the CBRC updated its guidelines regarding foreign equity investment. According to the revised guidelines, foreign investors are allowed to own up to 25% of a Chinese domestic bank, with an upper ceiling of 20% for any single investor. However, the potential benefits of foreign investment in domestic banks have been reduced by the short-term investment policy of some foreign bank investors.³

Since China's entry into the WTO at the end of 2001, the Chinese government has progressively adopted the so-called open policy, to enhance the openness of the banking sector. Within five years of China's accession to the WTO, most restrictions had been removed on foreign banks' business operations and on the expansion of their branch networks. Since 2006, foreign and domestic banks have been treated in a similar manner, with a few exceptions.⁴ In general, they provide the same types of banking services, and face the same legal restrictions.⁵

The number of foreign bank branches has experienced rapid growth in recent years due to further opening-up of the Chinese banking sector. During 2004 to 2012, the number of foreign bank entities almost doubled (Figure 2). By the end of 2012, 181 banks from 45 countries had set up 209 representative offices, and 37 banks from 14 countries had established incorporated entities, with 245 branches in China (CBRC, 2012). These 37 banks posted record profits in 2012,

reaching RMB 16.7 billion, while their total assets were also up by 24% year-on-year to RMB 2.2 trillion. The rapid expansion of foreign bank branches increased competitive pressures on local banks. For example, between 2007 and 2011, 18 new foreign bank branches were established in Jiangsu Province, the home of many small and medium-sized businesses. These branches were set up throughout the province. According to the CBRC Jiangsu office, the loans made by foreign banks increased 383% between 2007 and 2011. All the foreign branches were profitable within one year after opening, and some were profitable within three months.

[Insert Figure 2 about here]

Many of the foreign banks chose to set up branches in first- and second-tier cities in the highly developed Eastern coastal region (Figure 3). For instance, of the 35 branches established by the Bank of East Asia China, 22 were located in the Yangtze River Delta and the Pearl River Delta regions. China's financial centre, Shanghai, accommodated 75 foreign branches by the end of 2012, accounting for 22% of the total. They jointly controlled 12% of Shanghai's banking assets, much higher than the national average proportion of 2%. Of the 37 locally incorporated foreign banks, 21 have their head office in Shanghai, and several others have relocated their central treasury function to the city. Six other cities also have more than ten branches of foreign banks. Although the number of cities with foreign banks or branches has grown from 20 to 50 within the past decade, the regional distribution of foreign banks remains highly uneven (Figure 3). This means that it is often inappropriate to use a national aggregate measure to proxy for the presence of foreign banks. For example, the performance of a Chinese CCB located in a western

city can hardly be influenced by a foreign branch located in a south-eastern city. Therefore, we propose a measure to account for the geographic proximity of foreign banks and their branches.

[Insert Figure 3 about here]

3. Previous research

According to Levine (1996), the benefits that can derive from allowing foreign bank entry include: stimulating the development of the supervisory framework of the domestic banking sector; enhancing the country's access to a broader range of capital sources; and improving banking practices in areas such as service quality, products on offer, and the adoption of advanced technologies. In addition, since foreign banks tend to be less politically connected with the domestic regulatory authorities, their increased presence might inject additional competition (Terrel, 1986; Kroszner, 1998). In order to compete with international banks, domestic banks may 'cut prices' to be more efficient, and fight fiercely to retain their previous market share (Bhattacharaya, 1993; Levine, 1996). Consequently, increased foreign entry forces local bankers to abandon their 'quiet life' and concentrate more on efficiency improvements (Berger and Hannan, 1998). On the other hand, to compete against foreign banks, local banks may need additional investments in updating their production technologies and techniques, building new branches, improving customer service, and recruiting talented human capital (Bhattacharaya, 1993; Xu, 2011). This would lead to an increase in costs and a decrease in profits in the short term, but to an improvement in overall performance of domestic banks in the long term (Hermes and Lensink, 2004; Shen et al., 2009)

Mixed empirical results have been documented in the literature. Clarke et al. (1999), Claessens et al. (2001) and Naaborg and Lensink (2008) find that an increased foreign presence leads to a reduction in profits, net interest margin and overall operating expenses for domestic banks in general. Unite and Sullivan (2003) and Manlagñit (2011) show that foreign banks serve as an effective competitive force which reduces the excess profit earned by Philippines banks and improves their efficiency. Barajas et al. (2000) likewise find that, in Columbia, increased liberalisation reduces intermediation spreads, but also lowers non-financial costs, instils additional competition, improves loan quality, and consequently strengthens the overall performance of the banking sector.

Regarding China, Berger et al. (2009) find that minority foreign ownership improves both the profit and the cost efficiency of domestic banks significantly, in particular smaller banks. Garcia-Herrero and Santabarbara (2008) find further that domestic banks can achieve the greatest efficiency gains when the foreign investor takes a minority stake and acts as a strategic investor. Similarly, Hasan and Xie (2012) find that foreign strategic investment improves the corporate governance of Chinese banks, which promotes overall performance. Firth et al (2014) find that after the introduction of a foreign investor, domestic banks tend to decrease their non-traditional business. Gao and Ge (2008) report that the majority of foreign banks in China are from developed nations, and that they exert a positive influence on the regulatory environment and consequently improve the efficiency of the banking sector. Xu (2011) and Seo et al. (2013) test the impact of foreign entry on the net profit margin, non-interest income and operating costs of Chinese banks. They conclude that the additional competition brought about by foreign banks has squeezed the interest margins of Chinese domestic banks, pushing them to cut operational

expenses and expand actively into non-traditional business areas, such as asset management and investment-consultancy services. However, Shen et al (2011) find that foreign bank penetration improves the profitability of Chinese banks, but does not reduce operating costs.

The above studies mainly rely on country-level aggregate measures such as the number of foreign bank branches operating in China, or the share foreign banks of total banking assets, which capture the overall foreign presence in the host country. To perform bank-level analysis, a better measure would capture the bank-specific exposure of individual domestic banks to foreign banks, based on geographic proximity. Chung (2001) and Gormley (2010) document the impact of geographic proximity in facilitating technology spillover and the transfer of lending practices from foreign to local banks. Xu (2011) argues that handily located foreign banks exercise more competitive pressure on incumbent banks than distant foreign banks.

Xu (2011) proposes a spatially disaggregated foreign exposure index based on the number of foreign banks in the city of the bank's head office, in the case of CCBs, or in the city where the bank has a presence which has the largest number of foreign banks, in the case of other types of domestic bank. However, the index fails to reflect the impact of the rapidly expanding branch networks, and therefore does not take full account of the way in which foreign banks exert their influence on domestic banks. Xu's index was more suitable when the operation of CCBs was restricted to within their geographical locations and when there was strict control of the number of foreign bank branches.

4. Research design

4.1. Foreign bank branch networks index (FBBNI)

The mutual influence and competition between domestic and foreign banks in China have significantly increased over the last few years, as explained above. We argue that the influence of foreign banks can be transmitted to a domestic bank via their respective branch networks. Thus, this study uses the total number of foreign bank branches operating in the cities in which a domestic bank's branches are also located, to determine the level of foreign bank influence on the domestic bank:

$$FBBNI_{i,t} = \frac{\sum_{m=1}^j N_{i,t,m}}{\max \sum_{m=1}^j N_{i,t,m}} \quad (1)$$

where $N_{i,t,m}$ is the number of foreign bank branches in city m in year t in which domestic bank i has at least one branch. So $N_{i,t,m} = 0$ for a city in which bank i has no branches in year t . The denominator, $\max \sum_{m=1}^j N_{i,t,m}$, is the maximum total number of foreign bank branches which a domestic bank faced in China over the sample period, i.e. the panel total maximum, which is 342.⁶ $FBBNI$ takes values over the interval $[0, 1]$ and the higher the value is, the greater the influence of the foreign bank is on bank i in year t .

Table 1 presents three examples of the $FBBNI$ calculation. Taking the Bank of Nanjing as an example, in 2011 it had branches in five cities; Nanjing, Shanghai, Wuxi, Hangzhou and Suzhou. There is a total of 104 foreign bank branches in these five cities, which can exercise their influence over the Bank of Nanjing's branches. The ratio of 104 to 342 is used to measure the foreign exposure level that the Bank of Nanjing experienced in 2011.

[Insert Table 1 about here]

4.2. Measures of bank performance and hypothesis development

Five proxies of bank performance are employed to investigate the links between foreign bank penetration and bank performance. These are return on assets (*ROA*), non-interest income ratio (*NII*), cost-to-income ratio (*CI*), loan-loss reserves ratio (*LLR*), and a performance index (*PI*) which is constructed by applying a principal components analysis to the four individual performance measures. In China the financial year-end is always 31 December, so the periods to which the accounting variables relate match the periods to which the measure of foreign exposure relates.

4.2.1 Return on assets (*ROA*)

ROA is net income after tax divided by total assets, and it is the most frequently used measure to assess the profitability of banks. Foreign bank entry is usually expected to increase competition in the host countries, which in turn could weaken the ability of incumbent banks to sustain their profitability (Clarke et al., 1999; Claessens et al., 2001; Unite and Sullivan, 2003). However, Lensink and Hermes (2004) argue that the impact of foreign bank entry on profitability also depends on the level of competition in the domestic banking sector. In the case of a less competitive banking market, an increase in foreign bank presence may not significantly and immediately increase competitive pressures on domestic banks. The benefits gained from foreign banks can outweigh increased costs due to greater competition. Therefore, the predicted effect of foreign bank penetration on banks' profitability is ambiguous. In China the banking industry has remained semi-controlled by the government, and some studies confirm the existence of a

significant positive relationship between foreign presence and the profitability of domestic banks (e.g. Berger et al. 2009; Shen et al. 2009). On balance, we expect a positive relation between *FBBNI* and *ROA*.

4.2.2 *Non-interest income ratio (NII)*

A second bank performance measure is the ratio of non-interest income to total assets. This captures a bank's non-lending activities, including securities trading, fund management and credit cards. Levine (1996) and Blomstrom and Kokko (1998) suggest that foreign direct investment is likely to bring new products, processes and technology to the domestic market. Local banks will learn from their foreign competitors and engage more in fee-paying activities to increase their income. On the other hand, foreign banks generally possess a comparative advantage in non-traditional banking business. Consequently, this would squeeze the market share of domestic banks' non-traditional banking business. Therefore, the predicted effect of foreign bank penetration on *NII* is ambiguous. However, on balance we expect a positive relation, because domestic banks have been compelled to develop new products and services to compete with foreign banks.

4.2.3 *Cost-to-income ratio (CI)*

CI is defined as the ratio of operating expenses to operating income (interest and non-interest income). This ratio is often considered to be the most popular non-frontier bank efficiency measure, in part because it reflects operations both on and off the balance sheet. Levine (1996) suggests that the spillover effect from foreign operations not only increases competition but also improves the efficiency of the domestic banking sector, by bringing better management skills,

advanced technology and new products to the domestic market. Foreign bank penetration is therefore expected to have a positive effect on the efficiency of domestic banks.

4.2.4 Loan-loss reserve ratio (LLR)

LLR is the ratio of the loan-loss reserves to total earning assets. The loan-loss reserve is designed to provide for problem loans on which borrowers are likely to default. Thus, *LLR* is often used to measure the risk level of banks. Claessens et al. (2001) argue that an increase in foreign bank presence is likely to increase risks among domestic banks. With greater operational experience and higher quality customer services, foreign banks potentially are able to cherry-pick higher profile customers and leave the less creditworthy ones to the domestic banks (Grigorian and Manole, 2002). On the other hand, an increased influence of foreign banks, especially via higher foreign ownership, may generate some positive effects on the risk exposure of domestic banks, as they could learn more sophisticated risk-management techniques.

4.2.5 Standardised performance index (SPI)

To assess the overall impact of foreign bank penetration, we apply principal components analysis to the above four performance measures, to construct an overall performance index for each bank. The first step is to determine how many factors should be used in our analysis. Only those factors with an eigenvalue of 1 or more are retained. Two factors are extracted for analysis, accounting for 67.5% of the total variance of the four financial ratios. For the first factor, *F1*, *ROA* has a positive factor loading while *CI* has a negative factor loading, as expected. *F1* accounts for 41.1% of the total variance. For the second factor, *F2*, *NII* has a positive loading, also as expected,

and *LLR* has a negative loading. *F2* accounts for 26.4% of the total variance. The performance index is computed using the following formula:

$$PI_{i,t} = (41.1\%/67.5\%)(F1\ score)_{i,t} + (26.4\%/67.5\%)(F2\ score)_{i,t} \quad (2)$$

where the factor score for a given bank and factor is the sum of the products of the relevant bank-specific variables and their corresponding factor loadings. The value of the index can be either positive or negative, making it difficult to interpret. Therefore, following Shih et al. (2007), we standardise the index using the following formula:

$$SPI_{i,t} = \frac{PI_{i,t} - \min PI_{i,t}}{\max PI_{i,t} - \min PI_{i,t}} \quad (3)$$

where $\min PI_{i,t}$ ($\max PI_{i,t}$) is the minimum (maximum) value of the index in the sample. The value of the standardised performance index (*SPI*) ranges from 0 to 1, and a higher value indicates better bank performance. We expect foreign bank penetration to have a positive effect on the overall performance of domestic banks.

4.3 Empirical models

To examine the impact of foreign bank penetration on banking performance in China, we use the following regression model:

$$BP_{it} = \alpha + \beta FBBNI_{it} + \gamma Z_{it} + \theta YD_t + \varepsilon_{it} \quad (4)$$

where bank performance BP_{it} represents various performance measures for domestic bank i in year t ; $FBBNI_{it}$ is the key explanatory variable; Z_{it} is a vector of control variables; YD_t is a year dummy, capturing time-specific effects such as trends in regulatory reforms and technological advances; and ε_{it} is the error term. In order to reduce a potential omitted-variables problem caused by assuming a linear relation between the dependent and independent variables, we allow for a non-linear relationship by adding a squared term for $FBBNI$ into the benchmark

specification.⁷ We also calculate results, for comparison, using two aggregate measures of foreign bank penetration from previous research. The first, FBA_t , is the total assets of foreign banks divided by the total assets of Chinese banks sector in year t . The second, FSI_t , is the total number of banks with foreign strategic investment divided by the total number of Chinese banks. In line with the previous literature (e.g. Fu and Heffernan, 2009; Manlagñit, 2011; Xu, 2011), we also include several bank-specific and macroeconomic control variables in our models which might affect bank performance. The bank-specific variables are: capital adequacy (equity over total assets); total investment (non-interest-earning assets over total earning assets); operating expense (overheads over total earning assets); and LLR , except, of course, when LLR is the dependent variable. The two macroeconomic variables are real GDP growth and the rate of inflation, to control for the general economic environment in China over the sample period.

As discussed in Section 2, Chinese domestic commercial banks can be divided into four main types, namely SOCBs (Big Five), JSCBs, CCBs and RCBs. Each type has a distinct ownership structure, size, market segmentation and objective, and each is subject to a different set of regulations. Given these facts, the presence of foreign banks could have a different impact on the performance of each type of bank. We capture such differences by means of interaction terms of $FBBNI_{i,t}$ with dummy variables for bank type, namely $JSCB_{it}$ and CCB_{it} (with RCBs included with CCBs).⁸ $SOCB_{it}$ is the omitted type.

During the five-year transitional period after joining the WTO, 2002-06, the Chinese government gradually removed all restrictions on foreign banks in terms region of operation, client base, and business scope. In 2007, China progressed into the ‘post-WTO transitional period’

during which foreign banks could gain access to the Chinese banking market without restrictions on branch location or customers. Therefore, we expect the presence of foreign banks to have a greater impact on domestic banks during the latter post-WTO transitional period than the initial five-year transitional period, and we capture any difference in impact by means of an interaction term consisting times *FBBNI* times a dummy variable which takes the value of one for the years 2007-11.

As an important part of the reform process, the Chinese government has encouraged foreign strategic investment (FSI) into many Chinese banks in the last ten years. The introduction of a foreign investor into those banks could have improved their competitiveness and corporate governance, and they may react differently to competition from foreign banks. We expect that foreign banks will have a greater impact on domestic banks with FSI than on domestic banks without FSI, and we test for this by including an interaction term consisting of *FBBNI* times a dummy variable for FSI. Finally, we also include an interaction term consisting of *FBBNI* times *GFC*, a dummy variable which takes the value of one for the years of global financial crisis, i.e. 2008-2009, to explore the effect of the crisis on the progress of foreign banks.

Regarding estimation methods, we first apply ordinary least squares (OLS) to estimate the benchmark specification (equation 4), and we then use the two-step system dynamic Generalised Method of Moments (GMM) approach with Windmeijer-corrected standard errors to control for potential instances of endogeneity. For example, bank performance may affect the levels of bank-specific variables such as capital adequacy and investment, and thus the latter may be endogenously determined in the model. Moreover, a bank's current performance could influence

its future performance, so this could be another source of endogeneity. The consistency of the system GMM estimator depends both on the validity of the instruments used and on the assumption that the error term is not autocorrelated. The over-identifying restrictions can be tested by both the Sargan and Hansen *J* tests, which examine the overall validity of our instruments by analysing the sample analogue of the moment conditions in the estimation process. We use Arellano and Bond's (1991) test to examine whether the error term is serially correlated.

4.4. Data and sample

Our sample is an unbalanced panel that comprises 107 Chinese commercial banks over the period from 2002 to 2011, with a total of 797 observations. The number of Chinese banks in the sample varies from a minimum of 36 banks in 2002 to a maximum of 107 banks in 2010. The sample comprises the five biggest SOCBs, twelve national and regional JSCBs, 83 CCBs, and 7 RCBs. At the end of 2011, these 107 banks owned about 76% of the total assets of the Chinese banking sector. Thus, we believe that our sample offers a good representation of the overall banking market. All the bank-level data are drawn from BankScope – Fitch's international bank database – and the annual financial reports of individual banks. The data on the location and numbers of both domestic and foreign bank branches used for measuring foreign bank penetration are gathered from the Almanac of China's Finance and Banking (ACFB), the CBRC's database, and the annual reports and official websites of individual banks. The macroeconomic data are collected from the World Bank's World Development Indicator database. Table 2 presents a summary of the variable definitions and data sources.

[Insert Table 2 About Here]

5. Results

The regression results are reported in Tables 3 to 7. Regressions 1 and 2 in these tables examine the impact of foreign bank presence by using the traditional aggregate measures, *FBA* and *FSI*. Regressions 3 and 4 use our bank-specific measure, *FBBNI*. Regression 5 includes the squared term of *FBBNI*.⁹ In regression 6, *FBBNI* is interacted with dummy variables for bank type, JSCB and CCB. In regression 7, *FBBNI* is interacted with a dummy variable to capture whether the domestic bank has foreign strategic investment. Regressions 8 and 9 include the interaction terms *FBBNI*×*OPEN* and *FBBNI*×*GFC* to examine whether, respectively, the period of greater derestriction for foreign banks (2007-2011) and the global financial crisis (2008-2009) have an impact on the results. In each table, regressions 1 to 3 are estimated using OLS, while regressions 4 to 9 are estimated using GMM. The results for the control variables are in line with expectations, and to save space, we only report the results for the control variables in Table 3.¹⁰

5.1 Return on assets

[Insert Table 3 about here]

Table 3 reports the results with *ROA* as the dependent variable, which is used as a proxy for profitability. Both the aggregate and disaggregate measures of foreign bank presence have a statistically significant positive relationship with the profitability of domestic banks. These measures are also economically significant. For example, for a bank with the median level of *ROA* (0.0051), a one standard deviation increases in *FBBNI* (i.e. 0.267) leads to an increase in *ROA* of 0.0016 unit, or 31%.¹¹ The results suggest that high-quality management skills and/or modern

banking practices transferred from foreign banks enhance the profitability of Chinese banks. This finding is consistent with some previous studies of Chinese banks, including Shen et al. (2009) and Huang and Qin (2009), but it differs from the majority of studies of other countries, such as Claessens et al. (2001) and Unite and Sullivan (2003). They argue that in response to the increased competitive pressures induced by the presence of foreign banks, domestic banks are forced to reduce their profit margin to defend their market position.

In China, the opposite conclusion might result from the uniqueness of its financial market. As suggested by Lensink and Hermes (2004), the impact of foreign bank entry on profitability may depend on the level of competition of the domestic market. When the domestic market is less competitive, local banks are able to increase their prices in order to offset increased costs arising from foreign competition. Due to specific institutional arrangements and strict control over many years in China, the banking sector remains dominated by a few big SOCBs, and competition within the sector is moderate. Controlled interest rates remain a reality in China as the ceilings on deposit rates and the floor on lending rates have yet to be removed (Yao et al., 2012). Therefore, all these factors enable domestic banks to control market pricing to some extent, so as to maintain abnormal profits.¹²

In addition, the strength of impact could be influenced by the extent of foreign bank penetration. If the level of penetration is high, the benefits achieved by domestic banks in terms of efficiency gains could be offset by the additional competitive pressure that is brought about by the foreign banks. On the other hand, when foreign presence is limited, the improved performance of domestic banks can outweigh competitive pressure from foreign banks. This is the case for the

Chinese banking sector, where the degree of foreign bank penetration is increasing but is still at a fairly low level.¹³ This potentially explains the positive relationship between foreign bank penetration and the return on assets of domestic banks.

When we include the squared term of *FBBNI*, its coefficient is not statistically significant and there are no significant differences in the results for the other explanatory variables. So there is no sign of a non-linear relation between *ROA* and *FBBNI*. The coefficient of the interaction term *FBBNI*×*CCB* is negative and statistically significant at the 10% level, while *FBBNI*×*JSCB* is also negative but not significant. These results suggest that the profitability of the Big Five and JSCBs is affected more by foreign bank penetration than the profitability of the CCBs. The coefficient of the interaction term *FBBNI*×*FSI* is positive and statistically significant at the 5% level, indicating that Chinese banks with FSI gain more from foreign bank penetration than banks without FSI, in terms of profitability. We also find that the effect of foreign banks on the profitability of domestic banks has significantly increased since the foreign banks were given easier to access to the Chinese banking market. This is indicated by the positive and statistically significant coefficient of the interaction term *FBBNI*×*OPEN*. Finally, the coefficient of the interaction term *FBBNI*×*GFC* is negative and statistically significant at the 5% level, suggesting that the impact of foreign bank penetration on the profitability of domestic banks during the crisis period is weaker than the impact during the non-crisis period. These results are in line with expectations.

5.2 Non-interest income

[Insert Table 4 About Here]

Table 4 reports results using *NII* as the measure of bank performance. There is no statistically significant relationship between foreign bank penetration and domestic banks' *NII* (regressions 1-3). Using GMM, the coefficient of *FBBNI* becomes positive and statistically significant at the 10% level (regression 4). However, such a relationship only seems to exist among the JSCBs, as shown by the insignificance of the interaction term *FBBNI*×*CCB* and the positive and statistically significant coefficient for *FBBNI*×*JSBC*. This latter result is also economically significant. An increase of one standard deviation in *FBBNI* (0.267) for a JSCB is associated with an increase in *NII* of 0.0157 units, which represent a 176% increase in relation to the median for JSCBs (0.0089). So it appears that foreign banks have most impact on product range and services of JSCBs.

The coefficient of the interaction term *FBBNI*×*FSI* is positive and statistically significant at the 5% level in regression 7. This result suggests that Chinese banks with FSI tend to react more actively to foreign banks' presence than those banks without FSI, as we expected. Perhaps FSI implies that the learning process of banks is improved, enabling them to engage more in non-traditional banking business and generate higher non-interest income. The coefficient of *FBBNI*×*GFC* is negative and significant at the 10% level, suggesting that although foreign bank penetration tends to increase non-interest income during 'normal times', the impact is weaker during the financial crisis.

5.3 Efficiency ratio

[Insert Table 5 about here]

Table 5 presents the results with cost-to-income ratio, *CI*, as the dependent variable, which is used as a proxy for efficiency. A significant negative relationship is found between *CI* and the aggregate measures of foreign bank presence. However, this relationship is not so strong when the disaggregate measure *FBBNI* is used instead. The coefficients on *FBBNI* are only negative and marginally significant in regressions 4 and 7. The coefficient on *FBBNI*×*OPEN* is negative and statistically significant at the 5% level, suggesting that *CI* declines significantly in response to competitive pressures from foreign banks only during the post-transitional period, 2007-2011. The further opening-up of the domestic banking market allows greater foreign competition, which appears to lead to improved efficiency. Our findings on efficiency are in line with the bulk of previous research from China and from other countries, which reports that foreign entry is associated with improvements in efficiency (e.g. Berger et al, 2009, Unite and Sullivan, 2003, Manlagñit, 2011).

5.4 Loan-loss reserve ratio

[Insert Table 6 about here]

Table 6 reports the results for *LLR*. The coefficients on *FBBNI* are negative and statistically significant at the 10% level or better across all regressions. These results provide consistent evidence that foreign bank penetration encourages domestic banks to improve their risk management, resulting in better loan quality and lower risk exposure. The estimated coefficient of the interaction term *FBBNI*×*FSI* is negative and significant at the 5% level, indicating that risk reduction in response to foreign competition by banks with *FSI* is greater than by banks without *FSI*. Our findings with regard to *LLR* and *ROA* are not consistent with the results from some other countries that foreign banks are able to cherry-pick the best customers from domestic banks, causing the loan quality and profitability of domestic banks to fall.

5.5 Standardised performance index

[Insert Table 7 about here]

Table 7 presents the results for the standardised bank performance index, *SPI*, which is constructed by means of a principal components analysis. The results show that the coefficients for both the aggregate and disaggregate measures of foreign bank exposure are positive and significant at the 10% level or better across all models. This finding suggests that foreign bank penetration improves the overall performance of Chinese banks. The coefficient of the interaction term *FBBNI*×*JSCB* is positive and significant at the 10% level, while *FBBNI*×*CCB* is negative but not significant. This suggests that the overall performance of the Big Five and *JSCBs* is affected more by foreign bank penetration than the performance of *CCBs*. A possible reason is that the former two types of bank have a more extensive branch network than the *CCBs*, and so they

potentially receive more influence from foreign banks. In addition, competition is more intense between foreign banks and the Big Five and JSCBs, than between foreign banks and CCBs, because the target customers and the services they provide are more similar in the former cases.

The interaction term $FBBNI \times FSI$ is positive and significant at the 10% level, indicating that banks with FSI benefit more from the presence of foreign banks than banks without FSI. Finally, we find that the influence of foreign banks on the overall performance of domestic banks significantly increased during 2007-2011. Overall, the results for the four performance measures and for SPI , using the improved $FBBNI$ measure of foreign entry, provide robust evidence that the penetration of foreign banks into China has led both to improved profitability and, to some extent, improved efficiency on the part of domestic banks.

5.6 Further checks for nonlinearity

There is no particular reason to expect a linear relation between aspects of the performance of domestic banks and the level exposure of the latter to foreign banks. Although $FBBNI^2$ is included in some of the above regression specifications, it is possible that potential nonlinearity is not captured adequately by including this squared term. To check further for nonlinearity, we carry out two tests. First, we run regression specification error tests (RESETs) on the OLS regressions reported above (Wooldridge, 2006, p. 308). Second, we replace $FBBNI_{i,t}$ in regression 4 in Tables 3 to 7 by dummy variables reflecting the ranking of exposure to foreign banks of bank i in year t . The values of $FBBNI_{i,t}$ are ranked and split into quartiles, Q1 with the lowest values and Q4 with the highest. Three dummy variables are included in the regression; for example $Q2FBBNI_{i,t}$ takes the value one if $FBBNI_{i,t}$ is in the second quartile, and zero otherwise.

$Q1FBBNI_{i,t}$ is the omitted quartile. Inspection of the coefficients on the three dummy variables gives a direct impression of the extent to which the relation between the dependent variable and $FBBNI_{i,t}$ is linear.

None of the RESET tests provides evidence of nonlinearity, and most of the results (unreported) for the dummy variables indicate an approximately linear relation. The coefficients increase monotonically and without major jumps when ROA , NII , LLR or SPI is the dependent variable. The only exception is when CI is the dependent variable. The coefficient is -0.059 on $Q2FBBNI_{i,t}$ and -0.139 on $Q3FBBNI_{i,t}$, indicating that increased exposure to foreign banks is associated with a smaller cost-to-income ratio, as expected. However, the coefficient on $Q4FBBNI_{i,t}$ is -0.112 , less negative than that on $Q3FBBNI_{i,t}$, indicating nonlinearity in the upper half of exposure to foreign banks. We find no other evidence of nonlinearity. So we are reasonably confident that the regressions in Tables 3 to 7 are not seriously mis-specified with respect to linearity.

6. Conclusion

Since the end of 2006, when China further opened its domestic financial market to foreign competition, many foreign banks have rushed into the market, competing for a vast customer base and potentially lucrative business opportunities. This paper explores the impact on domestic banks of exposure to foreign banks. The exposure of each domestic bank is measured by the total number of foreign bank branches operating in the cities in which the domestic bank's branches are also located, scaled by the maximum possible exposure during the sample period. The resulting new foreign bank branch network index is sensitive to geographic proximity, which matters given recent developments in Chinese commercial banking, such as further relaxation of geographic

restrictions for city commercial banks. Both OLS and GMM are used to test the impact of exposure on: the return on assets of domestic banks; their non-traditional activities, measured by non-interest income ratio; operational efficiency, measured by the cost-to-income ratio; their management of risk, measured by the loan-loss reserves ratio; and their overall performance, measured by a performance index derived from a principal components analysis.

We find that, using both both aggregate and disaggregate measures, exposure to foreign banks has a significant positive relationship with the profitability of domestic banks. A possible explanation is that high-quality management skills and/or modern banking practices have been learned from foreign banks, and have enhanced the profitability of the Chinese banking sector. The positive impact on domestic profitability is contrary to the findings of some previous studies, but it could be explained by circumstances specific to China. After all the reforms, the Big Five state-owned banks were left dominating the financial system, and some controls on the banking sector are still in place. These circumstances reduce the negative impact of foreign bank competition on the profitability of domestic banks. In addition, despite expanding rapidly in recent years, the penetration level of foreign banks remains limited in China. Therefore, our interpretation is that the efficiency gains obtained by domestic banks which learn from foreign counterparts have yet to be fully offset by additional competitive pressure. We find, in addition, that the profitability of the Big Five and JSCBs has benefited more from foreign bank penetration than that of the CCBs.

Regarding non-interest income, only use of our new *FBBNI* measure reveals a significant positive relationship between foreign bank penetration and domestic banks' *NII*. Foreign entry

appears to stimulate local banks to engage in some non-traditional business activities. However, we find that such a response occurs only among the JSCBs. Regarding efficiency, we do not find a significant relationship between the cost-to-income ratio and *FBBNI* for the full sample period. Nevertheless, we do find that exposure to foreign banks is associated with greater efficiency at domestic banks during the period of greater liberalisation for banks, 2007-2011. We also report evidence that foreign bank penetration could help domestic banks to improve their management of risk, in particular among those banks with foreign strategic investment. Finally, based on the results of our performance index, we find that exposure to foreign banks has a significantly positive impact on the overall performance of domestic banks. The impact of exposure has been most beneficial among banks with foreign strategic investors, and joint-stock commercial banks. Our evidence supports the view that, to enable the Chinese banking sector to continue to improve its efficiency, the Chinese government should further encourage foreign banks to expand their operations by opening more branches, and should allow foreign banks to acquire larger stakes in Chinese banks.

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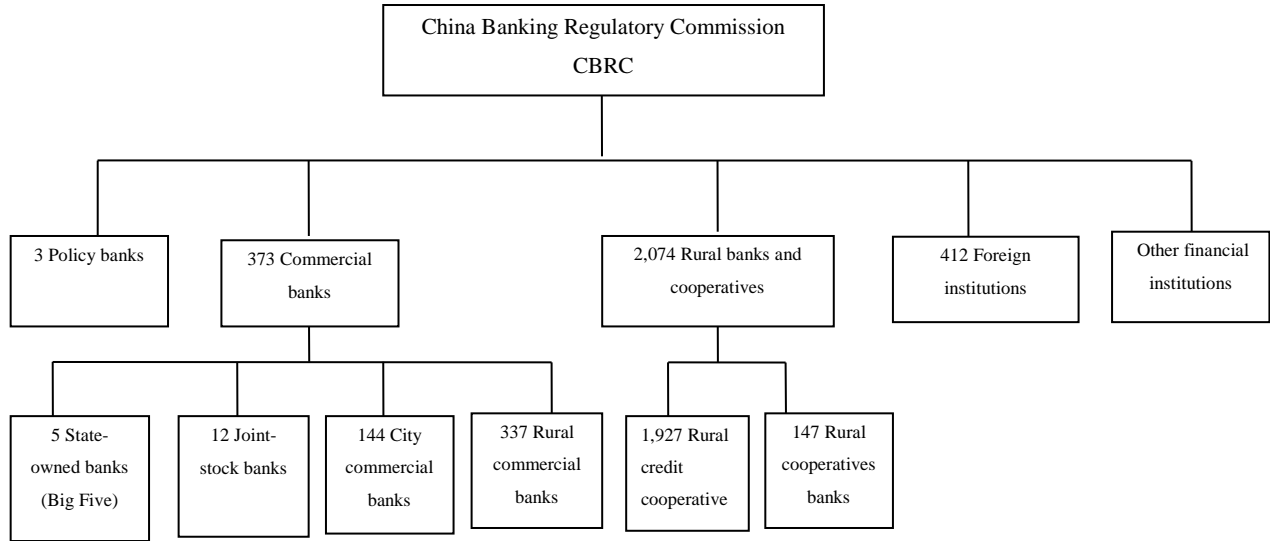
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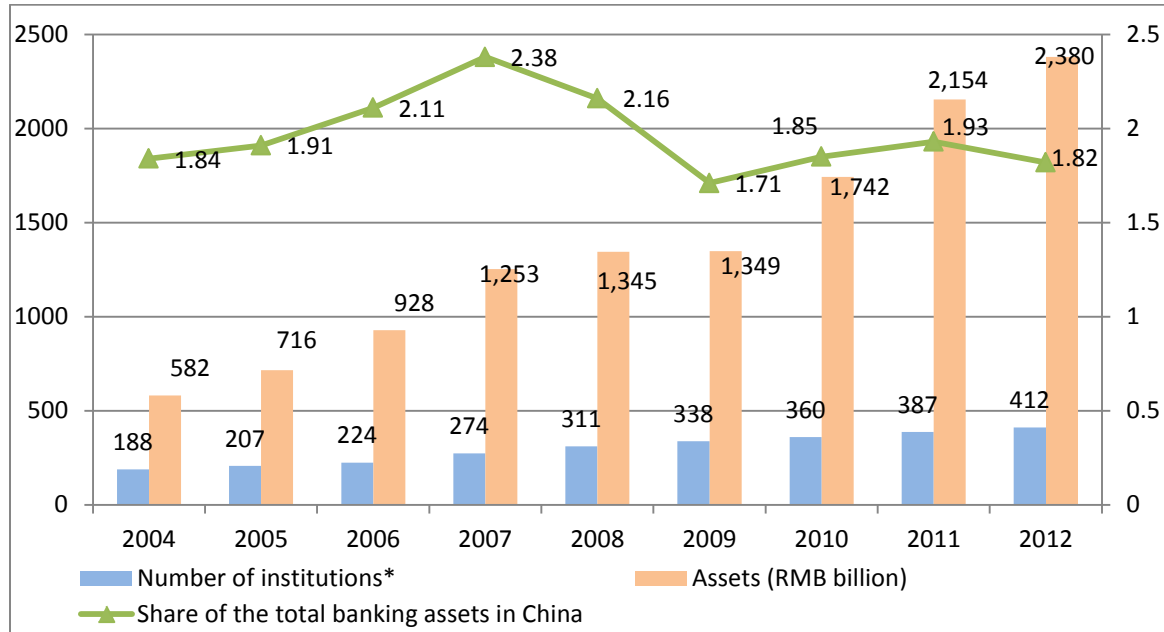
Tables and figures:

Figure 1: Overall structure of the Chinese banking system



Source: CBRC 2012 annual report

Figure 2: Foreign Banking Operations in China (2004-2012)



Source: CBRC 2012 annual report; Almanac of China's Finance and Banking (2003-2004).

* Include the headquarters, branches and subsidiaries of locally incorporated foreign banks and foreign bank branches.

Figure 3: Distribution of foreign banks in mainland China (excluding Hong Kong, Macao and Taiwan), 2011

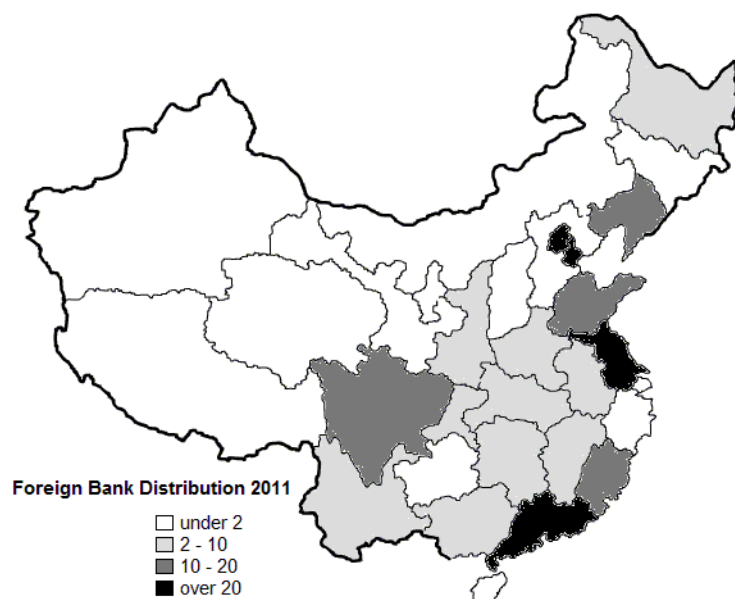


Table 1 Three examples of the calculation of *FBBNI*

Bank name	Domestic bank branch locations	Exposure to foreign bank branches	Panel total maximum	<i>FBBNI</i>
Bank of Nanjing (CCB) in 2011	Nanjing	5	342	$=104/342=0.3041$
	Shanghai	75		
	Wuxi	4		
	Hangzhou	9		
	Suzhou	11		
	<i>Total</i>	104		
China Minsheng Bank (JSCB) in 2009	Beijing	41	342	$=275/342=0.8041$
	Shanghai	75		
		
	Xi'an	2		
	Kunming	1		
<i>Total</i>	275			
Bank of China (SOCB) in 2006	Beijing	27	342	$=197/342=0.5760$
	Shanghai	57		
		
	Chongqing	5		
	Kunming	1		
	<i>Total</i>	197		

Note: CCB = city commercial bank, JSCB = joint-stock commercial bank, SOCB = state-owned commercial bank.

Table 2 Description of variables and data sources

Variable	Definition	Data source
Dependent variables		
Return on asset (ROA)	Ratio of net income to total assets	Bankscope; Banks' annual reports
Non-interest income (NII)	Ratio of non-interest income over total assets	Same as above
Efficiency ratio (CI)	Ratio of operating expenses to operating income	Same as above
Risk (LLR)	Ratio of loan loss reserves to total loans	Same as above
Standardised performance index	Constructed by using a principal components analysis	Authors' calculation
L1, L2	Lag of one year, lag of two years	Bankscope; Banks' annual reports
Independent variable		
<i>Foreign presence</i>		
Foreign bank assets (FBA %)	Share of total assets of foreign banks in total Chinese banking assets	CBRC and ACFB
Foreign strategic investors (FSI)	The number of banks with FSI over total number of domestic commercial banks	Same as above
Foreign bank branch network index (FBBNI)	The total number of foreign bank branches in all cities in which domestic banks have branches over the panel total maximum	ACFB and Banks' annual reports
<i>Bank-specific variables</i>		
Equity level (E/TA)	Ratio of the book value of shareholders' equity to total assets	Bankscope; Banks' annual reports
Total investment (TI/TA)	Ratio of total investment to total assets	Same as above
Loan loss reserve ratio	Ratio of loan loss reserves to total loans	Same as above
Operating expense (OE)	Ratio of total overhead expenses to total assets	Same as above
Big Five state-owned banks (SOCBs) (Omitted)	A dummy variable equal to 1 if a bank is one of the five biggest state-owned commercial banks and 0 otherwise	CBRC
Joint stock commercial banks (JSCBs)	A dummy variable equal to 1 if a bank is a joint stock commercial bank and 0 otherwise	Same as above
City and rural commercial banks (CCBs)	A dummy variable equal to 1 if a bank is a city or rural commercial bank and 0 otherwise	Same as above
Dummy for foreign strategic investment (DFSI)	A dummy variable equal to 1 if a bank has foreign strategic investment and 0 otherwise	Banks' annual reports
<i>Economic factors</i>		
Economic growth (GDP %)	Annual growth rate of GDP	World Bank
Inflation rate (INFL %)	Percentage change in the consumer price index	Same as above
Post-transitional period of WTO entry (Open)	A dummy variable equal to 1 for the post-transitional period of WTO entry and 0 otherwise	CBRC
Global financial crisis (GFS)	A dummy variable equal to 1 for Global financial crisis period and 0 otherwise	Same as above

Table 3 Effects of foreign bank penetration on Chinese banks' return on assets (ROA)

Dependent variable: ROA	OLS			GMM					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
L1.ROA				0.141*	0.083	0.150*	0.1259	0.113	0.532***
L2.ROA				(0.076)	(0.133)	(0.818)	(0.135)	(0.140)	(0.120)
E/TA	0.067***	0.064***	0.079***	-0.023	-0.057	-0.078	0.002	-0.009	0.107
TI/TA	(0.008)	(0.008)	(0.001)	(0.075)	(0.081)	(0.085)	(0.080)	(-0.075)	(0.655)
OE	-0.001	-0.001	-0.002	0.173***	0.150**	0.154**	0.158***	0.148**	0.150***
LLR	(0.001)	(0.013)	(0.001)	(0.030)	(0.067)	(0.059)	(0.057)	(0.075)	(0.051)
GDP	-0.047	-0.028	-0.096	-0.015***	0.003	0.008	-0.002	0.002	-0.003
INFL	(0.055)	(0.058)	(0.060)	(0.005)	(0.007)	(0.011)	(0.005)	(0.007)	(0.006)
FBA	0.031***	0.030***	0.036***	0.211	0.200	0.673	0.425	0.442	0.445
FSI	(0.010)	(0.011)	(0.016)	(0.272)	(0.223)	(0.429)	(0.337)	(0.343)	(0.325)
FBBNI	-0.073***	-0.084***	-0.053***	0.069	0.027	-0.056	0.062	0.091	0.114
FBBNI ²	(0.010)	(0.011)	(0.016)	(0.125)	(0.168)	(0.110)	(0.134)	(0.166)	(0.116)
JSCB	-0.006	0.001	-0.006	-0.012	-0.012	-0.021	-0.062	-0.013	-0.021
CCB	(0.009)	(0.008)	(0.009)	(0.013)	(0.016)	(0.018)	(0.134)	(0.015)	(0.018)
FBBNI *JSCB	0.264***			0.013	0.0124	0.017	-0.013	0.011	0.013
FBBNI *CCB	(0.027)			(0.113)	(0.010)	(0.018)	(0.035)	(0.013)	(0.017)
DFSI		0.027***							
FBBNI *DFSI		(0.004)							
OPEN			0.004***	0.006**	0.003*	0.010**	0.011*	0.005*	0.008**
FBBNI *OPEN			(0.001)	(0.003)	(0.002)	(0.004)	(0.006)	0.003	(0.003)
GFC					0.010				
FBBNI *GFC					(0.014)				
Constant						0.016			
Time dummy						(0.030)			
No. of observations						0.040			
R ²						(0.024)			
AR(1)/AR(2)						-0.020			
Sargan/Hansen						(0.045)			
						-0.008*			
						(0.005)			
							-0.006		
							(0.005)		
							0.010**		
							(0.005)		
								0.002	
								(0.003)	
								0.009**	
								(0.004)	
									-0.017**
									(0.007)
									-0.003**
									(0.001)
									-0.002
	0.007***	0.010***	0.010***	-0.006	-0.003	-0.043*	-0.004	-0.089	-0.002
	(0.001)	(0.001)	(0.001)	(0.048)	(0.005)	(0.026)	(0.005)	(0.006)	(0.004)
	No	No	No	Yes	Yes	Yes	Yes	No	No
	797	797	797	582	582	582	582	582	582
	0.308	0.303	0.252						
				0.003/0.528	0.007/0.802	0.028/0.533	0.015/0.453	0.007/0.529	0.002/0.852
				0.196/0.191	0.395/0.111	0.597/0.191	0.236/0.099	0.065/0.129	0.356/0.333

Notes: A detailed definition of variables can be found in Table 2. To save space, results for the control variables are omitted in Table 2 and the remaining tables. Heteroscedasticity-robust standard errors in parentheses. Sargan and Hansen are the p value of the Sargan and Hansen test statistics of over-identifying restrictions. AR(1)/AR(2) reports the p value of the first- and second-order autocorrelation test statistic. *, ** and *** represent that the estimation is significant at the 10%, 5% or 1% level, respectively.

Table 4 Effects of foreign bank penetration on Chinese banks' non-interest income (NII)

Dependent variable: NII	OLS		GMM						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
L1.NII				0.694*** (0.150)	0.630*** (0.15)	0.586** (0.175)	-0.834 (0.615)	-1.650*** (0.420)	-1.322*** (0.448)
L2.NII				0.016 (0.100)	-0.003 (0.091)	-0.005 (0.110)	0.469 (0.602)	0.368 (0.070)	0.392 (0.405)
FBA	0.033 (0.046)								
FSI		0.003 (0.003)							
FBBNI			-0.001 (0.006)	0.004* (0.002)	0.019 (0.018)	0.009 (0.027)	0.010 (0.015)	0.009* (0.005)	0.007* (0.004)
FBBNI ²					-0.017 (0.018)				
JSCB						-0.013 (0.023)			
CCB						-0.012 (0.026)			
FBBNI *JSCB						0.059** (0.027)			
FBBNI *CCB						0.009 (0.031)			
DFSI							0.084 (0.070)		
FBBNI *DFSI							0.051** (0.025)		
OPEN								0.005** (0.019)	
FBBNI *OPEN								0.002 (0.008)	
GFC									-0.001 (0.001)
FBBNI*GFC									-0.005* (0.003)
Constant	0.002* (0.012)	0.003** (0.001)	0.002** (0.012)	0.005 (0.008)	-0.004 (0.005)	0.019 (0.030)	0.025 (0.017)	0.012 (0.010)	-0.014 (0.011)
Time dummy	No	No	No	Yes	Yes	Yes	Yes	No	No
No. of observations	797	797	797	582	582	582	582	582	582
R ²	0.066	0.065	0.252						
AR(1)/AR(2)				0.001/0.958	0.004/0.915	0.003/0.910	0.123/0.529	0.006/0.854	0.009/0.474
Sargan /Hansen				0.334/0.624	0.458/0.819	0.178/0.544	0.049/0.442	0.139/0.239	0.236/0.099

Notes: A detailed definition of variables can be found in Table 2. Heteroscedasticity-robust standard errors in parentheses. Sargan and Hansen are the p value of the Sargan and Hansen test statistics of over-identifying restrictions. AR(1)/AR(2) reports the p value of the first- and second-order autocorrelation test statistic. *, ** and *** represent that the estimation is significant at the 10%, 5% or 1% level, respectively.

Table 5 Effects of foreign bank penetration on Chinese banks' cost-to-income ratio (CI)

Dependent variable: CI	OLS			GMM					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
L1.ER				0.352** (0.002)	0.367** (0.156)	0.160** (0.276)	0.415** (0.189)	0.456*** (0.123)	0.571*** (0.128)
L2.ER				-0.105* (0.054)	-0.105 (0.053)	-0.106* (0.057)	-0.070 (0.081)	-0.035 (0.084)	-0.025 (0.064)
FBA	-8.259*** (1.196)								
FSI		-0.558*** (0.075)							
FBBNI			-0.096 (0.060)	-0.231* (0.134)	-0.435* (0.267)	-0.530 (0.764)	-0.268* (0.157)	-0.1244 (0.1225)	-0.107* (0.060)
FBBNI ²					-0.159 (0.339)				
JSCB						0.444 (1.455)			
CCB						0.115 (0.770)			
FBBNI *JSCB						-0.517 (0.591)			
FBBNI *CCB						0.196 (0.997)			
DFSI							0.029 (0.087)		
FBBNI *DFSI							0.104 (0.268)		
OPEN								-0.024 (0.035)	
FBBNI *OPEN								-0.282** (0.121)	
GFC									-0.008 (0.012)
FBBNI*GFC									0.009 (0.048)
Constant	0.735*** (0.035)	0.6385*** (0.032)	0.608*** (0.003)	-0.031 (0.172)	0.180 (0.154)	-0.143 (0.770)	-0.042 (0.198)	0.274 (0.175)	0.047 (0.153)
Time dummy	No	No	No	Yes	Yes	Yes	Yes	No	No
No. of observations	797	797	797	582	582	582	582	582	582
R ²	0.288	0.295	0.251						
AR(1)/AR(2)				0.014/0.570	0.014/0.630	0.585/0.932	0.038/0.571	0.001/0.536	0.000/0.522
Sargan /Hansen				0.428/0.684	0.378/0.652	0.702/0.690	0.435/0.690	0.203/0.105	0.425/0.645

Notes: A detailed definition of variables can be found in Table 2. Heteroscedasticity-robust standard errors in parentheses. Sargan and Hansen are the p value of the Sargan and Hansen test statistics of over-identifying restrictions. AR(1)/AR(2) reports the p value of the first- and second-order autocorrelation test statistic. *, ** and *** represent that the estimation is significant at the 10%, 5% or 1% level, respectively.

Table 6 Effects of foreign bank penetration on Chinese banks' loan-loss reserves (LLR)

Dependent variable: LLR	OLS		GMM						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
L1.LLR				0.346** (0.180)	0.343* (0.204)	0.270 (0.307)	0.367* (0.192)	0.306** (0.139)	0.287** (0.122)
L2.LLR				0.723 (0.044)	0.070 (0.048)	0.0241 (0.090)	0.046 (0.046)	0.077* (0.040)	0.071* (0.037)
FBA	0.409* (0.235)								
FSI		-0.092 (0.059)							
FBBNI			-0.008* (0.005)	-0.009** (0.004)	-0.043* (0.026)	-0.034** (0.017)	-0.065** (0.029)	-0.053** (0.242)	-0.016** (0.007)
FBBNI ²					0.041 (0.026)				
JSCB						-0.115 (0.098)			
CCB						0.047 (0.059)			
FBBNI *JSCB						-0.011 (0.011)			
FBBNI *CCB						0.036 (0.067)			
DFSI							0.002 (0.009)		
FBBNI *DFSI							-0.008** (0.004)		
OPEN								-0.004 (0.005)	
FBBNI *OPEN								0.009 (0.010)	
GFC									0.001 (0.001)
FBBNI*GFC									-0.004 (0.003)
Constant	0.031*** (0.007)	0.035*** (0.007)	0.035*** (0.007)	0.005 (0.024)	-0.012 (0.013)	0.105 (0.078)	0.033** (0.014)	-0.012 (0.016)	-0.006 (0.012)
Time dummy	No	No	No	Yes	Yes	Yes	Yes	No	No
No. of observations	797	797	797	582	582	582	582	582	582
R ²	0.0481	0.0493	0.0429						
AR(1)/AR(2)				0.246/0.151	0.233/0.199	0.464/0.414	0.227/0.290	0.216/0.137	0.227/0.111
Sargan /Hansen				0.106/0.180	0.069/0.092	0.124/0.158	0.307/0.458	0.114/0.163	0.163/0.193

Notes: A detailed definition of variables can be found in Table 2. Heteroscedasticity-robust standard errors in parentheses. Sargan and Hansen are the p value of the Sargan and Hansen test statistics of over-identifying restrictions. AR(1)/AR(2) reports the p value of the first- and second-order autocorrelation test statistic. *, ** and *** represent that the estimation is significant at the 10%, 5% or 1% level, respectively.

Table 7 Effects of foreign bank penetration on Chinese banks' overall performance

Dependent variable: SPI	OLS			GMM					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
L.SPI				0.507* (0.283)	0.420** (0.187)	0.190 (0.276)	0.417*** (0.155)	0.364*** (0.130)	0.476*** (0.141)
L2.SPI				-0.189 (0.160)	-0.098* (0.053)	-0.114 (0.044)	-0.130** (0.057)	-0.100** (0.047)	-0.106* (0.058)
FSI		0.873*** (0.115)							
FBBNI			0.045*** (0.016)	0.168*** (0.047)	0.170*** (0.066)	0.201** (0.094)	0.307* (0.163)	0.403** (0.159)	0.181** (0.087)
FBBNI ²					0.294 (0.742)				
JSCB						0.489 (0.725)			
CCB						0.830 (0.608)			
FBBNI*JSCB						1.230* (0.736)			
FBBNI *CCB						-1.209 (0.814)			
DFSI							0.073 (0.079)		
FBBNI*DFSI							0.250* (0.144)		
OPEN								0.059* (0.035)	
FBBNI*OPEN								0.118* (0.633)	
GFC									-0.009 (0.019)
FBBNI*GFC									-0.017 (0.052)
Constant	0.366*** (0.053)	0.549*** (0.049)	0.565*** (0.054)	0.217 (0.150)	0.604 (0.241)	-0.135 (0.647)	0.691*** (0.250)	0.500*** (0.148)	0.711*** (0.174)
Time dummy	No	No	No	Yes	Yes	Yes	Yes	No	No
No. of observations	797	797	797	582	582	582	582	582	582
R ²	0.288	0.293	0.248						
AR(1)/AR(2)				0.036/0.956	0.09/0.489	0.05/0.555	0.169/0.563	0.020/0.928	0.033/0.933
Sargan /Hansen				0.078/0.241	0.208/0.951	0.120/0.437	0.681/0.297	0.521/0.645	0.057/0.193

Notes: Detailed definition of variables can be found in Table 2. Sargan and Hansen are the p value of the Sargan and Hansen test statistics of over-identifying restrictions. AR(1)/AR(2) reports the p value of the first and second-order autocorrelation test statistic. *, ** and *** denote that an estimate is significantly different from zero at the 10%, 5% or 1% level, respectively.

Footnotes

¹ In 2006, the ‘Big Five’ were officially relabelled as ‘large-scale commercial banks’ from ‘wholly state-owned commercial banks’ to reflect the result of ownership diversification. BOCOM is much larger than the JSCBs, and its shares are spread among different state-owned entities. Therefore, in 2006, the CBRC redefined it as a SOCB and it joined the other four big state-owned banks (the Big Four) to become the Big Five. For consistency, we treat BOCOM as a SOCB rather than a JSCB throughout the period.

² The Asian Development Bank was the first foreign financial institution to purchase an interest in a Chinese domestic bank when in 1996 it purchased a 3.3% stake in the China Everbright Bank for \$1.9m (Berger et al., 2009).

³ For example, on 17 June 2005, the Bank of America (BOA) invested \$3.0 billion in a 9% stake of the China Construction Bank and in August 2011, BOA sold half of its China Construction Bank holding for \$8.3 billion, making an after-tax profit of about \$3.3 billion in five years (Protess, 2011).

⁴ For instance, foreign banks are still not allowed to offer automobile financing.

⁵ At the end of 2006, the CBRC imposed a prudent supervision measure on foreign banks. It requires that foreign banks must be locally incorporated as legal entities before they offer a full range of banking services to Chinese citizens.

⁶ The cross-sectional maximums per year are not the preferred benchmark since they vary over time. In order to reflect changes in the number of foreign bank branches at the city level over time, we use the panel total maximum as a constant benchmark.

⁷ We thank a reviewer for raising this point.

⁸ Due to their relatively small size and shorter history, this study only includes seven major RCBs. During the past few years, the RCBs have gradually shifted away from a policy-driven, rural-oriented business model to a market-oriented urban-focused operational model, and they have also started to compete directly with other commercial banks, especially the CCBs. Therefore, we classify the RCBs within the CCB category.

⁹ In order to minimise the potential omitted-variables problem, we also include the squared terms of the control variables in the models. There is little evidence of non-linear effects, and so these results are not tabulated.

¹⁰ Ferri (2009) argues that CCBs have a strong local focus and that their performance is related to the banks’ locations. Therefore, as a robustness check, we re-estimate the main regressions by controlling for the levels of regional economic development in the sub-samples of CCBs. We include the real GDP growth of the province in which the head office of a CCB is located in the models. The results are not materially different from those for the models which do not control for regional economic growth. They are available on request.

¹¹ The results of OLS estimation also show a similar level of economic significance.

¹² Although the Chinese government has gradually liberalised interest rates over last two decades, the banks’ interest rates are still semi-controlled by the Central Bank. Feyzioglu (2009) argues that the large interest margin given by the managed interest-rate system is one of main reasons for the high profitability of Chinese banks.

¹³ The market share of foreign banks accounts for only around 2% over the sample period, indicating that the extent of foreign bank penetration is relatively limited.