Towards a more accurate measure of foreign bank entry and its impact on domestic banking performance: a case of China

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Abstract

A limitation of existing empirical studies on the impact of foreign bank entry in a host country lies in the measurement of foreign bank presence. Conventional measures are aggregate measures that fail to capture micro-level foreign presence in a host country. Moreover, in an empirical setting where bank data are used, it is difficult to separate their effects from macroeconomic variables' effects, resulting in unreliable estimates. To surmount weaknesses of these aggregate measures, this study contructs a bank-level measure of foreign presence for local Chinese banks, employing location data of foreign bank branches. Using these bank-level measures, it reexamines the relationship between foreign presence and banking performance in China. The estimation results show that the bank-level measures evidently outperform the aggregate measures and they are vital in resolving the unexplained discrepancies found in existing empirical studies contingent on aggregate measures. Importantly, the study provides strong empirical evidence that foreign entry is supportive of a more competitive and efficient banking industry in China.

JEL classification: G2, G21, G28

Key words: foreign entry; financial liberalization; banking efficiency; bank performance; FDI spillovers; China

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1 Introduction

A limitation of existing empirical studies on the impact of foreign entry on a host country lies in the measurement of foreign bank presence. Two groups of measures are often used - (1) the number or share of foreign banks operating in the host country and (2) the assets (or share of assets) of foreign banks operating in the host country (Terrell 1986; McFadden 1994; Clark et al. 1999; Barajas et al. 2000; Denizer 2000; Unite & Sullivan 2003; Shen et al. 2009). These aggregate numbers may capture the overall scale of foreign presence a host country encounters over a period and are thereby useful in a cross-country analysis (Claessens et al. 2001; Lensink & Hermes 2004). However, in a single-country panel data analysis, such aggregate measures offer limited and in many cases inaccurate information about the impact of foreign presence on an individual domestic bank. One important reason is that foreign bank actitivies often centre on a few large cities. A domestic bank located in these cities is under completely different foreign influence compared to a bank located farther away. This is particularly the case for countries whose banking businesses are location dependent, such as in China's case.

Moreover, aggregrate measures create econometric problems that lead to biased estimators in empirical analyses. As aggregate measures are observed annually, they are among macroeconomic variables and their effects are easily mixed up with other influential macro-factors either identified or omitted. In a banking environment undergoing rapid and constant reforms and industry-wide macro-factors dominate, the effect of foreign entry becomes more difficult to capture. Due to the above two reasons, empirical studies that rely on aggregate measures have produced many unexplainable results contradictory to the theory as well as to the observable facts. This is especially true among studies of foreign entry in China's banking system (Chen & Xiao 2007; Jiao 2008; Liu 2008; Huang & Qin 2009; Shen et al. 2009).

To overcome the inherent problems of aggregate measures, this paper constructs a bank-level measure of foreign presence for Chinese banks. The measure is based on the concept of geographic proximity and employs location data of foreign bank branches in China. In other words, each Chinese bank in the sample has its own

foreign exposure level measured by the number of foreign bank branches operating in the city where this Chinese bank is located.

This bank-level or city-level measure of foreign presence has two important advantages against the aggregate measure. First, it provides a more accurate measurement of foreign presence at the local level where the actual influence occurs. Therefore, it overcomes the problem of measurement errors built in the aggregate measure. Second, as foreign entry becomes panel data, identification of macro-factors is not required any more. Inclusion of time-dummies in the model can control for all time-variant macroeconomic factors, which as a result reduces the problem of omitted macro variables and further helps to obtain an accurate measure of the effect of foreign entry.

Using the constructed bank-level measures, the study re-examines the impact of foreign bank presence on China's banking performance. Four performance indicators are analyzed: net interest margins, noninterest incomes, costs, and profits. In contrast to existing findings, the bank-level measures help to find highly significant results that are consistent with the theory and provide strong evidence that an increased foreign presence in China is associated with a competitive and developed banking sector.

The remaining of the paper is structured as follows. Section 2 provides an overview of China's banking system and foreign entry. This is followed by the theoretical framework and the hypotheses construction in Section 3. Section 4 describes the bank-level foreign exposure index (FEI) and Section 5 discusses the empirical model and data. Finally, Section 6 presents the results and discussion, followed by the conclusion and policy implications in Section 7.

2 China's Banking System and Foreign Entry

2.1 China's Banking System

There are four types of commercial banks[2] in China and each type has its distinctive features on size and geographic branch coverage. State-owned banks are the largest banks in China. All five state-owned banks[3] account for over half (52.1 per cent in 2008) of the total commercial banking assets. In terms of branch coverage, they maintain nation-wide branch networks covering almost all large cities in China. Joint-stock banks represent the second largest group and twelve of them make up 14 per cent of banking assets. They started with building up regional branch networks in particular regions, most being along the coastal. Over years, the networks have expanded rapidly and most of them have had national coverage now. In contrast to state-owned and joint-stock banks, city banks and rural banks[4] are small by individual size in spite of the large numbers. They have city or town based bank operations, by and large in one city or town where they offer limited and area-specific banking services.

China owns one of the largest banking sectors in the world. At the end of 2004, total banking assets were equivalent to 160 per cent of GDP, compared to 77 per cent in the United States and 68 per cent in India. A large banking system dominates financial intermediation of the economy. Banks intermediate nearly 75 per cent of the capital in the economy, compared to 19 per cent in the United States and 43 per cent in India. Total loans and total deposits increased 1.40 and 2.08 times respectively from 1999 to 2006 (Figure 1). Fast increase in loans is made possible because of even faster increase in deposits. Household saving contribute most of the growth in total deposits as a result of swift income growth since the end of 1990s.

However, a large banking system is far from being a developed and efficient system. Chinese banks still mainly engage in traditional banking services. In 2003, loans took up 60.8 per cent of assets and almost all liabilities were deposits with an average share of 89 per cent. Financial resources were not allocated efficiently and effectively,

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[2] This study focuses on commercial banks so all banks discussed are commercial banks.

[3] Recently they have been renamed as 'five large commercial banks' to acknowledge their ownership diversifications. However, the state remains the single majority owner of these banks.

[4] In addition to commercial banking entities, there is a large population of credit cooperatives existing in China's financial sector, including urban credit cooperatives in cities and rural credit cooperatives and rural cooperative banks in rural areas. They share similar characteristics with city (commercial) banks and rural (commercial) banks respectively in terms of size and location. Moreover, they have been gradually integrated into the commercial bank system under these two groups, so the sample in the empirical analysis of this study also includes rural credit cooperatives.

resulting in a large stock of nonperforming loans (NPLs) accumulated on banks' balance sheets. The official ratio of NPLs to total loans in 2003 was 20 per cent, which is far above international standards. The ratio for EU banks in the same year was 3.1 per cent. Especially before the World Trade Organization (WTO) accession in late 2001, large state-owned banks dominated the system. Share of the three largest state-owned banks in total commercial banking assets was constantly higher than 80 per cent. In addition to a credit plan made by the government directing bank credits, the banking system had little room for competition and few incentives to improve efficiency.
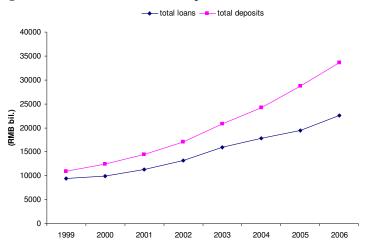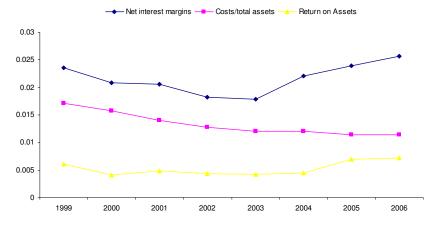
Figure 1 Total loans and total deposits of all financial institutions in China

Source: Almanac of China's Finance and Banking, various years (2000-2007), Beijing: China Financial Publishing House.

Banking reforms have been launched and intensified over the last two decades to address high NPLs and low efficiency in China's banking sector. Two pillars of bank reforms have been banking restructuring and financial liberalization. These have had significant and wide impacts on banking performance. Bank restructuring has been characterised by capital injection and NPLs disposal, which has so far focused on state-owned banks. Since 1998, the government has injected the capital equivalent of US$70.5 billion into four state-owned banks, around 20 to 24 per cent of the total 2004 GDP. At the same time, banks' NPLs have been substantively disposed. Roughly US$150 billion worth of NPLs, at face value, have been transferred to four asset management companies (AMCs). Consequently, NPL ratios of state-owned

commercial banks fall notably, from 31 per cent of loan balances in 2001 to 10 percent in 2005.

At the same time, financial liberalization includes removal of credit plans, gradual liberalization of interest rates, and opening up to foreign competition. The credit plan system was terminated in 1998, indicating the central government's determination in eliminating politicization of banks' lending practices. State-owned commercial banks joining other commercial banks were given more freedom to choose customers, projects, and lending volumes to extend their loans, based on commercial considerations. Also, the central bank (the People's Bank of China) has taken rapid steps to widen the floating band on interest rates of financial institutions starting from 1998. In 2004, interest rates were partially liberalized with removal of the ceiling on lending rates and the floor on deposits rates. This allows banks to gain high profitability but also allow them to construct interest rate structure basing on commercial factors and to engage in risk-based pricing of loans. The next section discusses the process of opening up to foreign competition.

Figure 2 China's banking performance indicators, 1999-2006

Note: Data are compiled from the World Bank's Financial Structure Database, 2007

Progress and impact have been made on the banking performance as a result of banking reforms[5]. Overall, in the period 1999-2006, there has been a consistent and gradual decline on costs as well as a steady fall in margins, reflecting banks' positive responses to industry restructuring and financial liberalization (Figure 2). An efficient

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[5] For more comprehensive reviews of China's banking performance, please refer to Garcia-Herrero et al. (2006), Dobson and Kashyap (2006), and MGI (2006).

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and competitive banking system has gradually emerged. Bank margins rose in 2004 suddenly however, followed by returns on assets, mainly due to the interest reforms in 2004.

2.2 Foreign Entry

Opening up to foreign competition is another milestone in financial liberalization. Foreign banks are allowed to enter China through four forms of entry. They are foreign bank branch, wholly-owned foreign banks, joint-venture, and acquisition[6]. Among them, foreign banks branch, wholly-owned foreign banks, and joint-venture are defined as foreign (funded) banks operating in China and subject to particular rules and regulations different from those governing the domestic banks. Acquisition or foreign equity investment in Chinese banks is one form of foreign entry. However, as foreign investors currently can only acquire minority ownership of the invested domestic bank[7], those banks remain Chinese banks.

Among the foreign banks, foreign bank branches capture the momentum of foreign entry in China and they represent the main form of foreign bank presence[8]. Joint-venture and wholly-owned foreign banks first appeared in China in the mid-1980s. Yet, the numbers have barely grown since their first appearance. Compared with Joint-venture and wholly-owned foreign banks, foreign bank branches enjoy much faster growth (Figure 3). The first branch was set up in Shenzhen in 1981. By the end of 2006, the number has grown to 209. These branches were established by 74 foreign banks from 22 countries and were located in 25 Chinese cities (Figure 4). As a group, foreign banks branches have the largest number and widest coverage in China. The correlation ratio of numbers of foreign bank branches and foreign banking entities in major cities in 2006 is 99.21 per cent. Hence, the presence of foreign bank branches is used to proxy the presence of the whole foreign bank population in this study.
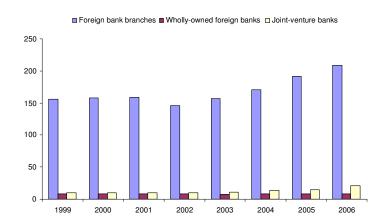
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[6] Representative offices (RO) are another form of foreign entry, but they are not commercial presence and prohibited from undertaking any profit-making commercial banking activities. The main function of RO is to serve as foreign banks' front offices and provide information on foreign banks in China.

[7] The maximum total shares legally allowed to hold by foreign investors in a Chinese bank are 20 per cent for a single investor and 25 per cent for all foreign investors.

[8] This applies to the period before 2006, which coincides with the period of the data sample. After 2007, many foreign banks began converting their branches into locally incorporated foreign banks to conduct full range RMB business, taking advantage of the new regulation. Details see footnote 10.

Accordingly, numbers of foreign bank branches are used to construct bank-level measures of foreign bank presence and examined in the empirical analysis.

Figure 3 Forms of foreign entry in China, by number (1999-2006)

Source: Almanac of China's Finance and Banking, (2000-2007), Beijing: China Financial Publishing House.

Regulatory Reform

Traditionally, foreign entry in the banking sector has been highly regulated and subject to strict entry requirements. The key requirements include minimum entry capital requirements, previous presence in China, and minimum total assets[9]. Furthermore, there were also a whole range of rules and regulations restricting foreign bank activities, in terms of customer type, location, and ranges of businesses such as currency denomination. For instance, before 2001, only two cities in China were open to foreign bank activities. And these foreign banks were only allowed to conduct business with foreign firms and individuals.

However, restrictions on foreign banking activities were substantially relaxed after China acceded to the WTO at the end of 2001 (Table 1). Within the five-year phase-in period after the WTO accession, customer and geographic restrictions were gradually lifted. Moreover, a most significant development in 2006 is that locally incorporated

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[9] For example, the minimum capital requirement for a foreign bank branch to conduct business in all currencies with corporate and individual clients (since 2003) is RMB 500 million, while the requirement for a domestic bank branch with the same business scope is only RMB 300 million. In addition, to apply for the establishment of a branch, foreign commercial banks must have a representative office in China for at least two years and have total assets no less than US$ 20 billion at the end of the year preceding the application.

foreign banks were allowed to conduct the same type of RMB business as their Chinese counterparts[10]. In all, after December 2006, there are no discriminatory restrictions on foreign bank entry and banking business in China. Foreign banks enjoy national treatment[11].

Table 1 **Graduate liberalization of China's banking market to foreign banks**

Commencement date	Customer type	Currency denomination of business	Locations
Pre- WTO accession			
Apr. 1985	Foreign firms and individuals	Foreign currency only	Shanghai
Dec. 1996	Foreign firms and individuals	Local currency and foreign currency	Shanghai , Shenzhen
WTO Accession			
Dec. 2001	Chinese firms and individuals	Foreign currency only	4 cities
Dec. 2003	Chinese firms only	Local currency and foreign currency	8 cities
Dec. 2006	Chinese firms and individuals	Local currency and foreign currency	20 cities
Post-WTO Accession			
Dec. 2006	No client restrictions	No currency restrictions *	No location restrictions

Note: The table combines tables in Leung et al. (2003) and Bonin & Huang (2002).
*: applies only to locally-incorporated wholly-owned or joint-venture foreign banks.

Foreign Banking Performance

As a result of the liberal policies on foreign entry and foreign banking activities, the post-WTO period has seen a rapid increase of foreign bank presence in China. There have been a large number of new foreign banks entering the market and more existing foreign banks expanding their businesses. The total number of foreign banking entities doubled and total banking assets tripled from 2003 to 2007 (Table 2). Before-tax profits increased 2.5 times from RMB 1.66 billion to 5.77 billion during the period 2003-2006. Loan quality improved significantly. The average NPL ratio dropped from 3.08 per cent in 2002 to 0.75 per cent in 2006, in stark contrast to a high 7.02 per cent of the domestic average.

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[10] Foreign bank branches are not allowed to conduct the full range of RMB business as locally incorporated wholly-owned and joint-venture foreign banks do, though, upon the CBRC approval, they are allowed to take deposits of no less RMB 1 million from the Chinese citizens. Nevertheless, many foreign banks have since started to covert their existing branches into locally incorporated foreign banks after 2007.

[11] Nevertheless, restrictions remain on foreign bank branches in terms of the RMB business scope as explained in footnote 9.
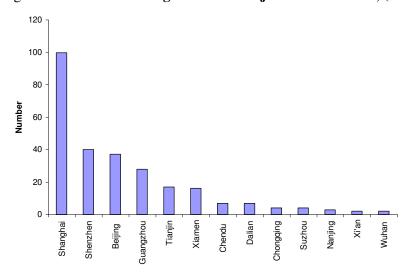
Table 2 **Foreign banking entities in China, (2003-2007)**

	2003	2004	2005	2006	2007
No. of operational foreign banking entities *	192	211	254	312	440
Growth of numbers (%)	-	9.90	20.38	22.83	41.03
Assets (RMB 100 million)	4,159	5,823	7,155	9,279	12,525
Growth of assets (%)	-	40.01	22.87	29.69	34.98
Share of the total banking assets in China (%)	1.5	1.84	1.91	2.11	2.38

Source: China Banking Regulatory Commission (CBRC) Annual Report, 2008. Beijing: CBRC.
*: including head offices, branches, and subsidiaries of locally incorporated foreign banks and foreign bank branches.

Certainly, the share of foreign banking assets in total banking assets remains small at 2.38 per cent. However, there are a couple of factors needed to be taken into account. First, China's fast economic growth contributed to enormous accumulation of assets in domestic banks, which as a result overshadowed the growth of assets in foreign banks; second, foreign banks activities are highly concentrated in a few cities (Figure 4). If observed at a local level, foreign banks' presence is more outstanding. For example, in 2006, the share of foreign bank assets was 14.54 per cent in Shanghai and 7.17 per cent in Beijing, much higher than the national average of 2.38 per cent. Moreover, the average size of individual foreign banking entity in Shanghai is RMB 5.78 billion, much larger than those of the state-owned (RMB 1.39 billion) and joint-stock (RMB 3.57 billion) banks. As such, the national aggregate ratio is hardly reflective of the actual foreign bank presence in the city and less indicative of its impact at the local level.

Figure 4 **Location of foreign banks in major cities of China, (2006)**

Source: Wang, S.Q. (2007). 'Report on Commercial Bank Competitiveness in China', Beijing: Social Science Academic Press.

Like many domestic Chinese banks, foreign banks in China engage in banking business such as accepting deposits and making loans, albeit most business in foreign currency due to restrictions on RMB business until 2007. An important feature of foreign banking activities is that they extend more loans than collect deposits (Figure 5). In 1999, total loans of foreign banks were four times as big as total deposits. This is contrary to their domestic counterparts that finance loans mainly by deposits collected domestically (Figure 1). Foreign banks' ability to take, in particular RMB, deposits was largely constrained by government regulations. Therefore, their main source of lending was fund mobilized from headquarters, subsidiaries, and other overseas foreign banks. This contributed a large item of foreign liabilities on foreign banks' balance sheets just enough to cover their loans. Nevertheless, the situation started to change since the WTO accession especially after 2003 (Figure 4). There has been a sharp rise in loans followed by deposits, indicating a faster expansion of business in response to relaxed restrictions. Also, loans have gradually surpassed foreign liabilities since 2005 with the difference being financed by the rapidly increasing local deposits as well as borrowing from the local interbank market. Foreign banks engage more deeply with the domestic banking market.
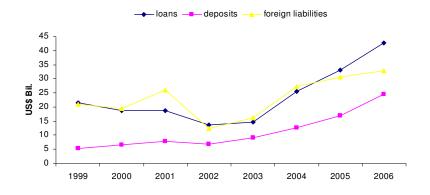
Figure 5 **Foreign banks' balance sheets driven business, 1999-2006**

Source: Almanac of China's Finance and Banking, various years (2000-2007), Beijing: China Financial Publishing House.
Note: Foreign banking entities include wholly-owned foreign banks, Joint-ventures, foreign bank branches, wholly-owed and joint-venture finance companies.

However, rather than traditional banking business, foreign banks' main focus is on the niches market and fee-based banking business where their comparative advantages lie. Traditionally, foreign banks are the main providers of financial services to foreign companies and manufactures operating in China (Leung et al. 2003; Wang 2007).

These banks possess strong experience and expertise in trade finance and foreign exchange business. For instance, they have been important players in interbank foreign exchange markets in China since 1994 and their total volume of transaction over 10 years from 1994 to 2004 reached USD 146.1 billion, only next to state-owned and joint-stock commercial banks in China. Since the WTO accession and subsequent regulatory development, foreign banks have been able to explore other niche markets such as investment banking as well as the retail banking business such as wealth management and credit cards in China. By 2004, they have already introduced more than 100 financial products to their customers in China, 3 times larger than the total number that domestic banks could provide. Furthermore, Citigroup, HSBC, and Hang Seng have all issued their Sino-foreign co-branded cards and it has reported that many local providers have successfully learned the marketing and product design strategies from these foreign banks (KPMG, 2007).

In sum, post-WTO era has seen an increasing presence of foreign banks and more diversified and sophisticated foreign banking business in China owing to the post-WTO liberalization policies. This has significance implications on local banking industry. In the fee-based banking business, foreign banks' international experience and expertise have suggested that they may have exerted large beneficial effects on the relatively inexperienced local Chinese banks in these areas. Whereas in the traditional banking business, that foreign banks' deeper engagement in the local banking markets have started to pose a competitive threat on local banking industry. Nevertheless, a full scale competition has not yet started as it is only recently that all categories of restrictions on foreign banking activities have been gradually relaxed. Hence, the pre-2006 period under study is more of a preparatory period for domestic banks, facing the growing threat of foreign entry. The impact of foreign entry revealed is therefore likely to be short-run and immediate impact.

3 Theoretical Framework

This section introduces the theoretical framework for the empirical analysis. Essentialy, FDI spillovers theory provides the theoretical basis how financial FDI or foreign banks could impact on China's banking performance. Also, the theoretical

framework reveals the importance of proximity in linking foreign presence and local banking performance in China.

3.1 FDI spillovers theory

The FDI spillovers theory (Hymer 1960; Caves 1974; Dunning 1980, 1983) posits that, to overcome the disadvantages of operating overseas such as culture, language barriers and established local business practices, multinational corporations must possess some firm-specific advantages to survive. Commonly-observed firm-specific advantages include superior production technologies and advanced management skills (Blomstrom & Kokko 1998). Other intangible advantages include, for example, brand name, trade mark, or reputaion for quality (Dunning 1983). An important inference from the theory is that multinational corporations operating in a foreign country could generate produtivity 'spillovers' through channels such as demonstration, personnel training, and competition (Blomstrom & Kokko 1998).

Although the related empirical literature focuses on the manufacturing industry, FDI spillovers theory is well-positioned and readily applied to the service sector in general (Dunning 1989) and the financial sector in particular (Goldberg 2004). Goldberg argues that the technology transfer and productivity themes have close counterparts in the financial sector FDI literature. He further notes that instead of using the language of productivity, research in this area addresses the issue of efficiency improvement as a result of foreign entry to the hosting country's financial or banking sector.

Levine (1998) suggests that there are two channels where foreign bank presence may positively influence domestic bank efficiency. The first channel is through technology transfer. He notes that 'Foreign banks may directly bring new and better skills, management techniques, training procedures, technology, and products to the domestic market' (p.91). Technology transfer therefore helps to upgrade the efficiency of domestic banks. Competition is an indirect channel of spillovers. Levine suggests that foreign bank entry will stimulate competition in domestic financial markets so as to put downward pressure on profits and overhead expenses and as a result enhance domestic banking efficiency.

3.2 Hypotheses

Based on the spillovers theory and its extensions, financial FDI or foreign bank presence is expected to facilitate technology transfer and meanwhile to intensify competition in the local banking industry. This has important implications for various dimensions of domestic banking performance. Four dimensions of local banking performance are tested and they are net interest margin, noninterest income, operational costs, and accounting profits.

Net interest margins

Net interest margins are interest incomes minus interest expenses divided by total earning assets. An increase in foreign bank presence is expected to reduce net interest margins. Foreign bank entry increases competitive pressure on domestic banks. In order to retain their market shares, domestic banks may respond by lowering lending rates or increasing deposit interest rates or both. Both forces work in the same direction, narrowing interest margins and improving the competitiveness of the local banking industry. This is a reasonable hypothesis in China. As explained in the previous section, although government manoeuvres on interest rates remain, banks have been given more scope to set up their interest rate structure on the commercial basis and have already shown evidence of doing so.

Noninterest incomes

Noninterest incomes are income generated from non-lending operations, including investment banking and brokerage services. Foreign entry is expected to increase noninterest incomes because local Chinese banks lag behind in these areas and they are also the areas where foreign banks' comparative advantages lie. PWC's (PWC 2007 & 2008 & 2009) surveys confirm that foreign banks in China focus on noninterest niche markets, including credit cards, fund management, securities trading, and trade finance. With foreign banks running such businesses nearby, technology spillovers are likely to occur through demonstration and labour mobility. At the same time, Chinese banks are aware of their lack of competence in non-traditional banking business and are eager to catch up. Their efforts are reflected in them actively engaging with foreign banks for this purpose, for example, by inviting foreign equity

partners to assist in developing new banking services and forming joint ventures with foreign banks to start credit cards businesses (CBRC 2004).

Costs

An increase in foreign bank presence is expected to reduce domestic banks' operational costs[12] in the long run, but in the short run this is more likely to increase costs. The FDI spillovers theory suggests that foreign entry intensifies competition in the local industry and therefore induces efforts of cost reduction by local banks. However, Lensink and Hermes (2004) observe that cost reduction may only occur in the long run. In the short run, they argue that more expenses are incurred, because in order to gain competitiveness and defend their market share, local banks often spend more on new facilities and technologies to implement new services and improve existing services. They are also likely to increase salaries to attract skilled personnel and experienced managers to strengthen human capital. This short-run scenario is likely to be observed in China's banking industry during the period under study.

Accounting profits

It is difficult to predict the impact of foreign entry on accounting profits. The theory suggests a decline in profits due to the intensified competition accompanying foreign entry. However, accounting profits that are used in the literature and also adopted by this study are derived from the accounting identity (accounting profits = net interest margins + noninterest incomes – costs – loan loss provisions). Since foreign entry is expected to have both positive effects (noninterest incomes) and negative effects (net interest margins) on factors in the identity, the effect of foreign entry on accounting profits is ambiguous.

Table 3 Summary of hypotheses

Performance Indicators	Hypotheses	Predicted sign
Net interest margins (NIM)	Competition results in lower margins, indicating higher efficiency of the banking industry	-
Noninterest income (NII)	Technology transfer increases NII	+
Costs (COST)	Competition reduces costs in the long run but may induces expenses in the short run	+
Accounting profits (PFIT)	Competition drives profits down	?

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[12] Operational costs include personnel expenses and rents.

3.3 Location matters

The FDI spillovers theory and related hypotheses suggest that foreign banks could have effective influence on domestic banking performance. Moreover, the channels of influence indicate that the proximity of foreign banks branches to local banks makes difference in whether foreign banks can exert effective influence on local banks.

Chung (2001) argues that technology transfer in general is enhanced by proximity – 'through hiring and firing of each other's workers, chances of meetings between scientists, and demonstration of previously unknown technologies' (p.6). In the banking industry, apart from its facilitating role in demonstration and labor mobility, proximity also matters for the level of competition fostered by foreign banks over the customer base and business innovation. As internet/e-banking is not common in China, bank customers are often location dependent for banking services. Closely located foreign banks exercise more competitive pressure on incumbent banks than distant foreign banks. As a result, the business and performance of bank 'a' located in city 'A' is more likely to be influenced by a foreign bank branch newly opened in city 'A', rather than a foreign branch 'b' opened in a distant city 'B', which serves the client group mainly in city 'B'. As such, the actual influence occurs more at the city level than national level, especially for country as large as China.

4 Foreign Exposure Index (FEI)

The key contribution of this study is the construction of a foreign exposure index to measure the degree of foreign exposure at bank level. As city is a realistic boundary of foreign bank influence, this study uses the number of foreign bank branches operating in the same city where the Chinese bank is located to determine the degree of foreign exposure for the bank. In other words, the more foreign bank branches there are in a city where a Chinese bank is located, the more foreign exposure it is under and the more foreign influence it receives. (Hence, FEI is also a city-level index because all the banks that locate in a city have the same FEI.)

The essence of FEI is to capture the degree of foreign exposure that each domestic bank is under by comparing it with its peers. To set up a benchmark, cross-sectional maximums are not preferable because they vary over t. Hence, the panel maximum, or the maximum number of foreign banking entities that any city has over the entire observation period, is used as the constant benchmark. Also importantly, in this way, FEI falls in the range of $[0,1]$, consistent to the data format of other bank variables included in the empirical models.

As discussed in Section 2, there are four types of commercial banks in China: rural banks, city banks, joint-stock banks, and state-owned banks. All have representations in the dataset collected for the analysis. So far, there are no foreign banks in rural areas in China, so the rural banks' FEIs are all equal to zero. City banks base and also often limit their banking activities to cities where they are located, so the level of foreign bank exposure in the city corresponds to the city bank's foreign exposure level. Accordingly, FEI for a city bank i operating at city m in year t is:

$$FEI_{i,m,t}^{CB} = \frac{N_{m,t}}{\max N},$$

the ratio of the number of foreign banking entities existing in city m in year t to the panel maximum N. Note that an underlying assumption attached to the formula is homogeneity of foreign bank branches. In other words, foreign bank branches are treated exactly the same and especially imposing the same level of influence on local Chinese banks across cities and over time[13], which is apparently a stringent assumption.

However, there are several factors justifying this assumption. First is a practical reason because apart from their numbers no other information is available on the nature and scale of foreign bank branches' activities in cities, such as total assets or volumes of transactions. Nevertheless, cross-country empirical evidence suggests that it is the number of foreign banking entities rather than their assets that matter in regard to their impact on domestic banking performance (Claessens et al. 2001). Second, even if one insists on loosening the homogeneity assumption using weights,

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[13] The assumption of homogeneity of foreign bank branches over time is dispensed later and tested through modifying the empirical model specification, i.e. interacting the variable of FEI with time t.

one can easily find that numbers of foreign bank branches in China are somewhat naturally weighted to reflect the divergence of influence. The more complex and influential foreign bank branch, therefore likely to imposing more influence on domestic banks than others, is often located in a developed city that hosts more foreign bank branches, such as Shanghai or Beijing, so it seems that adding extra weight is of little value.

Nevertheless, city banks' foreign exposure levels are straightforward, comparing to which those of state-owned and joint-stock banks are slightly involving. Unlike city banks that base their business in one city, state-owned and joint-stock banks undertaking banking business through a branch network covering a number of cities and each city may have a different level of foreign bank exposure. Therefore it is not obvious as to which level represents the bank's overall level of foreign exposure, so an additional assumption is required and a different formula is used to calculate FEIs for state-owned and joint-stock banks. A state-owned or joint-stock bank i with a set of branches in cities $m \in M$, $M = (1,2,...,k)$ in year t has a foreign exposure level measured by:

$$FEI_{i,M,t}^{JB,SB} = \frac{\max N_t^M}{\max N},$$

the ratio of the maximum number of foreign banking entities among k cities where a state-owned or joint-stock bank has branches in year t to the panel maximum. Note that the maximum of N_t across M cities is used to represent the bank's overall degree of foreign exposure in year t, basing on *a priori* assumption that the highest foreign exposure that a domestic bank receives through one of its branches prevails and influences equally the performance of the bank's headquarter and other branches[14]. Certainly, this scenario might not always happen and, as a result, measures based on

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[14] An alternative way of calculating FEI for joint-stock and state-owned banks is to use the total number of foreign bank branches in all cities that the domestic banks have branches compared with the panel total maximum:
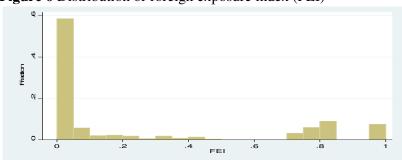
$$FEI_{i,M,t}^{JB,SB} = \frac{\sum_M N_t}{\max \sum N},$$

Compared with the adopted formula, this method releases the priori assumption on foreign influence transmitting among domestic bank branches, but instead it relies more on the homogeneity assumption of foreign bank branches across cities and by adding up the numbers across cities it losses the natural weights, which is a more serious defect leading to the dismissal of this method. Again, the importance of city boundary is highlighted in considering and comparing foreign bank influence.

this assumption should set the upper bound of the foreign exposure level that the domestic bank could receive. The actual exposure level is difficult to measure but likely falls under the upper bound and systematically lower than the estimated measure, which leads to underestimation of its impact. In this case, the actual effects of foreign bank presence should be larger than what the size of coefficients suggests. Nevertheless, the assumption is relevant in this context as among Chinese banks, especially state-owned banks, decisions on interest rates and banking services are made in headquarters rather than at branches[15]. Once the shock of foreign entry is received through one of a bank's branch, the headquarter responds with strategies and actions, which then disseminate at the local level to all branches almost unexceptionally[16].

Figure Figure 6 shows the distribution of FEI for Chinese banks. Around half of the observations have FEIs equal to zero. The other half cluster at the two ends of the $[0,1]$ range, which is a reflection of the geographic distribution of foreign bank branches in China. They gather in large numbers in a few mega cities (e.g. Shanghai, Beijing, and Shenzhen) and only have a few branches in other cities. A comparison between the aggregate measure (number of foreign bank branch) and FEI (Figure 7) shows the advantage of the latter. FEI not only captures year-to-year variations as does the aggregate measure but also cross-section variations.

Figure 6 Distribution of foreign exposure index (FEI)

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[15] This is also common practice for joint-stock banks. At least, interviews conducted by the author in two joint-stock banks suggest so.

[16] This appears contradictory to the observation of the city boundary of foreign bank influence, but it is not. The city boundary of foreign bank influence implies that foreign banks operating in city 'A' exercise influence over a domestic bank located in city 'A', but not a domestic bank in a far-away city 'B'. In other words, this influence does not transmit across cities. However, if this domestic banking entity is a branch of a domestic bank that has branches in city 'B', then the foreign influence can transmit to city 'B' through the internal transmission mechanism as explained above.

Figure 7 Comparison of aggregate measures with FEI

5 Empirical Model

Using an improved measure of foreign bank presence, this paper aims at a more accurate measure of the impact of foreign presence on banking performance in China. The empirical model is constructed as follows:

$$PI_{it} = \alpha + \gamma FEI_{it} + X_{it}'\beta + \lambda_t + \eta_i + \varepsilon_{i,t},$$

where PI_{it} is the dependent variable (one of the four bank performance indicators – net interest margin, noninterest income, costs, and accounting profits) for domestic bank i at time t; FEI_{it}, the bank-level foreign exposure index, is the key explanatory variable; X_{it} is a vector of bank variables that control for other factors affecting cross-bank variation in performance. Following Claessens et al. (2001), these include equity, non-interest earning assets, customer and short-term funding, and costs[17]. Similar to banking performance indicators, all bank variables are normalized by banks' total earning assets and are therefore all in ratio terms. Finally, all bank variables use lagged values to control for potential endogeneity[18]. It is also important to note that city dimensions are not relevant for constructing the domestic bank variables as data on domestic banks are integrated data inclusive of all their branches. City is only used as a matching point for constructing FEIs.

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[17] Costs are excluded from the vector of the explanatory variables in the cost model.
[18] Refer to the robustness test section for more discussions on the endogeneity issue.

The composite error-term includes ε_{it}, η_i, and λ_t; ε_{it} is the idiosyncratic error term as usual; η_i represents bank-specific effects that are time invariant, such as bank size, ownership, and location; λ_t captures all the effects that solely change over time, for instance, regulatory reforms and other external shocks that transform the banking environment as a whole. Note that one important advantage of the bank-level measure is that it allows for λ_t in the model to remove all the macroeconomic effects, whereas the conventional measure of foreign bank presence does not because it by itself is one of the variables that vary only by year.

Hence, the model proposed for all regressions is a two-way fixed effect model which integrates both bank-specific and time-specific fixed effects. First, bank-specific effects are important because Chinese banks are largely heterogeneous by size, ownership and location that are likely correlated with the explanatory variables including equity, short-term funding, and costs. The Hausman test and Breusch/Pagan Lagrangian multiplier test confirm that the fixed-effects model provides a better fit of the data in comparison with the random-effect model. Second, time-specific effects are essential because the observation period covers the time when the Chinese banking industry experiences significant transformations through a series of reforms pre- and post-WTO accession. The reforms have significant impacts on bank performance (Figure 2) and ignoring those effects might result in misestimating the effects from foreign bank presence. A distinctive feature of this study is the inclusion of time effects in the model, enabled by the bank-level measure of foreign presence. Time-effects can control for the industry-wide reform effects, both identifiable and unidentifiable, and help reduce the problem of omitted variables in the model.

5.1 Data

A panel dataset is employed in the study, containing annual data for 114 Chinese banks over the period 1999-2006. This includes all five state-owned banks and 12 joint-stock banks, jointly accounting for 66.1 per cent of total banking assets in China. In addition, 83 city banks (more than half the city bank population) and 14 rural banks and rural credit cooperatives are included, possibly providing the largest and most

diversified bank coverage among existing empirical studies on China's banking industry.

The panel data set is unbalanced, because not all banks have information for every year. This includes cases where existing banks are being merged or closed and new banks are being established, so the number of banks in the sample varies from a minimum of 18 banks in 1999 to a maximum of 104 banks in 2006. Additional observations are also dropped due to missing values for important variables. Accordingly, the final sample has a total of 405 observations.

The main data source is Fitch's International Bank Database – Bankscope, which compiles data mostly from balance sheet and income statements found in banks' audited annual reports. All the bank-level data required for the study are obtained from this database, in particular the unconsolidated accounts, if available, and otherwise the consolidated accounts[19]. Macroeconomic data – GDP growth rates, inflation rates, and real interest rates – used in the benchmark model come from the World Bank's World Development Indicator database.

Data sources for measures of foreign bank presence are more diverse. The total number of foreign bank branches and total assets of foreign funded banks are collected from the Almanac of China's Finance and Banking (ACFB) 2000-2007 and the China Banking Regulatory Commission (CBRC) annual report 2008. To construct the FEI, location data of foreign bank branches (1999-2006) were gathered from ACFB. In addition, the author refers extensively to each state-owned and joint stock bank's homepage for information on location of the bank's branch network. Table 4 presents a summary of variable definitions and data sources and Table 5 reports the summary statistics of important variables.

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[19] Unconsolidated accounts are preferred in this analysis for consistency as most of the Chinese banks only provide unconsolidated data in their annual reports and therefore compiled in the Bankscope. There are opposing views on the choice of consolidated and unconsolidated accounts. Garcia-Herrero and Santabarbara (2008) argue for unconsolidated data because they 'show relevant differences in profit and loss statements and avoid the loss of information from balance sheets of headquarters and subsidiaries compensating each other'. Others prefer consolidated data to avoid double accounting (Claessens and Laeven 2004).

6 Results and Discussion

The main objective of this study is to use an enhanced measure of foreign presence to assess the impact of foreign bank presence on domestic banking performance in China. Four performance indicators - net interest margin, noninterest income, costs, and profits - are examined and the results are presented in Tables 7-10 respectively (Appendix). All estimators reported are within-group estimators.

To compare the new bank-level measures with the conventional aggregate measures of foreign presence, the analysis goes through a three-step process for each performance indicator. First, the baseline models are estimated (model 1 and 2), following the conventional model specification, for example from Shen et al. (2009), and using the aggregate measures (both number and asset share) of foreign banking entities as well as bank and macroeconomic variables. The second step is to estimate the same model as the baseline model but replace the aggregate measures with FEI, the bank-level measure (model 3). By comparing the results from the first two steps, one should be able to find by how much the bank-level measures, containing more information than the aggregate ones, change the results with all the other variables remaining the same. This is the direct effect of using the bank-level measure. The third step is to substitute year dummies for the macroeconomic variables in the model (model 4). As bank-level measures allow for the inclusion of year dummies in the model, this helps to cancel out all the time-specific factors that are not the focus of the analysis but are related to bank performance. So this step should illustrate the indirect effect of the bank-level measure by addressing the problem of the time-specific omitted variables.

Bank variables are possibly endogenous. Equity level, noninterest assets and short-term funding may be endogenously determined in the model as all the performance indicators can influence their levels. Therefore, lagged values (lag 1) of one year are used as instruments to address the endogeneity issue (model 5). In the robustness tests, the potential endogenous variables are dropped to offer an alternative way to reduce the endogeneity problem.

Net Interest Margins

Table 6 reports the results associated with net interest margins. The baseline model using the aggregate measure (number of foreign banking entities) finds highly significant, positive relationship between foreign presence and domestic interest margins. This reproduces the result of many other studies, for example, Chen and Xiao (2007), Jiao (2008) and Huang and Qin (2009). This result is difficult to interpret as it contradicts the inference of the theory. Furthermore, there has been no convincing argument that can link an increased foreign presence to a rising interest margin in the domestic banking market.

Huang and Qin (2009) attribute the counterintuitive results to the unique situation in China where interest rates are semi-controlled by the central bank. During their study period (1999-2005) the control was relaxed many times to allow banks to gain higher margins. This may explain why the margin increases generally. Nevertheless, their reasoning offers little explanation as to why *foreign banks' presence* relates to higher margins since the significant and positive coefficient is associated with foreign entry.

However, the argument exposes the intrinsic problem of aggregate measures of foreign presence. Similar to the data for macroeconomic variables in the model, the aggregate measures of foreign presence are annual data and vary only by year. So it is difficult to distinguish their effects from regulatory variables, such as interest-rate policy, and other banking environment improvements that have possibly larger effects on interest margins than foreign bank entry. Without specifying and including those policy variables in the model, the foreign entry variable is likely to capture the larger effects from those policies.

Bank-level measures contain bank-specific information and capture cross-section variations, so they are able to overcome the problems of the aggregate measures. Model 3 using FEI shows completely different results. The correlation between foreign presence and interest margins is negative and highly significant, indicating that an increased foreign presence is associated with a lowered margin, or a more competitive and efficient domestic banking system, consistent with the theory.

There is other evidence supporting this finding as well. As discussed in Section 2, although interest rates are regulated by the central bank of China, the liberalization process is under way and rapidly advancing. Domestic banks have already started following an interest rate structure based on commercial terms. Despite the government's continuous widening of the floating bands of the interest rates, financial institutions have not raised the interest rate on all loans to the upper limits (PBC 2009). This can be taken as evidence that with the competitive pressure intensified by foreign entry, domestic banks have consciously kept their interest rates at a competitive level.

The coefficient of FEI increases as year dummies enter the model replacing the macroeconomic variables (model 4). This is because year dummies control for other policy effects including those that facilitate banks to earn more interest such as the widening band, unaccounted for by the identified macroeconomic factors. Once these opposite forces are taken into account, the more accurate effect of foreign presence is revealed. Model 5 controls for endogeneity and provides a slightly smaller coefficient but with an unchanged sign and significance level[20].

Regarding the control variables, it appears that other bank-specific factors are not important determinants of bank margins in China over the study period. Rather it is the banking environment and regulatory policies proxied by year dummies (year 2004, year 2005, and year 2006 especially) that play a more important role. This is a plausible description of the situation in China as interest rates have been partially liberalized since 2004.

In sum, the overall results show a significant negative correlation between foreign presence and domestic bank margins. In other words, a more open banking industry is strongly related to a more competitive one.

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[20]The interaction terms of FEI and year dummies are added to the model to account for variations of FEI overtime. The results, though not included in the result table, suggest that the FEI after 2004 have strong significant impact on domestic banks' margins but not before 2003. This is in line with the observation that foreign banks' engagement with the Chinese banking market have intensified only after the WTO accession.

Noninterest Income

With noninterest income as the dependent variable (Table 7), the baseline model finds no significant results associated with foreign entry, as demonstrated by Shen et al. (2009) among others. However, when FEI replaces the aggregate measures, it enters the model (3) significantly and positively, suggesting a positive correlation between foreign bank presence and local bank noninterest income. The enhanced measure of foreign presence suggests that foreign entry is associated with increased noninterest incomes for domestic banks. The result confirms the hypothesis that possible spillovers are likely to occur in this line of banking business. Local Chinese banks benefit from foreign presence.

Unlike NIM, the banking environment does not seem to influence domestic banks' noninterest income, reflected in the overall insignificance of the year dummies and the nearly unchanged coefficient of FEI in model 4 compared to model 3. In all, the results remain highly significant and consistent in all model specifications using FEI, suggesting a positive correlation between foreign bank presence and local banks' noninterest incomes.

Costs

FEI provides consistent evidence that an increased foreign presence is linked to a rise in costs for domestic banks (Table 8). This is in line with Lensink and Hermes (2004)'s observation that costs are likely to rise following foreign entry in the short-run, because domestic banks spend more to offer new services or improve the quality of existing services to defend their market share. This seems to be happening in China.

Accounting Profits

It is not surprising to see that there are no marked changes in profits due to foreign presence (Table 9). As explained, accounting profits are derived from the accounting identity ($PFIT = NIM + NII - COST - LLP$). Other performance indicators on the right-hand-side of the identity are examined in the study and the effects of foreign presence on them are both positive (noninterest incomes and costs) and negative (net interest margins). Hence, the correlation between accounting profits and foreign entry remains unclear.

Robustness tests

First-order serial correlations are detected in regressions associated with net interest margins, noninterest incomes and profits (Table 10). One implication of serial correlations is that they can bias the standard errors and cause the results to be less efficient. Baltagi and Wu (1999)'s method provides corrected estimators for the fixed-effects model with AR (1) in the disturbance and was adopted in the study. Table 11 shows that the key results remain unaffected after the serial correlations are corrected[21]. Multicollinearity is not likely an issue (Table 12) and robust standard errors are adopted to tackle observed heteroscedasticity in the disturbance terms.

The endogeneity issue related to bank variables is addressed by using instrumental variables. Although lagged values are common instruments for endogenous variables, no formal tests are available to justify the use of them or to examine whether they solve the problem. Hence, a sub-optimal strategy is to drop all the potential endogenous variables and compare the results. As shown in Table 13, using instruments or dropping them generates almost the same coefficients for foreign presence in terms of sign and significance level. It indicates that the key results hold.

There are two issues associated with the key variable calling for attention. The first one is what the possibility is that FEI is an endogenous variable and that FEI is correlated with the error term. In other words, the unexplained residual variation of the dependent variable influences FEI. A careful comparison between FEI with the dependent variable suggests that the possibility is considerably low. The variable of FEI, clear from its construction, is a city-level environmental factor. The factor can influence the performance banks located in that city, but it is highly unlikely that an individual bank performance could influence this environmental factor.

This links to the second issue, which is a reasonable concern that FEI might proxy for some omitted city factors that are also correlated with bank performance. In particular, economic growth or the sophistication of the economy in the city could induce better banking performance in general. Inclusion of these variables as controls in the model is a common strategy to release the concern, but it is not feasible in this case because

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[21] The coefficients changed slightly because the Beltagi-Wu method involves a transformation of data which results in the loss of observations.

there is no city dimension in the model. One could certainly construct another index like FEI with more assumptions involved, but an alternative method, and also a simpler one, is to examine the correlation between FEI and these factors, the underlying logic being if FEI is not correlated to these factors then it cannot proxy for them. Accordingly, the variable of city development, measured by share of tertiary sector value-added in city GDP, is constructed and its correlation with FEI is calculated. The correlation coefficient is 0.18 per cent, which indicates a low level of correlation and thereby a less likelihood of the proxy[22].

As a final robustness check, the same regressions are run for a sub-sample with five large banks (i.e. the state-owned banks dropped). Table 14 compares the results of the full samples and those of the sub-samples. The key results hold. Overall, the robustness tests help to confirm that the main results of the study are consistent and robust.

7 Conclusion

The paper constructs a bank-level measure – foreign exposure index (FEI) to overcome the problems associated with conventional aggregate measures of foreign presence in the banking sector. In an empirical panel-data analysis of foreign entry in China, FEI has two main advantages. The direct advantage is that it provides a more precise measure of foreign presence that an individual bank faces and therefore facilitates a more accurate assessment of the correlation between foreign presence and domestic banking performance. The indirect advantage is that FEI allows inclusion of year dummies in the econometric models and thereby isolates the effects of foreign entry from other macroeconomic influences, which further 'clean' the results. The main findings of the analysis are significant and consistent with the theoretical predictions. In contrast to the confusing results of previous studies contingent on aggregate measures, FEI provides strong evidence that foreign entry is supportive of a more competitive and efficient domestic banking industry in China.

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[22] This is consistent to the fact that the distribution of foreign banks in China over this period follows government regulations based on a range of factors.

This finding has important policy implications. Throughout the reform period, there have been two opposing views perplexing policy-making decisions regarding the liberalization of foreign entry in China. The positive stream argues that foreign bank entry offers the prospect of enhancing efficiency of the domestic banking sector; while the pessimistic view suggests that the inefficient domestic banking industry will lose under intensified foreign competition and become vulnerable to foreign takeover. The findings from this study provide empirical evidence for the positive outlook and support for China's opening-up policy in the banking sector.

Certainly, the observation period is a period of limited foreign entry and competition was not in full scale. After December 2006 foreign banks were granted national treatment, the relationship between foreign presence and domestic banking performance might evolve and therefore requires continuous examinations to assist proper policy decisions.

It is also important to distinguish financial liberalization and banking regulations. A more open banking sector does not mean a banking sector free of regulations. The main result of the study that foreign entry is associated with improved domestic banking performance is observed in a banking environment where foreign entry is closely monitored and properly regulated. Hence, a more open banking sector should continuously be accompanied by appropriate regulations to ensure an efficient and healthy banking sector, contributing to the development of the economy and welfare of the society.

Finally, due to current data availability, the bank-level measure of foreign presence only employs the number of foreign bank branches in a city to measure the influence of foreign presence, assuming the homogenous nature of foreign banks across cities. This is a strict assumption imposed only due to lack of data on alternative variables. In the future, if data on foreign banks assets and information on foreign bank balance sheets are accessible at the city level, the measure is expected to be further improved.

Appendix

Table 4 Variable definitions and data sources

Variables	Definitions	Data sources
Dependent Variables (bank performance indicators)		
Net Interest Margin (NIM)	interest income minus interest expenses over total earning assets (t.e.a.)	Bankscope
Cost (COST)	overheads over t.e.a.	Bankscope
Non-interest Income (NII)	other operating income over t.e.a.	Bankscope
Pre-tax profit (PFIT)	before tax profits over t.e.a.	Bankscope
Explanatory Variables		
Foreign Entry		
Foreign bank presence	**fb_nb:** numbers of foreign bank branches	ACFB (2000-2008); CBRC (2008)
	fb_as: share of total assets of foreign funded banks in total banking assets	ACFB (2000-2008); PBC*
	FEI: foreign exposure index	author's calculation**
Bank specific indicators (X)		
Equity (EQT)	book value of equity (assets minus liabilities) over t.e.a.	Bankscope
Non-interest earning asset (NIA)	cash, non-interest earning deposits at other banks, and other NIAs over t.e.a.	Bankscope
Customer & short-term funding (CSF)	all ST and LT deposits plus other non-deposit short term funding over t.e.a.	Bankscope
Cost (COST)	overheads over t.e.a.	Bankscope
Macroeconomic variables (Mac)		
GDP growth ($gdpg$)	annual growth rate of GDP	WDI
Inflation (inf)	percentage change in the CPI	WDI
Real interest rate (i)	lending interest rate adjusted for inflation as measured by the GDP deflator, where lending interest rate is the rate charged by banks on loans to prime customers.	WDI

* The People's Bank of China's web pages

** Refer to the explanation in the data section for detailed data sources.

Table 5 Summary statistics, average (1999-2006) for China' banks by type

	NIM	NII	COST	PFIT	FEI	EQT	NIA	CSF
State-owned banks								
Mean	2.2555	0.0032	0.0120	0.0081	0.8485	0.0426	0.4569	0.9753
Std. Dev.	0.5057	0.0023	0.0028	0.0045	0.0980	0.0454	0.0688	0.0547
Min.	1.0500	-0.0009	0.0070	0.0019	0.7018	-0.1235	0.3194	0.8727
Max.	2.8800	0.0084	0.0191	0.0154	1.0000	0.0913	0.5891	1.1401
Ob.	33	33	33	33	33	33	33	33
Joint-stock banks								
Mean	2.5171	0.0016	0.0124	0.0074	0.7695	0.0391	0.4443	0.9822
Std. Dev.	0.4401	0.0015	0.0035	0.0041	0.2454	0.0400	0.0840	0.0620
Min.	1.4700	-0.0032	0.0074	-0.0153	0.0175	-0.0138	0.3122	0.6952
Max.	3.5200	0.0082	0.0252	0.0137	1.0000	0.3201	0.6731	1.2030
Ob.	69	69	69	69	71	71	71	71
City banks								
Mean	2.4130	0.0047	0.0131	0.0087	0.0652	0.0498	0.4959	0.9885
Std. Dev.	0.9579	0.0048	0.0044	0.0049	0.1562	0.0176	0.1257	0.0777
Min.	0.4200	-0.0006	0.0052	-0.0009	0.0000	-0.0041	0.2211	0.7185
Max.	6.6800	0.0422	0.0390	0.0277	1.0000	0.1121	0.9586	1.4264
Ob.	252	249	249	250	268	262	262	262
Rural banks (incl. credit cooperatives)								
Mean	2.4703	0.0055	0.0147	0.0095	0.0000	0.0413	0.5590	0.9760
Std. Dev.	1.1038	0.0077	0.0045	0.0057	0.0000	0.0187	0.1083	0.0903
Min.	1.1400	0.0004	0.0078	0.0020	0.0000	0.0056	0.3705	0.8028
Max.	5.9800	0.0343	0.0225	0.0212	0.0000	0.0762	0.7851	1.3686
Ob.	30	31	31	32	33	32	32	32

Table 6 Effects of foreign presence on Chinese banks' net interest margins: (1999-2006)

(Dependent variable: $NIM_{i,t}$ - a Chinese bank i's net interest margins (NIM) at year t)

	Aggregate measures		Bank-level measures: FEI			
	(1)	(2)	(3)	(4) YD		(5) YD Instrument
EQT	0.4324	0.5528	2.9863*	1.1611	**L.EQT**	0.2024
	(1.782)	(1.842)	(1.835)	(1.535)		(1.739)
NIA	-0.5546	-0.5516	-0.6347	-0.3520	**L.NIA**	0.7442
	(0.515)	(0.521)	(0.519)	(0.486)		(0.464)
CSF	0.2151	0.1618	0.0752	0.2082	**L.CSF**	-0.4894
	(0.793)	(0.802)	(0.813)	(0.764)		(0.655)
COST	50.0769***	45.1306***	58.7055***	64.6572***	**L.COST**	41.0656***
	(16.267)	(17.151)	(16.033)	(17.211)		(13.727)
gdpg	0.0321	0.2418***	0.2622***			
	(0.050)	(0.040)	(0.044)			
inf	0.1231	0.1932**	0.2451***			
	(0.084)	(0.085)	(0.085)			
I	0.0971	0.1636**	0.1804***			
	(0.069)	(0.070)	(0.069)			
fb_nb	0.0124***					
	(0.002)					
fb_as		0.4594***				
		(0.110)				
FEI			-1.9001***	-3.9255***		-3.7376***
			(0.530)	(0.645)		(0.644)
Y99				0.0564		-
				(0.179)		-
Y00				-		0.0858
				-		(0.145)
Y01				0.0052		-
				(0.148)		-
Y02				-0.0998		-0.2269
				(0.164)		(0.143)
Y03				0.1571		0.0402
				(0.161)		(0.126)
Y04				0.4427***		0.5314***
				(0.159)		(0.142)
Y05				0.9293***		0.8964***
				(0.176)		(0.159)
Y06				1.1027***		1.0317***
				(0.193)		(0.172)
_cons	-1.1033	-1.9899*	-1.1259	1.9757**	**_cons**	2.6104***
	(1.104)	(1.150)	(1.128)	(0.872)		(0.758)
N	379	379	379	379	***N***	272
R²	0.262	0.236	0.212	0.369	***R²***	0.396
F	8.2576	7.3578	6.3802	7.8667	**F**	6.4166
P	0.0000	0.0000	0.0000	0.0000	**p**	0.0000

Note:
1. Regression are estimated using within-group estimation methods;
2. Robust standard errors in parentheses;
3. * significance level at 10% level, ** 5% level, and *** 1% level;
4. YD: year dummies (y99-y06) are included in the model;
5. Model (5) use lagged values (LAG1) of explanatory bank variables as instruments to control for endogeneity.

Table 7 Effects of foreign presence on Chinese banks' noninterest incomes: (1999-2006)

(Dependent variable: $NII_{i,t}$ - a Chinese bank i's noninterest incomes (NII) at year t)

	Aggregate measures		Bank-level measures: FEI			
	(1)	(2)	(3)	(4) YD		(6) YD Instrument
EQT	-0.0243*	-0.0205	-0.0288**	-0.0214*	**L.EQT**	-0.0002
	(0.014)	(0.013)	(0.014)	(0.012)		(0.011)
NIA	-0.0026	-0.0023	-0.0029	-0.0032	**L.NIA**	-0.0046
	(0.004)	(0.004)	(0.004)	(0.003)		(0.003)
CSF	-0.0128*	-0.0124*	-0.0123*	-0.0119*	**L.CSF**	0.0056
	(0.007)	(0.007)	(0.007)	(0.007)		(0.004)
COST	0.4863***	0.5011***	0.4543**	0.4684**	**L.COST**	0.0395
	(0.191)	(0.199)	(0.191)	(0.205)		(0.088)
gdpg	0.0000	0.0023	-0.0004			
	(0.000)	(0.004)	(0.000)			
inf	-0.0005	-0.0002	-0.0008			
	(0.001)	(0.001)	(0.001)			
i	-0.0002	-0.0001	-0.0004			
	(0.000)	(0.000)	(0.000)			
fb_nb	-0.0000					
	(0.000)					
fb_as		0.0017				
		(0.003)				
FEI			0.0115***	0.0144***		0.0185***
			(0.003)	(0.004)		(0.004)
y99				-0.0003		-
				(0.001)		-
y00				-		-
				-		-
y01				-0.0002		0.0009
				(0.001)		(0.001)
y02				0.0014		0.0014
				(0.001)		(0.001)
y03				-0.0003		-0.0002
				(0.001)		(0.001)
y04				-0.0013		-0.0016*
				(0.001)		(0.001)
y05				-0.0012		-0.0020*
				(0.001)		(0.001)
y06				-0.0015		-0.0025**
				(0.001)		(0.001)
_cons	0.0150*	0.0165**	0.0158**	0.0093	**_cons**	-0.0045
	(0.008)	(0.008)	(0.008)	(0.007)		(0.005)
N	382	382	382	382	**N**	273
R²	0.225	0.228	0.252	0.269	**R²**	0.189
F	2.2051	2.2327	3.4905	2.4292	**F**	3.1300
P	0.0000	0.0000	0.0000	0.0000	**p**	0.0000

Note:
1. Regression are estimated using within-group estimation methods;
2. Robust standard errors in parentheses;
3. * significance level at 10% level, ** 5% level, and *** 1% level;
4. YD: year dummies (y99-y06) are included in the model;
5. Model (5) use lagged values (LAG1) of explanatory bank variables as instruments to control for endogeneity.

Table 8 Effects of foreign presence on Chinese banks' costs: (1999-2006)

(Dependent variable: $COST_{i,t}$ - a Chinese bank i's costs at year t)

	Aggregate measures		Bank-level measures: FEI			
	(1)	(2)	(3)	(4) YD		(5) YD Instrument
EQT	0.0291***	0.0244**	0.0275**	0.0166	L.EQT	0.0143
	(0.011)	(0.011)	(0.011)	(0.011)		(0.010)
NIA	0.0029	0.0031	0.0025	0.0013	L.NIA	0.0018
	(0.002)	(0.002)	(0.003)	(0.003)		(0.003)
CSF	0.0076*	0.0074	0.0077*	0.0059	L.CSF	0.0117***
	(0.005)	(0.005)	(0.004)	(0.004)		(0.004)
Gdpg	-0.0011***	-0.0009***	-0.0012***			
	(0.000)	(0.000)	(0.000)			
Inf	0.0000	0.0000	-0.0001			
	(0.001)	(0.001)	(0.001)			
I	0.0001	0.0002	0.0001			
	(0.000)	(0.000)	(0.000)			
fb_nb	0.0000					
	(0.000)					
fb_as		0.0013**				
		(0.001)				
FEI			0.0084***	0.0110***		0.0066**
			(0.003)	(0.004)		(0.003)
y99				0.0020*		-
				(0.001)		-
y00				-		0.0003
				-		(0.001)
y01				-0.0006		-
				(0.001)		-
y02				-0.0019**		-0.0022***
				(0.001)		(0.001)
y03				-0.0037***		-0.0026***
				(0.001)		(0.001)
y04				-0.0032***		-0.0022***
				(0.001)		(0.001)
y05				-0.0044***		-0.0030***
				(0.001)		(0.001)
y06				-0.0055***		-0.0037***
				(0.001)		(0.001)
_cons	0.0120*	0.0091	0.0125*	0.0063	_cons	-0.0003
	(0.007)	(0.007)	(0.007)	(0.005)		(0.005)
N	382	382	382	382	N	286
R²	0.289	0.300	0.304	0.364	R²	0.336
F	14.3775	15.5594	14.2740	12.0373	F	8.5657
P	0.0000	0.0000	0.0000	0.0000	p	0.0000

Note:
1. Regression are estimated using within-group estimation methods;
2. Robust standard errors in parentheses;
3. * significance level at 10% level, ** 5% level, and *** 1% level;
4. YD: year dummies (y99-y06) are included in the model;
5. Model (5) use lagged values (LAG1) of explanatory bank variables as instruments to control for endogeneity.

Table 9 Effects of foreign presence on Chinese banks' accounting profits: (1999-2006)

(Dependent variable: $PFIT_{i,t}$ - a Chinese bank i's accounting profits (PFIT) at year t)

	Aggregate measures		Bank-level measures: FEI			
	(1)	(2)	(3)	(4) YD		(5) YD Instrument
EQT	0.0148	0.0122	0.0285*	0.0128	L.EQT	-0.0006
	(0.014)	(0.014)	(0.016)	(0.014)		(0.013)
NIA	0.0046	0.0047	0.0037	0.0048	L.NIA	0.0096**
	(0.004)	(0.004)	(0.004)	(0.004)		(0.004)
CSF	0.0017	0.0012	0.0015	0.0012	L.CSF	-0.0035
	(0.004)	(0.004)	(0.004)	(0.004)		(0.005)
COST	0.1344*	0.1002	0.1470*	0.1292*	L.COST	0.0692
	(0.070)	(0.067)	(0.078)	(0.074)		(0.107)
gdpg	0.0003	0.0017***	0.0015***			
	(0.000)	(0.000)	(0.000)			
inf	0.0006	0.0010**	0.0012**			
	(0.001)	(0.001)	(0.001)			
i	0.0006	0.0010**	0.0010**			
	(0.000)	(0.000)	(0.000)			
fb_nb	0.0001***					
	(0.000)					
fb_as		0.0038***				
		(0.001)				
FEI			0.0009	-0.0084**		-0.0070
			(0.004)	(0.004)		(0.005)
y99				0.0016		-
				(0.001)		-
y00				-		-
				-		-
y01				0.0001		-0.0006
				(0.001)		(0.001)
y02				-0.0010		-0.0017
				(0.001)		(0.001)
y03				0.0001		-0.0011
				(0.001)		(0.001)
y04				0.0017*		0.0014
				(0.001)		(0.001)
y05				0.0037***		0.0031***
				(0.001)		(0.001)
y06				0.0056***		0.0047***
				(0.001)		(0.001)
_cons	-0.0175***	-0.0248***	-0.0168***	0.0025	_cons	0.0067
	(0.006)	(0.006)	(0.006)	(0.005)		(0.006)
N	382	382	382	382	N	273
R²	0.281	0.281	0.190	0.302	R²	0.337
F	10.7731	10.7039	6.5407	7.5618	F	6.9585
p	0.0000	0.0000	0.0000	0.0000	p	0.0000

Note:
1. Regression are estimated using within-group estimation methods;
2. Robust standard errors in parentheses;
3. * significance level at 10% level, ** 5% level, and *** 1% level;
4. YD: year dummies (y99-y06) are included in the model;
5. Model (5) use lagged values (LAG1) of explanatory bank variables as instruments to control for endogeneity.

Table 10 Serial correlation tests for unbalanced panels

	Rho	Beltagi-Wu LBI
NIM	0.4772	1.5788
NII	0.3403	1.8075
COST	0.3789	1.9165
PFIT	0.4514	1.6680

Note: Baltagi and Wu (1999) extended the Durbin-Watson statistic for serial correlations to account for unbalanced panels with unequally spaced data. They derived the locally best invariant (LBI) statistic of $\rho = 0$.

However, no tables of critical values are currently available for the statistics. As a general rule, a statistics close to 2 indicates that there is no AR(1) in the disturbance term.

Table 11 Correction for serial correlations in (NIM, NII, and PFIT)

	NIM		NII		PFIT	
		With AR(1)		With AR(1)		With AR(1)
FEI	-3.7376***	-1.8035**	0.0185***	0.0149***	-0.0070	-0.0065
	(0.644)	(0.775)	(0.004)	(0.005)	(0.005)	(0.006)
L.EQT	0.2024	-0.5374	-0.0002	0.0049	-0.0006	-0.0027
	(1.739)	(2.066)	(0.011)	(0.014)	(0.013)	(0.016)
L.NIA	0.7442	0.1266	-0.0046	-0.0036	0.0096**	0.0006
	(0.464)	(0.438)	(0.003)	(0.003)	(0.004)	(0.003)
L.CSF	-0.4894	-0.9540	0.0056	0.0090*	-0.0035	-0.0012
	(0.655)	(0.649)	(0.004)	(0.005)	(0.005)	(0.005)
L.COST	41.0656***	6.5890	0.0395	0.0615	0.0692	-0.0574
	(13.727)	(17.447)	(0.088)	(0.123)	(0.107)	(0.135)
_cons	2.6104***	-0.3211	-0.0045	0.0129	0.0067	0.0091
	(0.758)	(0.956)	(0.005)	(0.009)	(0.006)	(0.008)
N	272	195	273	196	273	196
R²	0.396		0.189		0.337	
F	6.4166	3.8144	3.1300	2.2374	6.9585	3.7145
p	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000

Note:
1. Robust standard errors in parentheses;
2. * significance level at 10% level, ** 5% level, and *** 1% level;
3. Year dummies are omitted to save space.

Table 12 Correlation matrix

	EQT	NIA	CSF	COST	FEI
EQT	1				
NIA	0.0476	1			
CSF	-0.2629	0.2303	1		
COST	0.1673	-0.0225	0.217	1	
FEI	-0.1828	-0.1164	-0.0423	-0.1586	1

Note: (Obs. = 515)

Table 13 Alternative methods to address endogeneity

	NIM			NII			COST		
		Instruments	Drop		Instruments	Drop		Instruments	Drop
FEI	-3.9255***	-3.7376***	-3.3558***	0.0144***	0.0185***	0.0190***	0.0110***	0.0066**	0.0115***
	(0.645)	(0.644)	(0.666)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)
EQT	1.1611			-0.0214**			0.0166*		
	(1.535)			(0.011)			(0.010)		
NIA	-0.3520			-0.0032			0.0013		
	(0.486)			(0.003)			(0.003)		
CSF	0.2082			-0.0119***			0.0059*		
	(0.764)			(0.004)			(0.003)		
COST	64.6572***			0.4684***					
	(17.211)			(0.068)					
L.EQT		0.2024			-0.0002			0.0143	
		(1.739)			(0.011)			(0.009)	
L.NIA		0.7442			-0.0046*			0.0018	
		(0.464)			(0.003)			(0.002)	
L.CSF		-0.4894			0.0056			0.0117***	
		(0.655)			(0.004)			(0.003)	
L.COST		41.0656***			0.0395				
		(13.727)			(0.083)				
_cons	1.9757**	2.6104***	2.9668***	0.0093**	-0.0045	0.0008	0.0063	-0.0003	0.0139***
	(0.872)	(0.758)	(0.197)	(0.004)	(0.005)	(0.001)	(0.004)	(0.004)	(0.001)
N	379	272	384	382	273	382	382	286	382
R²	0.369	0.396	0.286	0.269	0.189	0.117	0.364	0.336	0.351
F	7.8667	6.4166	8.9038	8.1065	3.9218	4.4503	13.8175	9.8329	18.1306
p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note:
1. The table compares results using two different ways to address endogeneity problem: use lagged values as instruments of the potential endogenous variables or drop them;
2. Robust standard errors in parentheses;
3. * significance level at 10% level, ** 5% level, and *** 1% level;

Table 14 Robustness test II: sub-samples without large banks (i.e. SOBs)

	NIM		NII		Cost		PFIT	
	Full sample	Sub-sample	Full sample	Sub-sample	Full sample	Sub-sample	Full sample	Sub-sample
FEI	-3.7376***	-3.5736***	0.0185***	0.0180***	0.0066**	0.0076**	-0.0070	-0.0080
	(0.644)	(0.674)	(0.004)	(0.004)	(0.003)	(0.003)	(0.005)	(0.005)
L.EQT	0.2024	-0.1144	-0.0002	0.0023	0.0143	0.0140	-0.0006	-0.0037
	(1.739)	(2.328)	(0.011)	(0.015)	(0.010)	(0.013)	(0.013)	(0.016)
L.NIA	0.7442	0.8782*	-0.0046	-0.0064*	0.0018	0.0019	0.0096**	0.0090**
	(0.464)	(0.490)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
L.CSF	-0.4894	-0.4602	0.0056	0.0049	0.0117***	0.0114***	-0.0035	-0.0035
	(0.655)	(0.665)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
L.COST	41.0656***	31.5805**	0.0395	0.0327			0.0692	-0.0459
	(13.727)	(14.655)	(0.088)	(0.092)			(0.107)	(0.104)
L.roaa								
_cons	2.6104***	2.4110***	-0.0045	-0.0003	-0.0003	0.0003	0.0067	0.0087
	(0.758)	(0.787)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
N	272	244	273	245	286	258	273	245
R^2	0.396	0.413	0.189	0.214	0.336	0.352	0.337	0.359
F	6.4166	6.3212	3.1300	3.4206	8.5657	8.5567	6.9585	7.0358
p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note:
1.   Robust standard errors in parentheses;
2.   * significance level at 10% level, ** 5% level, and *** 1% level;

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