Bank Ownership and Efficiency in China: What Will Happen in the World's Largest Nation?

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June 2006

Abstract

China's economy has been growing rapidly based on globalization of trade, but the country is only beginning to "globalize" its banking sector. China's current banking reform includes partially privatizing three of its dominant "Big Four" state-owned banks and taking on minority foreign ownership of these institutions. Other state-owned banks are also engaging in this practice. Predicting the efficiency effects of these and other reforms is difficult because of little relevant background research evidence. This paper helps to fill some of the gaps in the literature, analyzing the profit and cost efficiency of banks representing 95% of commercial banking assets in China over 1994-2003 with different majority and minority ownership structures. The key findings are that the Big Four state-owned banks are by far the least efficient, and that minority foreign ownership of other banks is associated with significantly improved efficiency. These and other findings suggest that minority foreign ownership of the Big Four and other reforms that allow foreign banks to play larger roles will likely improve the performance of the Chinese banking sector, with positive effects on economic growth.

JEL Classification Numbers: G21, G28, G34, F23
Keywords: China, Banks, Efficiency, Foreign ownership.

The opinions expressed do not necessarily reflect those of the Federal Reserve Board or its staff. The authors thank Adam Ashcraft, Lamont Black, Nicola Cetorelli, Christa Bouwman, Choa Chen, Tim Coelli, Astrid Dick, Anurag Gupta, Dirk Hackbarth, Bev Hirtle, Ed Kane, C.N.V. Krishnan, Subal Kumbhakar, Lubo Litov, Don Morgan, Ralitsa Petkova, Peter Ritchken, Joao Santos, Ajai Singh, Kevin Stiroh, James Vickery, Paul Wachtel, and audience participants at the Financial Management Association meetings, Case Western Reserve University, and the Federal Reserve Bank of New York for helpful suggestions.

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1. Introduction

China's economy has been growing about 10% per year in real terms over the last decade, and is projected by some to become the world's largest economy in the coming decades (e.g., Allen, Qian, and Qian 2005). The rapid growth of this developing economy may be largely linked to the globalization of trade, but it has yet to "globalize" its banking sector. Chinese banking is dominated by four very large state-owned banks – the "Big Four" – with about three-fourths of industry assets, and very few banks with majority foreign ownership. As well, its legal and financial systems are not well developed – even by the standards of most developing nations.

Research on bank efficiency in developing nations and on the finance-growth nexus strongly suggests that the observed high growth rates cannot continue indefinitely without significant reform of the banking system and the legal/financial infrastructure. The banking research suggests that state ownership is associated with low efficiency, restricted access to credit for small and medium enterprises (SMEs), and slow economic growth in developing nations. This literature also suggests that foreign bank ownership and relatively unrestricted foreign bank entry are associated with higher efficiency and SME credit availability in other developing nations.

The finance-growth nexus literature also consistently finds that economic growth in developing nations is highly positively related to efficient legal systems and better financial market development (e.g., King and Levine 1993, La Porta, Lopez-de-Silanes, Shleifer, and Vishny 1998, Djankov, La Porta, Lopez-de-Silanes, and Shleifer 2003, Beck, Demirguc-Kunt, and Maksimovic 2005, Jappelli, Pagano, and Bianco 2005). As well, recent banking research suggests that elements of the legal/financial infrastructure have important effects on the abilities of banks to use "hard" information lending technologies – such as loans based on financial statements, credit scores or easily-valued fixed assets pledged as collateral – to extend credit to SMEs (e.g., Qian and Strahan 2005, Berger and Udell 2006).

China has maintained high growth in spite of these problems in part because of the excess of funds available for investment. Very high savings rates and trade surpluses in recent years have yielded a surplus of funding that is currently used to invest in foreign securities (e.g., U.S. treasuries), as well as foreign direct investment (e.g., the Lenovo-IBM deal). Thus, efficient allocation of funding within China may not have been as necessary as in other funds-starved developing nations because there were more than enough funds available to invest in China. However, it seems unlikely that such large imbalances will persist and be sufficient to allow for poor credit allocation and high growth to continue indefinitely.

A recent study also suggests that most of the growth has been concentrated in what we might call the "private, unlisted sector" – firms that are not state-controlled or publicly listed. Using survey information on Chinese entrepreneurs and executives, the study also finds that that firms in this sector accessed funding through alternative financing channels and governance mechanisms, including those based on "soft" information from reputations and relationships (Allen, Qian, and Qian 2005). It also seems unlikely that high growth for the Chinese economy can persist indefinitely based in substantial part on alternative funding means for just this one sector of the economy. While a withering of the state-controlled sector may not harm long-term economic growth, the listed sector will likely need to grow significantly using standard "hard" information funding methods (e.g., public debt and equity offerings, bank loans based on collateral) in the long run.

Another recent analysis of China suggests that an inefficient banking sector and poor legal/financial infrastructure may already be restraining growth and development. The research finds that access to external finance in the form of bank loans is important to reinvestment of profits by Chinese firms (Cull and Xu 2005). The authors also find that key elements of the legal/financial infrastructure – contract enforcement, private ownership, and expropriation risk – are additional important determinants of reinvestment. Such profit reinvestment may grow in importance for capital deepening when surplus funds are less available.

Recent news suggests that significant reform of the banking system is occurring that may have considerable effects on bank efficiency, and may presage further reforms. During 2005, three of the Big Four state-owned banks announced plans to partially privatize and take on minority foreign ownership. In late August of 2005, Bank of America and Temasek (Singapore) finalized agreements to buy approximately 9% and 5% stakes in China Construction Bank (CCB), with further purchases planned after the IPO (Wall Street Journal (Eastern edition), Oct 20, 2005. p. 1). In August and December of 2005, Royal Bank of Scotland-led consortium and Temasek reached agreements to purchase 10% and 5% of the shares in Bank of China (BOC) (Financial Times (London Edition 1), February 17, 2006, p. 25; Wall Street Journal (Eastern edition), Dec 27, 2005. p. A.12). In August 2005, a group of foreign investors including Goldman Sachs, American Express, and Allianz signed a preliminary agreement to purchase approximately 10% of Industrial & Commercial Bank of China (ICBC), and the final agreement was signed in January 2006 (Wall Street Journal (Eastern edition), Dec 23, 2005. p. C.4; Wall Street Journal, Jan 27, 2006, p. C4).

While the Chinese banks are opening their ownership to foreigners as minority owners, they are also taking initiatives to offer their shares to both domestic and foreign market participants. This can be evidenced by

the on-going initial public offerings by some of the Chinese banks. In fact, CCB raised US $9.2 billion in October 2005, and BOC listed its IPOs in Hong Kong on June 1, 2006, raising US $9.7 billion (may increase to US $11.2 billion when underwriter options are exercised). Among BOC's cornerstone investors, Bank of Tokyo-Mitsubishi UFJ, Ping An Insurance (Group), and Li Ka-Shing's Cheung Kong (Holdings) and Hutchison Whampoa have each agreed to invest US $180 million but will not be permitted to sell the shares for a year. Temasek Holdings has agreed to buy an additional US $500 million of shares, in addition to its 5% stake (Wall Street Journal (Eastern edition), June 6, 2006. pg. C.4; May 10, 2006. pg. C.12), while ICBC plans to sell shares later in 2006 or 2007. The fourth Big Four bank, China Agriculture Bank, is restructuring its bad loans so it may attract foreign investors and market participants in the future. Note that the initial minority foreign ownership and the later IPOs may be related in the sense that the initial foreign stakes may send a positive endorsement signal to the capital market about the potential growth and performance and thus increase the values for the share in the IPO market.

Unfortunately, the extant research is missing some analyses that are needed to address the likely future efficiency effects of these changes and other potential reductions in state bank ownership and increases in foreign bank ownership in China. First, there is very little research evidence on Chinese bank efficiency. The few studies have mixed or contradictory results on the relative efficiency of the Big Four banks and on the effects of prior regulatory reforms. As well, none to our knowledge have used the comprehensive concept of profit efficiency nor have they addressed issues of foreign ownership, making it difficult to extrapolate to the likely effects of partial privatization and minority foreign ownership of the Big Four.

Second, we are unaware of prior research using data from any nation on the effects of minority foreign ownership of banks. We know only of prior studies of majority foreign ownership in other nations. While results on majority foreign ownership may be extrapolated to draw inferences about minority foreign ownership, it remains unclear whether minority foreign owners are able to significantly affect the performance of institutions that are majority controlled by the government or local private investors.

Third, relatively little background information on the Chinese banking industry is widely known. Much less information is disseminated in the research literature about institutional history and regulation of the Chinese banking system than is available about banks in other developing nations in Asia, Latin America, and Eastern Europe. Knowledge of how the economic environment in China differs from these nations and the effects of prior reforms in China may provide insight on the likely effects of future reforms.

The main goals of this paper are to help fill these gaps in the research literature. First, we analyze the profit and cost efficiency of banks operating in China using 266 annual observations over 1994-2003, covering 94% of total banking assets. We compare the efficiency of the Big Four banks, Non-Big Four state-owned banks, private domestic banks, and foreign banks. The data are from a number of sources, including Bankscope and Almanac of China's Finance and Banking.

Second, we examine the efficiency effects of minority foreign ownership of Chinese banks. Some of the Non-Big Four state-owned banks and some of the private domestic banks have minority foreign ownership. It seems reasonable to assume that if minority foreign ownership has strong effects on the efficiency of both of these types of institutions, it is likely to have qualitatively similar effects on the Big Four banks.

Third, we provide comprehensive background information on the history, regulation, and market environment for the Chinese banking industry. It has undergone a number of changes over the last several decades, including regulatory reforms in the 1980s and 1990s, introduction of competition from foreign entry in the 1990s, and substantial reform following China's World Trade Organization (WTO) entry in 2001.

As a preview, our results suggest strong favorable efficiency effects from reforms that reduce the state ownership of banks in China and increase the role of foreign ownership. In terms of majority ownership, foreign banks are the most profit efficient, followed by private domestic banks. State-owned institutions – particularly the Big Four – are least efficient. These results are consistent with research on other developing nations. The findings for banks with majority foreign ownership must be viewed with caution, however, as we are able to include only a small number of these banks with permission to take deposits/make loans in the local currency.

The cost efficiency findings present the anomaly that state-owned institutions have relatively high measured cost efficiency. This may be due in part to "skimping" on underwriting and monitoring loans. This behavior may save costs with reduced expenditures on lending due diligence the short-term, but it yields high nonperforming loans and poor loan revenues. Further investigation is consistent with "skimping," as state-owned banks have much higher rates of nonperforming loans and lower loan revenues than other institutions. Profit efficiency includes loan revenues and so nets out some of the effects of "skimping."

Our main empirical focus is on the effects of minority foreign ownership. The results suggest that such ownership increases the efficiency of both the state-owned banks and the private domestic banks that have such ownership. This finding holds for both profit and cost efficiencies. We also conduct a check of the data that suggests that our findings of beneficial effects of minority foreign ownership generally reflect improvements in

performance after the foreign investment, rather than just a selection effect in which foreigners purchase shares in relatively efficient banks.

The findings of benefits from minority foreign ownership are consistent with anecdotal evidence from the Chinese press and bank annual reports. Foreign investors tend to acquire one or two board seats on Chinese banks and are able to use their positions to press for positive results and changes in corporate culture. The findings are also consistent with research on corporate governance in developed nations on the roles of large, minority shareholders (e.g., Shleifer and Vishny 1986), and with results on partial privatization of state-owned nonfinancial companies in India (Gupta 2005).

Section 2 reviews some of the research literature on bank ownership type and efficiency in developing nations. Section 3 gives background information on the Chinese banking industry and its market environment. Section 4 shows our data on the Chinese banks and outlines our empirical methodology. Section 5 displays our empirical results and Section 6 concludes.

2. Literature on bank ownership type and efficiency

In recent years, a large number of studies have examined the efficiency effects of bank ownership type – whether an institution is state-owned, private domestic, or foreign – with very significant differences found among these types. The literature compares the performance of operations within a single nation, in effect, comparing foreign, state-owned, and private domestic institutions against the best-practice frontier for banks operating in the same host nation.[1] Here, we highlight some of the findings of this research, focusing on results for developing nations, which may give more insights into the likely effects in China than those for the developed nations. We also briefly discuss the limited evidence related to minority foreign ownership of banks in other nations and the few studies on bank efficiency in China.

2.1. Evidence on bank efficiency in developing nations

Foreign banks, state-owned banks, and private domestic banks have a number of efficiency advantages and disadvantages relative to one another, and the measured efficiency of each ownership type reflects the net effects of these comparative advantages/disadvantages. Foreign banks headquartered in developed nations have generally superior managerial expertise/experience, access to capital, use of hard-information technologies, and

[1] Although some studies compare the efficiencies of bank operations across different nations, such results are unreliable in our view because the economic environments in which the banks in different nations compete are simply too different.

ability to diversify risk in most developing host nations, where domestic institutions have not acquired comparable skills. However, foreign banks also generally suffer from disadvantages due to distance-related diseconomies, language and cultural differences, and poor ability to access and process locally-based soft information. State-owned institutions may have funding advantages due to government subsidies, but also often have disadvantages because of mandates to make certain types of loans. State-owned banks may also be inefficient due to a lack of market discipline.

The most common findings for developing nations are that on average, foreign banks are more efficient than or approximately equally efficient to private domestic banks. Both of these groups are typically found to be significantly more efficient on average than state-owned banks, but there are variations on all of these findings. To illustrate, some research using data from the transition nations of Eastern Europe finds foreign banks to be the most efficient on average, followed by private domestic banks, and then state-owned banks (Bonin, Hasan, and Wachtel 2005a,b). However, another study of transition nations finds the mixed result that foreign banks are more cost efficient, but less profit efficient than both private domestic and state-owned banks (Yildirim and Philippatos 2003). A study using 28 developing nations from various regions finds foreign banks to have the highest profit efficiency, followed by private domestic banks, and then state-owned banks (Berger, Hasan, and Klapper 2004). For cost efficiency, the private domestic banks rank higher than the foreign banks, but both are still much more efficient than state-owned banks. Two studies using Argentine data (prior to the crisis in 2002) find roughly equal efficiency for foreign and private domestic banks, and that both are more efficient on average than state-owned banks (Delfino 2003, Berger, Clarke, Cull, Klapper, and Udell 2005). A study employing Pakistani information finds foreign banks are more profit efficient than private domestic banks and state-owned banks, but all of these groups have similar average cost efficiency (Bonaccorsi di Patti and Hardy 2005). Finally, a study of banks in India finds that foreign banks are more efficient on average than private domestic banks (Bhattacharya, Lovell, and Sahay 1997). This study also finds the unusual result that state-owned banks are relatively efficient. The reason is not known, but it may be due to accounting practices, cross-subsidies from other government agencies, or relatively low-cost accounts by other government-owned firms.

2.2. Evidence related to minority foreign ownership of banks

Although we are unaware of any prior research measuring the efficiency effects of minority foreign ownership of banks, there is some evidence that suggests why it may increase efficiency, and that it has worked in China. Anecdotal evidence suggests that even when foreign investors have only one or two board seats on

Chinese banks, corporate governance and risk management improves significantly. The foreign board members/owners also appear to have convinced senior managers to be more aware of shareholders' interests and to use more modern management techniques. In at least one instance, foreigners have taken over senior positions on the board and in management. In some cases, the Chinese banks with minority foreign ownership are also able to send employees to the foreign bank's headquarters for advanced training (Ling and Lu 2004, Wall Street Journal 2004, Lin 2005, Liu 2005).

The finding that minority foreign owners have superior skills to transfer to Chinese banks is consistent with the findings above that majority foreign banks are generally much more efficient than state-owned banks and either more efficient than or equally efficient to private domestic banks in developing nations. These net comparative advantages may be even larger in China, given that the banking sector has been so tightly regulated until recently.

It is not as clear why the senior management agrees to implement the reforms suggested by the minority foreign ownership, particularly for the majority state-owned banks that may have very different objectives from maximizing shareholder value. Nonetheless, some research on other nations suggests why minority ownership can result can result in benefits, although the research does not differentiate minority foreign ownership from other private minority owners.

Research on corporate governance of nonfinancial corporations in developed nations suggests that large, minority shareholders such as institutional investors and individual block shareholders may improve monitoring of managers and mitigate free-rider problems (e.g., Shleifer and Vishny 1986, McConnell and Servaes 1995, Agrawal and Knoeber 1996). A study that tests these governance effects on the bank efficiency using U.S. data in some cases finds positive effects of institutional holdings (Berger and Bonaccorsi di Patti 2006). Finally, a study of partial privatization in India is consistent with favorable effects of minority private ownership of majority state-owned nonfinancial companies (Gupta 2005). The author finds that allowing non-controlling shares of state-owned enterprises to be held privately has positive effects on profitability, productivity, and investment.

2.3. Evidence on bank efficiency in China

Some of the bank research literature on China compares bank performance using ratio analysis (e.g., Li, Liu, Liu, and Whitmore 2001). Ratio analyses do not control for individual bank outputs, input prices, or other exogenous factors facing banks in the way that studies using modern efficiency methodology does, and so may

give misleading results. To illustrate, a cost-efficient bank may have relatively high cost ratios because it is producing a high-cost output bundle (e.g., more loans, fewer liquid assets) or faces high input prices, and so may be incorrectly identified as a poor performer.

Some studies also describe Chinese bank reform and its consequences (e.g., Shiria 2001). Examples include examinations of the determinants and timing of foreign bank entry into China and time for foreign branches in Shanghai to make a profitable return (e.g., Leung 1997, Leung, Young, and Rigby 2003a,b). The effects of the current reform in which the large state-owned banks are taking on minority foreign ownership has not been analyzed to our knowledge.

There have been a few recent studies of Chinese bank efficiency and reform with mixed or contradictory results. To our knowledge, none have used the comprehensive concept of profit efficiency that appears make an important difference in our empirical results below and nor have they addressed issues of foreign ownership. One study compares the cost efficiency of Big Four banks and two size classes of smaller banks that are majority state-owned, but have shares outstanding, called joint-equity banks. The study finds that the Big Four and smaller joint-equity banks are both cost efficient relative to the medium-sized joint-equity banks (Chen, Skully, and Brown 2005). However, a recent working paper using an input distance function approach finds contrary results. Kumbhakar and Wang (2005) find that the Big Four are less efficient than the joint-equity banks. The two studies also appear to have contradictory implications regarding the effects of deregulation. Chen, Skully, and Brown (2005) find that the financial deregulation of the mid-1990s had strong positive efficiency effects, whereas Kumbhakar and Wang (2005) find that deregulation did not result in significant efficiency improvement. Some articles in Chinese also find contradictory results (Huang 1998, Wei and Wang 2000, Yao, Feng, and Jiang 2004).

Our empirical application is quite different in that we show a very different outcome for the Big Four state-owned banks when use the more comprehensive concept of profit efficiency, which embodies revenues and loan performance, rather than just costs or inputs. More important, we study the effects of the current, potentially most important reforms that allow for foreign bank ownership, particularly minority foreign ownership of Chinese banks. Foreign bank ownership has not been previously addressed to our knowledge.

3. Background on the Chinese banking industry

We review the institutional history, regulation, and economic environment of the Chinese banking

system. This system has undergone – and continues to undergo – significant changes due to policy shifts prior to the 1990s, during the 1990s until WTO entry in 2001, and since WTO entry.

3.1. Pre-1990s banking environment

The Chinese socialist banking system was established in the late 1940s following the system in the former Soviet Union. The central bank, People's Bank of China (PBOC) was founded in 1948 through consolidation of the former Huabei Bank, the Beihai Bank and the Xibei Peasant Bank. PBOC was stripped of many of its central bank functions during the Cultural Revolution (1966-1976), but later regained responsibility for currency issue and monetary control. Before 1978, the Chinese system followed a mono-bank model, where PBOC combined the roles of central and commercial banking. The banks – which were either taken over/restructured into the PBOC system or under administration by PBOC or the Ministry of Finance – were just part of the hierarchy to ensure that national production plans would be fulfilled, with no incentives to compete with one another.

Under reforms begun in 1978, the banking system expanded by establishing several large state-owned commercial banks, and splitting the Big Four state-owned banks and the lending functions from the PBOC. The Big Four are Bank of China (BOC, established 1912), China Construction Bank (CCB, 1954), Agricultural Bank of China (ABC, 1979), and Industrial and Commercial Bank of China (ICBC, 1984). These banks were initially limited to only serve their designated sector of the economy (i.e., foreign trade and exchange, construction, agriculture, industrial and commercial), but starting in 1985, the Big Four were allowed to compete in loan and deposit services in all sectors. Nonetheless, competition among them was very limited until the mid-1990s, because they served mainly as policy-lending "conduits" for the government, and lacked incentives to compete.

Also in the mid-1980s, the nature of centrally planned financial resources allocation was revised, and the local governments could decide their own resource allocation via domestic loans and self-raised funds, nurturing a revitalization process of banking (Li 1994, Yi 1994). Although policy lending blocked competition among state-owned banks, the entry of new banks created a new source of competition in the industry.

3.2. The 1990s until WTO entry in December 2001

The asset quality of the state-owned banks deteriorated significantly during the 1990s, as the state-owned banks made most of their loans to state-owned enterprises (SOEs), which had little incentive to repay. To ameliorate this problem, the government established three policy banks in 1994 to take over the policy-lending activities from the state-owned banks and the Ministry of Finance issued 270 billion RMB or yuan (US $32.6

billion) of 30-year government special bonds to recapitalize the Big Four banks in 1998. In 1999, 1.4 trillion RMB of nonperforming loans (NPLs) of the Big Four (roughly 20% of their total loans) were bought at face value by four state-owned asset management companies.

Although the asset quality of the Chinese banks has been a serious concern, there is no explicit deposit insurance mechanism in the country. Instead, there is the implicit deposit insurance in the sense that the Chinese government has almost always stepped in to either help the banks who were in financial difficulties to write-off their bad loans, or paid off the outstanding debts in case of bank failures. A few examples are the Hainan Development Bank (HDB) and some small urban or rural credit cooperatives that went bankruptcy and had to be closed, but in all cases, the central government assumed the responsibilities of paying out outstanding debts. However, things began to change in 1999, when Guangdong International Trust and Investment Corporation (GITIC) was closed due to inability to payout outstanding debt with amount exceeding US $5 billion. The central government did not assume the main repayment responsibilities as creditors expected, and finally, the debt-holders collected an average of 12.54% back from their original investment. Even though the explicit deposit insurance system has not yet been established, and the legal framework of bankruptcy of commercial banks or other financial institutions is still, to large extent, incomplete, there are signs that the Chinese regulators are making efforts towards this issue, for example, a brand new "Deposit Insurance Office" has been established within the Financial Stability Bureau of PBOC in 2005 (Workers' Daily, Nov 3, 2005). Moreover, it is reported that the China Banking Regulatory Commission is working on plans to introduce a system like the U.S. Federal Deposit Insurance Corporation (Wall Street Journal (Eastern edition), May 9, 2006. pg. A.4)

Two major legislative reforms occurred in 1995. The 1995 Central Bank Law of China confirmed PBOC as the central bank and substantially reduced the influence of local governments on credit allocation decisions. The 1995 Commercial Bank Law of China officially termed the major state-owned banks as "commercial banks," and directed them more towards commercial business based on market principles instead of policy lending.

New banks also entered the market in the mid-1990s. China Minsheng Banking Corporation was founded in 1996 and is almost solely owned by private institutional shareholders, making it the largest private bank in China. By the end of 1999, there were 12 national shareholding commercial banks, with total assets of 1,447.7 billion RMB (PBOC 2000). The central government also allowed local governments to establish local banks in the mid-1990s by consolidating local rural and urban cooperatives. They take the form of shareholding banks and are named as city cooperative banks, with their business restricted to their localities. By the end of

1999, 90 such banks were operating in China, with total assets of 554.7 billion RMB (PBOC 2000).

The Chinese government has been very conservative in allowing foreign bank entry. Foreign banks were allowed to open representative offices in 1979, and have been allowed to open operational branches in Special Economic Zones since 1982 (e.g., Hong Kong banks operating in nearby Shenzhen). This geographical restriction was somewhat relaxed in 1994 – they were allowed to operate in 23 cities based on individual applications.

Foreign banks were first permitted to make deposits and loans in local currency (RMB or yuan) in the Shanghai Pudong New Zone in 1996 (and later in Shenzhen Special Economic Zone) on individual application basis. In 1998, PBOC permitted eight foreign licensee banks to obtain local currency funding in 1998. In 1999, foreign banks were further allowed to conduct local currency business in neighboring regions. By the end of 1999, 25 foreign banks had permission to conduct local currency business, with totals of 21,813 million RMB in assets, 11,341 million RMB in loans, and 15,100 million RMB in deposits. Total assets of all foreign banks in China reached US $32,844 million (nearly 272 billion RMB) by 1999.

Regulatory permission for foreign investors to hold minority stakes in domestic banks was forthcoming more slowly. The first case was in 1996, when Asian Development Bank (ADB) bought a 1.9% stake in China Everbright Bank (a national shareholding commercial bank, majority state-owned).[2] This was followed by the purchase of 5% stake in Bank of Shanghai (a municipal commercial bank, 30% stake held by Shanghai municipal government) by International Finance Corporation (IFC) in 1998, the purchase of a 15% stake of Nanjing City Commercial Bank (a majority state-owned city commercial bank) by ADB in 2001, and acquisition of an 8% stake in Bank of Shanghai by HSBC Holdings PLC. Total equity investment by foreigners in the domestic banks through 2001 was minimal due to stringent license granting policies and regulations, and most of the investors were non-profit international organizations.

Other important reforms in the 1990s include: 1) the 1995 Commercial Banking Law strictly prohibits commercial bank involvement in nontraditional banking activities like insurance and securities (similar to Glass-Steagall); 2) in 1998, PBOC further reduced local government influence on bank lending activities by replacing its 30 provincial branches with 9 cross-province regional branches; 3) increased flexibility for commercial banks

[2] A 21.39% stake of CEB has been held by China Everbright Limited (CEL) which was listed in HK stock exchange from 1973, and CEL's controlling shareholder is China Everbright Group (CEG) who holds 55.8% of CEL's total shares, acquired in 1994. CEG is a state-owned financial group under direct administration of the State Council.

to adjust interest rates; and 4) PBOC made recommendations to improve bank risk controls, specifically to follow the Basel requirements in classifying the loans into different risk-adjusted categories in order to meet the comprehensive banking supervision requirement outlined in "Basel Core Principles for effective supervision."

In order to facilitate and promote the overall reforms of SOEs, the authorities permitted two stock exchanges to be established in early 1990s, namely, the Shanghai Stock Exchange in 1990, and the Shenzhen Stock Exchange in 1991. Since then, the equity issuance has been a popular financing method for the Chinese firms. In the 1990s, the listing decisions largely have been retained in the hand of the central government, who always give the priority to favored SOEs in preferred industries and there exists, an underground but sore conflict of interests of different parties and institutions (e.g., local government vs. central government); a likely and popular practice of collusion between issuing firms and investment banks on firm performance, lack of independence of auditors and other financial intermediaries. It was not until after year 2000 when the central regulator introduced a series of new regulations and rules that are carried out to regain the confidence from investors and to improve the transparency and fairness in the market. By the end of 2003, total capitalization of listed firms has reached 42.46 trillion RMB (about 36% of GDP of 2003), and within which, capitalization of tradable shares has reached 13.18 trillion RMB (about 11% of GDP of 2003). Growth is also evidenced in the bond market since its start in 1986 (Chen, 2005).

Turning our attention to the issue of bank taxes, historically, every enterprise had to negotiate a contract every year with the government on their tax burden (the "contractual approach"), rather than following any explicit uniform tax laws or regulations (Xu and Zhang, 1995). The first reform came in 1994 and a further change was enacted in 1997 under which all domestic banks were subject to a uniform 33% tax rate with the exception of rural credit cooperatives subject to 18% to 27% depending upon the earned revenue. Foreign banks have been subject to a relatively lower tax burden, due to the different tax-exempt incentives available to all foreign companies, especially since 1991.

3.3. The environment after WTO entry in December 2001

Since China gained entry into the WTO, a new set of rules began to take effect. According to the promised agenda, we can expect more liberalization of interest rates, more fair treatment of tax rates among players, less restrictions on ownership takeovers and M&As, greater freedom of operational and geographical scope, etc. As one example, under the pledge of the WTO agreement, from December 2006, China will grant permission to foreign banks to take deposits and make retail loans in the local currency (RMB). Currently, the

foreign banks can only provide financial services in RMB for enterprises in the designated 25 cities in mainland of China, while their foreign currency businesses are much less restricted.

One attempt of the government to achieve better monitoring of the banking industry is the creation of China Banking Regulatory Commission (CBRC) in 2003 to oversee reforms and regulations. Other banking laws were subsequently issued, including revisions of the 1995 Central Bank Law and 1995 Commercial Bank Law. Also in 2003, the State Council initiated the "pilot state-owned bank-overhaul program," granting US $45 billion to BOC and CCB to increase capital, instead of writing off bad loans. New systems of external and internal monitoring of asset quality were also implemented.

Foreign investment in domestic banks intensified in 2003, when CBRC updated guidelines to encourage foreign share purchases. Under the year 2003 rules, foreigners can own up to 25% of any domestic bank, with any one investor allowed between 5% and 20%, subject to regulatory approval.[3] In February 2006, these limits of foreign investments were reaffirmed by the China Banking Regulatory Commission (CBRC). The commission issued a new set of rules stating that these limits are applicable to newly-established joint venture banks, city commercial banks, and urban credit cooperatives, though it was not mentioned whether these rules are applicable to newly-established state-owned banks (Wall Street Journal, Chinese online version, Feb 24, 2006).[4] Examples of strategic foreign investments post-WTO includes Citigroup's purchase of about 5% of Shanghai Pudong Development Bank (a Shanghai-based commercial bank, about 40% state-owned) in January

[3] These restrictions apply if the bank is to retain the status of "domestic" bank. Otherwise, if foreign investors' shares are 25% or more, the bank is defined as a joint venture or foreign bank. Mingkang Liu, President of China Banking Regulatory Commission (CBRC), remarked that the 25% restriction does not apply to banks that go public (Xinhua Daily Telegraph, December 6, 2005, p. 6).

[4] In 2004, the CBRC required that foreign investors are qualified only if they meet the following four principles: "long-term equity-holdings, optimizing corporate governance, business cooperation, competition-avoidance". Later in 2005, these four principles are amplified to a more detailed specification by CBRC, i.e., no less than 3 years of equity holding, board member appointment, technology and network support, and investing in no more than two Chinese banks with similar business, etc. (Zhuo, 2005). Moreover, CBRC requires that in order to become 'qualified' foreign strategic investor in a new shareholding commercial bank, the foreign investors must have: (1) a minimum assets of $10 billion; Good standing on its long-term credit rating by international credit rating agencies; positive profits on the last two accounting calendar years; and is committed to the principles of "long-term equity-holdings, optimizing corporate governance, business cooperation, competition-avoidance"; and finally conforming to the 20% limit for any single foreign investor and 25% limit for multiple foreign investors in any Chinese banks.

2003,[5] and a consortium including Hang Seng Bank Ltd., IFC, took a 24.98% stake in Industrial Bank (a southern Fujian Province-based bank, 34% held by Fujian Provincial Bureau of Finance) in December 2003. In 2004, Newbridge Capital Ltd. (a U.S. investor group) bought about 18% of Shenzhen Development Bank Co. (a national Shenzhen-based listed bank) on the condition that Newbridge does not sell or transfer the shares to any third party, the first time that foreign investors became the largest and controlling shareholder of a national domestic bank. In August 2004, Hong Kong & Shanghai Banking Corp. (a unit of HSBC Holding PLC.) also finalized its transaction to purchase a 19.9% stake of Bank of Communications (the fifth-largest bank in China, 23.76% owned by Ministry of Finance of China) US $1.75 billion, and it secured the right to double this share when regulations allow. However, after the investment, the Ministry of Finance increased its shares so that it remains the largest shareholder, potentially a sign that that the Chinese government remains cautious about foreign investment in domestic banks. More recently, Deutsche Bank AG-led group has agreed to buy 14% stake of Hua Xia Bank, another big national majority state-owned commercial bank. On Dec 31, 2005, the first Chinese bank born with foreign minority stake (from the Standard Chartered, which bought 19.99% of the shares), China Bohai Bank, was established, and it is also the only national shareholding commercial bank that established after 1997 (Wall Street Journal, Chinese online version, Feb 24, 2006).

The partial privatization has now spread to three of the Big Four banks, as they reached agreements to take on minority foreign ownership. On June 17, 2005, Bank of America reached a deal to buy a 9% stake in one of the Big Four, China Construction Bank (CCB), and committed to invest a further US $500 million to maintain its ownership level when the IPO occurred. This is the first foreign equity investment in one of the Big Four (Wall Street Journal, June 17, 2005, p. A.3). Bank of America also has a nonexclusive, 5 1/2-year option to increase its stake to 19.9% at the price of shares in the IPO (Wall Street Journal, Jan. 25, 2006, p. A11). In addition, Bank of America has a seven-year strategic alliance with CCB that involves committing the equivalent of 50 Bank of America employees' time to work at the Chinese bank. Also, Bank of America has one seat on a 15-person board, and the two sides have agreed to discuss a potential credit-card joint venture in China. As part of this, Bank of America agreed to withdraw from retail banking in China, though it retains its corporate and commercial-banking presence (Wall Street Journal, Eastern Edition, Feb 23, 2006, p. C1). Also in June 2005,

[5] In February 2006, Citibank was required by Shanghai Pudong Development Bank (SPDB) to transfer 16.2 million shares without compensation to those minority tradable-shareholders, as part of a broader shareholding-overhaul program in China's stock market. After the transfer, Citibank's stake in SPDB will drop to 4.203% from the 4.617% it bought in 2003 for about 556 million RMB, or about US $69 million.

CCB signed a deal with Temasek in which the Singapore investment firm would pay US $1.5 billion for a 5.1% stake and then invest a further US $1 billion in shares when the bank goes public. (International Herald Tribune, Sept. 21, 2005). Although these two blockbuster deals represent a combined US $5.4 billion investment, the investors paid less than 1.2 times book value,[6] while CCB's IPO fetched 1.95 times book value just months later (Wall Street Journal, January 25, 2006, p. A.11).

In September 2005, Royal Bank of Scotland and Temasek each agreed to buy 10% stakes in Bank of China (BOC, second-largest of the Big Four) (International Herald Tribune, September 21, 2005). Later however, Temasek Holdings cut its stake to 5%, following a backlash in China against the sale of shares in its large state banks to foreigners (Financial Times, Feb 17, 2006, p. 25). In both the CCB and BOC cases, the foreign strategic investors have also been required to lock up their shares for three years (Wall Street Journal, Jan 25, 2006, p. A11). However, more recently, it emerged that Merril Lynch, which is part of the RBS consortium, had sold part of its 2.5% stake in BOC to two US hedge funds, Los Angeles-based Oaktree Capital Management and New York-based Och-Ziff Capital Management. The presence of the two hedge funds has been sharply criticized in China (Financial Times, Feb 17, 2006, p. 25).

In January 2006, Goldman Sachs Group Inc., Allianz AG, and American Express Co. signed an agreement to buy a total 10% stake of Industrial and Commercial Bank of China (ICBC) for $3.78 billion, which is 1.22 times 2005 book value.[7] Furthermore, Goldman Sachs plans to provide staff training, risk-management assistance and guidance on internal control and corporate governance (Wall Street Journal, Jan 27, 2006, p. C4).

By June 2006, nine city commercial banks had also reached agreement with foreign investors.[8] In the past two years, foreigners -- including financial investors with no plans to do any banking in China, such as Singapore's Temasek Holdings Pte. Ltd. and New York hedge fund Och-Ziff -- have invested more than $20 billion into the Chinese banking sector (Wall Street Journal, Eastern Edition, Feb 23, 2006, p. C1). Two reasons, i.e., low prices of the shares and high potential of growth in the economy, might explain why foreign bankers are attempted to buy into Chinese banks. More long-term motives for the foreign investors might include getting

[6] Bank of America paid 1.15 times 2004 book value for its 9% stake, and Temasek paid 1.19 times 2004 book value for its 4.49% stake.

[7] The parties signed a preliminary pact in August 2005.

[8] These nine city commercial banks are (in sequence of the date of agreement): Bank of Shanghai, Nanjing City Commercial Bank, Bank of Beijing, Xi'an City Commercial Bank, Jinan City Commercial Bank, Wenzhou City Commercial Bank, and Nanyun City Commercial Bank, Hangzhou City Commercial Bank, and Ningbo City Commercial Bank

access of the huge client base, and an inside view of banking in the world's fourth-biggest economy. More importantly, the Chinese government is also expecting the expertise of foreign financial institutions to improve the Chinese banks' risk management, products development and stricter oversight and monitoring. In the latest regulations issued by CBRC in February 2006, all newly-established shareholding commercial banks are required to have at least one foreign investor, while any form of ownership from local government is explicitly forbidden (Oriental Morning Post, online, Feb 22, 2006). While it is apparent that the Chinese authority will not allow the foreigners to become the controlling shareholders of any of the Big Four, there are signs that the foreign investment limits will continue to be relaxed in the near future.

In sum, it is obvious that the Chinese government believes that strategic foreign investors can bring substantial improvements for the Chinese banks with respect to their corporate governance, technology advancement, risk management. The document, "Chinese Banking Sector's Reform and Opening, and New Progress of Regulations," issued by Chinese Banking Regulation Commission (CBRC) on Dec 5, 2005 further details that one of the major disadvantages or problems associated with state ownership in the banking sector is that the lack of incentives in monitoring state banks create "black holes" especially with regards to corporate governance. CBRC's perspective here could be that despite an imitation of investment by foreign entities, it still likely that such association will improve Chinese banks' performance from increased incentive of monitoring by outside owners as well as by the exposure to new ideas, modern technology transfer, and other advanced banking skills. Additionally, the foreign investment in equity holdings of these Chinese banks, especially the associated foreign buyers' commitment of better human capital, increased monitoring and technology transfer has strongly reinforced the credit worthiness of these banks as evidenced by the recent upgrade of credit ratings by international credit rating agencies, such as S&P (Li 2005).[9]

Recently, CBRC examined the changes of the Chinese banks which introduced foreign investors and found that the foreign strategic investors have been playing an active and positive role in improving the Chinese banks' corporate governance, cost control, operation technologies, and growth sustainability. For example, HSBC appointed one senior manager and two board members in Bank of Communications, Citibank appointed one board member to Shanghai Pudong Development Bank, Newbridge appointed the director of board and CEO of Shenzhen Development Bank, Standard Chartered appointed three board members to Bohai Bank, which is

[9] These seven Chinese banks are: the Big Four, Bank of Communications, China CITIC Group, Guangdong Development Bank.

established in Dec 2005. Additionally, the foreign investors have reached various agreements the Chinese banks on their cooperation in corporate governance, risk management, internal auditing and control, organizational design, marketing, client management, product development (e.g., credit card, personal finance, consumer credit), IT investment and design, etc. For example, by introducing foreign investors, China Construction Bank quickly reconstructed its operation streamline and established a new career fulfillment system which gauge the employees' performance based on the improved EVA (economic value added) model, rather than other criteria such as growth of loans and market share which was aiming at scale growth regardless of the quality of the assets. Similarly, Bank of Communications also experienced noticeable progress in its financial ratios and profits after it introduced the foreign investors, whereas Shenzhen Development Bank has quickly switched from losing businesses to enhanced cost and risk control and improved operation performance.

Thus, the anecdotal evidence of the recent past – plus the longer history of banking reform in China and other developing nations – strongly suggests positive outcomes from reform, particularly the minority foreign ownership of state-owned banks. While the effects on the Big Four cannot yet be measured, the extant data on minority foreign ownership in China should confirm or deny whether this ownership form can actually "deliver the goods" in terms of improving bank performance. As discussed earlier, more efficient allocation of resources by the Chinese banking system will likely be needed to help maintain the growth of this burgeoning economy.

4. Data and methodology

4.1. Sample and definition of majority ownership

Our sample is an unbalanced panel which includes financials and ownership data of 38 Chinese banks during the period of 1994 to 2003, totaling 266 observations. The basic data source is Bankscope - Fitch's International Bank Database. Whenever Bankscope doesn't provide enough information or has questionable values, we collect or double-check the data from other official sources as best as we can, such as annual issues of Almanac of China's Finance and Banking, 1994-2004; annual Issues of China Statistical Yearbook, 1994-2004. We also use annual reports provided by individual banks via their websites, and newspaper releases on the performance and financial information of the banks in tracing missing or unavailable data points, in some cases. Most of the sample banks follow Chinese Accounting Standards (CAS) while a few follow International Accounting Standards (IAS). The banks following IAS standards are primarily the joint venture banks, foreign banks, and banks listed in the stock market. While there are some differences between the CAS and IAS

however, it should be mentioned that the CAS was developed only in recent years following the principles of IAS. While we recognize that there may be some inconsistencies in financial data using different accounting standards, we, however, didn't capture a material difference between the financial statements of the same bank while reporting under both CAS and IAS respectively. Among the 38 Chinese banks, we have full information on the Big Four state-owned banks, which have more than 72% of the total market share in Chinese banking industry in 2003. Among the 11 national shareholding commercial banks – known as the "second-tier" domestic banks which own almost 19% of banking assets – our sample include 10 banks. These 10 banks own 99% of the total assets of the second-tier banks. We also have 16 of the 113 city commercial banks in China who possess almost half the assets of these city banks. Most of these city banks are established after 1998 and are very small and do not provide any information of their financial activities or ownership details. We also have 6 joint venture banks[10] and 2 solely foreign banks. The city commercials, along with the joint venture banks and solely foreign owned banks, make up the "third-tier" banks in the industry, and they took up less than 10% of the total markets in 2005. We have attempted an exhaustive search to get all information and any banks missing our sample means they do not provide any relevant information in any public domain or they suffer from missing information and observations. Our sample covers over 95% of the banking assets in China.

Based on the sample banks, we further define majority state-owned banks as those banks whose state and state-owned enterprises ownership is greater than 50% of total ownership; majority private domestic banks are defined as those banks whose private domestic ownership is greater than 50% of total ownership; majority foreign banks are defined as those banks whose foreign ownership is greater than 50% of total ownership, and no majority ownership banks are those without any majority ownership. We acknowledge the possibility that some of the banks we identify as majority private domestic banks may be more than 50% state-owned if the government or state-owned enterprises own most of the outstanding shares. Bank size is defined based on total assets (prices are inflation-adjusted to the base year 1994) of the bank at year t, and the bank is a small bank if its assets are less than or equal to US $ 1 billion, medium bank if the bank's assets are greater than US $1 billion but less than or equal to US $20 billion; large bank if the bank's assets are greater than US $20 billion.

4.2. Computation of efficiency levels and efficiency ranks

Cost and profit efficiency levels and ranks measure how well a bank is predicted to perform relative to

[10] The joint venture banks are defined by relevant government documents as the banks whose foreign ownership is more than or equal to 25% but less than 100% of total shares.

other banks in a particular sample or a peer group for producing the same output bundle under the same exogenous conditions. We estimate efficiency levels by pooling all observations across years with year dummies.

We specify the commonly-used translog functional form to estimate the cost and profit functions. For convenience, we show only the cost function:

$$
\begin{aligned}
\ln(C/w_2z_1) = {} & \delta_0 + \delta_1 \ln(y_1/z_1) + \delta_2 \ln(y_2/z_1) + \delta_3 \ln(y_3/z_1) + \delta_4 \ln(y_4/z_1) \\
& + \tfrac{1}{2}\, \delta_{11} \ln(y_1/z_1) \ln(y_1/z_1) + \tfrac{1}{2}\, \delta_{22} \ln(y_2/z_1) \ln(y_2/z_1) + \tfrac{1}{2}\, \delta_{33} \ln(y_3/z_1) \ln(y_3/z_1) \\
& + \tfrac{1}{2}\, \delta_{44} \ln(y_4/z_1) \ln(y_4/z_1) + \tfrac{1}{2}\, \delta_{12} \ln(y_1/z_1) \ln(y_2/z_1) + \tfrac{1}{2}\, \delta_{13} \ln(y_1/z_1) \ln(y_3/z_1) \\
& + \tfrac{1}{2}\, \delta_{14} \ln(y_1/z_1) \ln(y_4/z_1) + \tfrac{1}{2}\, \delta_{23} \ln(y_2/z_1) \ln(y_3/z_1) + \tfrac{1}{2}\, \delta_{24} \ln(y_2/z_1) \ln(y_4/z_1) \\
& + \tfrac{1}{2}\, \delta_{34} \ln(y_3/z_1) \ln(y_4/z_1) \\
& + \beta_1 \ln(w_1/w_2) + \tfrac{1}{2}\, \beta_{11} \ln(w_1/w_2) \ln(w_1/w_2) + \theta_1 \ln(y_1/z_1) \ln(w_1/w_2) \\
& + \theta_2 \ln(y_2/z_1) \ln(w_1/w_2) + \theta_3 \ln(y_3/z_1) \ln(w_1/w_2) + \theta_4 \ln(y_4/z_1) \ln(w_1/w_2) \\
& + \text{year dummies} \\
& + \ln u_{it} + \ln v_{it}, \qquad (1)
\end{aligned}
$$

where C represents the bank's total costs. The four output (y) variables (total loans, total deposits, liquid assets, other earning assets), two input price (w) variables (interest expenses to total deposits, noninterest expenses to fixed assets), and one fixed input (z) variable (total earning assets). The ln u term is a factor that represents a bank's efficiency level and ln v is a random error that incorporates both measurement error and luck. The cost function is estimated using the ($\ln u + \ln v$) as a composite error term. The normalization by bank's total earning assets (z_1) reduces heteroskedasticity, and allows banks of any size to have comparable residual terms from which the efficiencies are calculated. The normalization by the last input price (w_2) ensures price homogeneity.

The level of cost efficiency of a bank is determined by comparing its actual costs to the best-practice minimum costs to produce the same output under the same conditions using estimates of the efficiency factor ln u, which is disentangled from the estimated cost function residual using some distributional assumptions.[11] We also use the efficiency rank, and we create a rank ordering of the banks in each year based on the cost efficiency

[11] For a general description and examples of bank efficiency estimation, see Berger and Mester (1997).

levels. The ranks are then converted to a uniform scale over [0,1] using the formula $(order_{it} - 1)/(n_t - 1)$, where $order_{it}$ is the place in ascending order of the ith bank in the tth year in terms of its cost efficiency level and n_t is the number of banks in year t. Thus, the bank i's efficiency rank in year t gives the proportion of the other sample banks in that year with lower efficiency level (e.g., a bank in year t with efficiency level better than 70% of other banks in the country has a rank of 0.70). The bank with the lowest cost efficiency level has the worst rank of 0 $[(1 - 1)/(n_t - 1)]$, and the bank with the highest cost efficiency level has the best rank of 1 $[(n_t - 1)/(n_t - 1)]$.

Profit efficiency levels and ranks are estimated in similar fashion. Total profits replace total costs and we add a constant before taking the log to avoid taking a log of negative number. For the ranks, we arrange the residuals in ascending order, so that the bank with the highest profit function residual has the highest rank of 1.[12]

The efficiency levels are more accurate than the ranks because only the levels account for the measured distance from the best-practice frontier. However, the efficiency ranks have the benefit of being more comparable across time. The ranks for every time period follow the same uniform [0,1] distribution, whereas the distributions of efficiency levels may differ with the economic environment over time. Neither the levels nor the ranks are clearly superior ex ante. Fortunately, we show both concepts below and the results are qualitatively similar.

5. Empirical results

We test the differences in average profit and cost efficiency for the four main categories of majority bank ownership – Big Four, non-Big Four majority state-owned, majority private domestic, and majority foreign over the sample period. We also test for differences in average efficiency of some subcategories – specifically the non-Big Four majority state-owned banks with minority foreign ownership, and the majority private domestic banks with minority foreign-ownership. Together, these findings may help address the issue of whether the Big Four banks have a problem of low efficiency and whether minority foreign ownership of these institutions might help correct such a problem.

We consider profit efficiency to superior to cost efficiency as an indicator of the quality of bank management. This is because profit efficiency is the more inclusive concept – taking account of both cost and

[12] The use of output quantities, rather than output prices is necessitated by the lack of accurate data on output prices. Other arguments also favor the use of this alternative profit function (see Berger and Mester 1997).

revenue performance – and managers have some control over both revenues and costs. Any qualitative differences in the findings between profit and cost efficiency are due to differences in revenue performance.

As mentioned earlier, we measure efficiency levels and ranks from pooled observations incorporating year dummies. In doing so, we avoid any estimation biases that may arise due to potential changes in bank performance due to technological progress or changes in the economic and regulatory environments. We stay away from using time fixed effect again in the secondary regressions given the efficiency scores are adjusted for sample years, thus avoiding time adjustment twice. Importantly, if we add year dummy variables in the secondary regressions, we end up imposing different constant for each year. This is a disadvantage for capture the effects when banks convert to another types of ownership in the later years, particularly taking on minority foreign ownership. Nonetheless, we try including these time fixed effects and the results are qualitatively similar. Our regressions for the effects of ownership type also take account of the changes over time due to technological progress and changes in the economic environment by using efficiency ranks that impose the same distribution on the efficiencies each year.

Before proceeding, some important caveats are in order regarding analyzing the efficiency of state-owned banks. These institutions have objectives other than profit maximization. They often have mandates to subsidize certain customers, or may allocate funds for political purposes (e.g., Sapienza 2004). As we described in the background section, the Chinese state-owned banks have been facing pressures and directions from central and local governments to grant policy loans which are not based on market principles. However, as noted above, research from other developing nations found that state-owned banks often failed to fulfill their mandates and resulted in reduced economic growth. It is also notable that the Chinese government does not appear to be content with the performance of their banking sector or they would not be pushing so hard for reform of the ownership structure. Looking forward, the ownership structures that foster market principles and result in high levels and ranks of profit efficiency are likely to provide the best chance for more efficiency allocation of financial resources and continued economic growth. Thus, we test the hypothesis that minority foreign ownership has resulted in improved profit efficiency in the past to predict its effect on the Big Four.

Table 3 shows descriptive statistics for the profit and cost efficiency levels and ranks for the different ownership categories. The overall efficiencies shown at the bottom of the table are in line with efficiency literature. The mean profit efficiency level of 0.476 suggests that on average, banks earn about half of the profits that the best-practice bank in the sample would make under the same conditions. Similarly, the mean cost

efficiency level of 0.897 suggests that the typical bank wastes about 10% of its costs relative to the best-practice bank. The means for the efficiency ranks are both 0.50 by construction. As discussed above, the levels are more accurate, but the ranks are more comparable over time – so neither concept is strictly preferred ex ante. The profit efficiencies in Table 3 clearly suggest that with regard to majority ownership, foreign banks are the most efficient, with mean level and rank of 0.692 and 0.797, respectively, followed by private domestic banks (0.589, 0.642), non-Big Four majority state-owned institutions (0.480, 0.495), with the Big Four being measured as least profit efficient by far (0.234, 0.222). The banks with no majority ownership (mix of state, private domestic and foreign ownership with no share above 50%) have no clear ownership control, and so are just included as a control group in the regressions, but their efficiencies are not analyzed.

The subcategories of ownership show even more dramatic and interesting differences, suggesting that minority foreign ownership may be quite important. Non-Big Four state-owned banks with minority foreign ownership have much higher profit efficiency and rank than those with no foreign minority, and the same effect occurs for majority private domestic banks. For example, for non-Big Four banks, minority foreign ownership is associated with almost a 20 percentage point higher profit efficiency level (61.7% versus 42.1%) and almost a 30 percentage higher profit efficiency rank (69.4% versus 41.0%). Thus, the profit efficiency means are consistent with the hypothesis that the Big Four banks are quite inefficient, and that minority foreign ownership may be expected to make these institutions more efficient, although formal tests of these hypotheses await the regression analysis below.

The cost efficiencies in Table 3 suggest that non-Big Four state-owned banks and majority foreign are the most efficient, with the majority private measured as the least efficient. The Big Four are only about 2 percentage points below the most cost-efficient categories, and not much below the median cost efficiency with an average rank of 0.454. Importantly, however, both subcategories with minority foreign ownership still have higher average measured cost efficiency than the corresponding subcategories with no minority foreign ownership.

A few more words are appropriate regarding some of the seeming inconsistency between the findings for cost efficiency and profit efficiency of state-owned banks, particularly the Big Four, which are measured as very profit inefficient and only slightly more cost inefficient on average. It is not likely that these institutions are reasonably adept at managing their costs but extremely incompetent in managing their revenues. A much more likely explanation is the "skimping hypothesis" in which these banks allocate few resources on underwriting and

monitoring loans, which saves costs in the short term, but yields poor loan revenues in the long run (Berger and DeYoung 1997). That is, these banks may spend little on screening and investigating potential borrowers prior to granting credit and/or monitoring borrowers after loans are issued. As a result, many of the loans do not perform and loan revenues are very low – which may more than offset the cost savings from "skimping." Further investigation is consistent with this explanation – state-owned banks – particularly the Big Four – have much higher rates of nonperforming loans than other institutions.

It is also possible that the measured cost efficiency for these institutions may reflect in part government subsidies on the cost side. For example, state-owned banks may not pay full market rent for offices, may pay below-market rates on deposits from government-owned nonfinancial firms, or may have subsidized equity capital and other protections from the government.

It is beyond the scope of this paper to distinguish empirically how much of the measured cost efficiency may reflect "skimping," cost subsidies, or other causes. Nonetheless, we generally generally favor the profit efficiency results because profit efficiency is the more inclusive concept and the revenue differences between state-owned and other banks appear to be more important than cost differences.

Tables 4 and 5 present regressions with the formal tests of all of these efficiency differences. The first four columns in Table 4 show regressions of profit efficiency levels on the ownership types. The last four columns use profit efficiency ranks. The regressions vary according to whether bank size class dummies are included and whether the subcategories of the minority foreign ownership are specified. Table 5 presents the corresponding findings for cost efficiency. In all cases, the omitted dummy variable is Majority private domestic, so all of the efficiencies are measured relative to this category. As noted in the tables, the t-statistics are based on standard errors clustered at the bank level.

The results in Table 4 are consistent with the findings for the raw data on efficiency means discussed in Table 3. In columns (1) and (2) for both profit efficiency levels and ranks, the Big Four are the least profit efficient by far, with the non-Big Four state-owned banks being second-to-least efficient. In columns (3) and (4), minority foreign ownership is included. In all cases, these indicators are positive and statistically significant, consistent with the hypothesis that the addition of minority foreign owners to either majority state-owned banks or majority private domestic banks increases efficiency.

The cost efficiency results in Table 5 are also consistent with the hypothesis that minority foreign ownership increases bank efficiency in all cases. The majority ownership results again show the anomaly that

state-owned banks are measured as more cost efficient than private domestic banks, consistent with "skimping" on due diligence or other quality dimensions. In all cases, regression results are consistent with the findings for the raw data on efficiency means discussed in Table 3 and support the hypothesis that the Big Four banks are very profit inefficient, and that minority foreign ownership may be expected to improve their efficiency.

We recognize the possibility that our main empirical result – that minority foreign ownership is associated with higher efficiency – could reflect selection effects, rather than efficiency benefits. For instance, foreign owners could have selected relatively efficient institutions in which to invest and the efficiency of these banks did not improve as a consequence of their ownership.

To investigate this possibility, we compute the average efficiency change from the 4 years prior to the foreign investment to as many as the 4 years after taking on minority foreign ownership (although there are usually fewer than 4 ex post years in the data set). We compare this with the change in average efficiency for the exact same years for the peer group of banks with no foreign ownership. That is, we examine the change in average efficiency between periods $T - 4 \leq t_{before} < T$ and periods $T \leq t_{after} \leq T + 4$ for banks that take on minority foreign ownership in period T. We do this comparison separately for majority private domestic banks and non-Big Four majority state-owned banks. Thus, we see if the foreign investment is associated with an improvement in efficiency beyond what occurred for the appropriate peer group for the same time period to ensure that the finding in our main regressions does not simply reflect selection effects.

The results of these comparisons are shown in Table 6. Panel 1 focuses on the three majority private domestic banks that took on minority foreign ownership during the sample period and their peer group comparison. Panel 2 shows the corresponding information for the two majority state-owned banks with ownership change and peer comparison. The table explicitly excludes from all comparisons the Big Four banks, majority foreign-owned banks, no majority banks, and banks with minority foreign ownership that took on this ownership prior to the start of the sample period in 1994. We also exclude observations more than 4 years removed in either direction from the ownership change to reduce the influence of extraneous events further away in time. Thus, Table 6 has many fewer observations than are shown in Tables 3 - 5 in order to focus on the cleanest possible comparisons to address the question of whether our main finding reflects only selection effects rather than efficiency benefits.

The findings suggest that minority foreign ownership is associated with efficiency improvements above and beyond any selection effects, although we do not rule out selection effects. As shown in Panel 1 of Table 6,

for all four ways in which we measure efficiency – profit levels and ranks and cost levels and ranks – the change in efficiency from periods $T - 4 \leq t_{before} < T$ to periods $T \leq t_{after} \leq T + 4$ is statistically significantly greater for private domestic banks that take on minority foreign ownership than their peer group that remains entirely domestically-owned over the same time interval. For example, the profit efficiency level for private domestic banks that add minority foreign ownership rises from 0.589 to 0.740, which rounds to an average of 0.150 or 15.0 percentage points higher after investment than it was for these same institutions prior to the investment, (Difference A). The peer group average efficiency actually decreased over this same time interval by 12.7 percentage points from 0.554 to 0.428 (Difference B). As shown in the bottom row of Panel 1, the difference between these two differences of 0.277 or 27.7 percentage points is statistically significant, as well as large in magnitude (Difference C). The other three differences in the bottom row are also large, positive, and statistically significant, supporting the beneficial average effects of the foreign investments. Interestingly, although we focus on the changes in efficiency after investment as the correct tests for value enhancement associated with minority foreign ownership, we do observe that the private domestic banks selected for foreign investment had a higher efficiency ex ante than their peers.

The findings for state-owned banks other than the Big Four in Panel 2 are qualitatively similar. For all four ways we measure efficiency, the change in efficiency is statistically significantly greater for the state-owned institutions that take on minority foreign ownership than their peer group. Although the differences relative to peer groups shown in Table 6 are small relative to the minority foreign ownership effects shown in the regressions above, these are stringent tests using subsets of the data chosen for only the cleanest comparisons. While we do not rule out selection effects, the data do show improvements associated with adding minority foreign ownership.

We also run an additional set of robustness checks of the effects of minority foreign ownership that are not shown for reasons of brevity. Specifically, we run efficiency regressions with fixed effects for every private domestic bank and every non-Big Four domestic bank and include dummies for minority foreign ownership of these institutions to capture the average effect of minority foreign ownership, controlling for the characteristics of the bank that remain constant. For these fixed-effects regressions, we exclude observations on the Big Four, majority foreign, and no majority banks, and drop their indicator variables.[13] The results again suggest positive

[13] We cannot include fixed effects and indicators for these groups because the fixed effects would be perfectly correlated with the indicators, as their ownership does not change over time.

efficiency effects for minority foreign ownership – all of the dummies for minority foreign ownership are positive and significant.

6. Conclusions

The future growth of China's economy and its effects abroad may depend in important ways on the reform of its banking industry – reform which is currently taking place at a rapid rate. The most important reforms are to its dominant "Big Four" banks, state-owned institutions which control about three-fourths of the nation's banking assets. The Chinese government is partially privatizing three of the Big Four, taking on minority foreign ownership of these institutions, and going public with some of the shares. The fourth of the Big Four is currently being restructured for eventual partial privatization. Predicting the efficiency effects of these and other reforms is difficult because 1) the extant research on Chinese bank efficiency is very thin and contradictory; 2) there is no extant research to our knowledge on the efficiency effects of minority foreign ownership in any nation; and 3) information about the institutional history and regulation of the Chinese banking system is not widely known.

The main goals of this paper are to try to help fill in these three gaps in the research literature in order to help address issues of Chinese bank reform. We analyze profit and cost efficiency using 266 annual observations over 1994-2003 on 38 commercial banks in China with different majority ownership – Big Four, non-Big Four state-owned, private domestic, and foreign. The data cover over 95% of the commercial banking assets in the country. We also examine minority foreign ownership of some of the non-Big Four state-owned and private domestic Chinese institutions. In addition, we provide background information on the history, regulation, and market environment for the Chinese banking industry.

Our empirical results suggest strong favorable efficiency effects from reforms that reduce the state ownership of banks in China and increase the role of foreign ownership. The Big Four are by far the least profit efficient, apparently due in large part to poor revenue performance and high nonperforming loans. The majority foreign-owned banks are also relatively efficient. For policy purposes, our most important findings concern the effects of minority foreign ownership, given that this is the current direction of bank reform. The data are strongly consistent with efficiency gains for this type of foreign investment. For both efficiency concepts (profit and cost) and for both categories of majority domestic ownership that have minority foreign ownership (non-Big Four state-owned and private domestic), minority foreign ownership is associated with higher efficiency. These results are also robust to checks for "selection effects." The checks suggest that efficiency improves after foreign

investment, rather than just "selecting" efficient Chinese banks in which to invest.

In terms of policy implications, the very poor efficiency of Big Four banks and the efficiency benefits to minority foreign ownership of both non-Big Four state-owned banks and private domestic banks suggest that the partial privatization of the Big Four banks with minority foreign ownership are likely to improve efficiency substantially. Additional benefits may be forthcoming if other non-Big Four state-owned banks and private domestic banks also add foreign owners. Although little more can directly extrapolated from the current empirical exercise, based on findings in the literature for other developing nations, there are likely even bigger improvements in efficiency forthcoming if China allows unfettered foreign majority ownership of current state-owned and private domestic banks, removes other remaining restrictions on foreign banks, and eventually totally privatizes the state-owned banks. The "real" reward of such reforms may be continued economic growth because an open and flexible banking environment not only provides more credit, but a better allocation of credit, funding more positive net present value projects that contribute to economic growth.

References

Agrawal, A., Knoeber, C.R., 1996. Firm performance and mechanisms to control agency problems between managers and shareholders. Journal of Financial and Quantitative Analysis 31, 387-397.

Allen, F., Qian, J., Qian, M., 2005. Law, finance, and economic growth in China, Journal of Financial Economics 77, 57-116.

Altunbas, Y., Liu, M.H., Molyneux, P., Seth, R., 2000. Efficiency and risk in Japanese banking, Journal of Banking & Finance 24, 1605-1628.

Beck, T., Demirguc-Kunt, A., Maksimovic, V., 2004. Bank competition and access to finance: International evidence. Journal of Money, Credit, and Banking 36, 627-648.

Beck, T., Demirguc-Kunt, A., Maksimovic, V., 2005. Financial and legal constraints to firm growth: Does firm size matter? Journal of Finance 60, 137-77.

Berger, A.N., Bonaccorsi di Patti, E., 2006. A new approach to testing agency theory and an application to the banking industry, Journal of Banking and Finance 30: 1065-1102..

Berger, A.N., Clarke, G.R.G., Cull, R., Klapper, L., Udell, G.F., 2005. Corporate governance and bank performance: A joint analysis of the static, selection, and dynamic effects of domestic, foreign, and state ownership. Journal of Banking & Finance 29, 2179-2221.

Berger, A.N., DeYoung, R., 1997. Problem loans and cost efficiency in commercial banks. Journal of Banking and Finance 21, 849-870.

Berger, A.N., Hasan, I., Klapper, L.F., 2004. Further evidence on the link between finance and growth: An international analysis of community banking and economic performance, Journal of Financial Services Research 25: 169-202.

Berger, A.N., Miller, N.H., Petersen, M.A., Rajan, R.G., Stein, J.C., 2005. Does function follow organizational form? Evidence from the lending practices of large and small banks, Journal of Financial Economics 76, 237-269.

Berger, A.N., Udell, G.F., 2006. A more complete conceptual framework for SME finance, Journal of Banking and Finance 30.

Bhattacharaya, J., 1993, The role of foreign banks in developing countries: A survey of evidence. Cornell University, mimeo.

Bonaccorsi di Patti, E., Hardy, D., 2005. Bank reform and bank efficiency in Pakistan. Journal of Banking and Finance 29, 2381-2406.

Bonin, J.P., Hasan, I., Wachtel, P., 2005a. Bank performance, efficiency and ownership in transition countries. Journal of Banking and Finance 29, 31-53.

Bonin, J.P., Hasan, I., Wachtel, P., 2005b. Privatization matters: Bank efficiency in transition countries. Journal of Banking and Finance 29, 2155-2178.

Boubakri, N., Cosset, J., Guedhami, O., 2005. Postprivatization corporate governance: The role of ownership structure and investor protection, Journal of Financial Economics 76, 369-399.

Chang, C. Edward, Iftekhar Hasan, and William C. Hunter. 1998. Efficiency of Multinational Banks: An Empirical Investigation, Applied Financial Economics 8: 1-8.

Chen, Hong, 2005. Fostering the Asian bond market: Challenges and options faced by China, Published by http://www.iwep.org.cn/.

Chen, B., Feng, Y., 2000. Determinants of economic growth in China: Private enterprises, education, and openness, China Economic Review 11, 1-15.

Chen, X., M. Skully, K. Brown, 2005. Banking efficiency in China: Application of DEA to pre- and post-deregulations era: 1993-2000. China Economic Review 16, 229-245.

Claessens, S., Demirgüç-Kunt, A., Huizinga, H., 2001. How does foreign entry affect the domestic banking market? Journal of Banking and Finance 25, 891-911.

Claessens, S., Glaessner, T., 1998. The internationalization of financial services in Asia, Working Papers -- Domestic finance, Saving, financial systems, stock markets, 1911, World Bank.

Clarke, G., Cull, R., D'Amato, L., Molinari, A., 2000. The effect of foreign entry on Argentina's domestic banking sector, in: Claessens, S., Jansen, M. (Eds.), Internationalization of Financial Services: Issues and Lessons for Developing Countries. Kluwer Law, London, pp. 331-354.

Cull, R., Xu, L.C., 2005. Institutions, ownership, and finance: the determinants of profit reinvestment among Chinese firms. Journal of Financial Economics 77, 117-146.

Dages, B.G., L. Goldberg, D. Kinney. 2000. "Foreign and domestic bank participation in emerging markets: Lessons from Mexico and Argentina," Federal Reserve Bank of New York Economic Policy Review 6, no. 3: 17-36.

Delfino, M.E., 2003. Bank ownership, privitisation and efficiency. Empirical evidence from Argentina. Working paper, University of Warwick.

Djankov, S., La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 2003. Courts, Quarterly Journal of Economics 118: 453-516.

Gilbert, R.A., Wilson, P.W., 1998. Effects of deregulation on the productivity of Korean banks, Journal of Economics and Business 50, 133-155.

Gupta, N., 2005. Partial Privatization and Firm Performance, Journal of Finance 60, 987-1015.

Hasan, Iftekhar and William C. Hunter. 1996. Efficiency of Japanese multinational banks in the United States, Research in Finance 14 JAI Press: 157-173.

Hasan, Iftekhar and Ana Lozano-Vivas. 1998. Foreign banks, production technology, and efficiency: Spanish experience. Working Paper presented at the Georgia Productivity Workshop III, Athens, Georgia.

Hasan, I., and Marton, K., 2003. Development and efficiency of the banking sector in a transitional economy: Hungarian experience, Journal of Banking & Finance 27, 2249-2271.

Huang, X., 1998, Analysis of Chinese banking industries's efficiencies, 1998, International Finance Studies (a Chinese journal, Guoji Jinrong Yanjiu) 7, 32-25.

Jappelli, T., Pagano, M., Bianco, M., 2005. Courts and banks: Effects of judicial enforcement on credit markets. Journal of Money, Credit and Banking 37, 223-244.

Li, W., 2005. Tax burdens of Chinese banks, Guo Ji Jin Rong Bao (International Finance New), Sept 29, 2005, 2.

Lin, L., 2005. Does foreign board member play a role? People In Focus Weekly (Chinese version), 2005-07-04.

Ling, H., Lu, Y., 2004. When foreigners buy the shares of our banks: Temptation and confusion. Caijing Magazine, Issue 123, 12/27/2004.

Liu, C., 2005. Good or bad? Comments on introducing strategic foreign investors into Chinese domestic banks, Economists (Chinese). http://www.jjxj.com.cn/news_detail.jsp?keyno=7692.

King, R.G., Levine, R., 1993. Finance and growth: Schumpeter might be right, Quarterly Journal of Economics 108, 717-738.

Kumbhakar, S.C., Sarkar, S., 2003. Deregulation, ownership, and productivity growth in the banking industry: Evidence from India. Journal of Money, Credit & Banking 35, 403-424.

Kumbhakar, S.C., Wang, D., 2005. Economic reforms, efficiency, and productivity in Chinese banking. State University of New York –Binghamton working paper.

Kwan, S.H., 2003. Operating performance of banks among Asian economies: An international and time series comparison, Journal of Banking & Finance 27, 471-489.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 1997. Legal determinants of external finance. Journal of Finance 52, 1131–1150.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R.W., 1998. Law and finance, Journal of Political Economy 106, 1113–1155.

La Porta, R., Lopez-De-Silanes, F., Shleifer, A., 2002. Government ownership of banks, The Journal of Finance 57, 265-301.

Leung, M.K., 1997. Foreign banks in the People's Republic of China, Journal of Contemporary China 6, 365-76.

Leung, M.K., D. Rigby and T. Young, 2003a. Entry of foreign banks in the People's Republic of China: a survival analysis. Applied Economics 35, 21-31

Leung, M.K., T. Young and D. Rigby, 2003b. Explaining the profitability of foreign banks in Shanghai, Managerial and Decision Economics, 24, 15-24.

Li, S., Liu, F., Liu, S., Whitmore, G.A., 2001. Comparative performance of Chinese commercial Banks: analysis, findings and policy implications, Review of Quantitative Finance and Accounting 16, 149-170.

Lin, H., 2003. Ten years of uneasy reforms in loans classifications, Caijing Magazine, Issue 89 (15), online version.

Mahajan, A., N. Rangan, and A. Zardkoohi. 1996. Cost Structures in Multinational and Domestic Banking. Journal of Banking and Finance 20: 238-306.

McConnell, J.J., Servaes, H., 1990. Additional evidence on equity ownership and corporate value, Journal of

Financial Economics 27: 595-612.

Miller, S. R. and A. Parkhe. 2002. Is there a liability of foreignness in global banking? An empirical test of U.S. banks' X-efficiency. Strategic Management Journal 23: 55-75.

Qian, J., Strahan, P.E., 2005. How law and institutions shape financial contracts: The case of bank loans, National Bureau of Economic Research working paper 11052.

Sapienza, P., 2004. The effects of government ownership on bank lending. Journal of Financial Economics 74: 357-384.

Shleifer, A., Vishny, R.W., 1986. Large shareholders and corporate control, Journal of Political Economy 94: 461-488.

Shirai, S., 2001. Banking sector reforms in the People's Republic of China---Progress and constraints, presented at First Brainstorming Workshop on "Sequencing Domestic and External Financial Liberalization," organized in Beijing, by the Asian Development Bank Institute, 20-21 November 2001.

Stein, J.C., 2002. Information production and capital allocation: Decentralized vs. hierarchical firms, Journal of Finance 57, 1891-1921.

Sturm, J.E., Williams, B., 2004. Foreign bank entry, deregulation and bank efficiency: Lessons from the Australian experience. Journal of Banking and Finance 28: 1775-1799.

Sturm, J.E., Williams, B., 2005. What determines differences in foreign bank efficiency? Australian experience. Bond University working paper.

Unite, A.A., Sullivan, M.J., 2003. The effect of foreign entry and ownership structure on the Philippine domestic banking market, Journal of Banking & Finance 27, 2323-2345.

Vander Vennet, Rudi. 1996. The Effect of Mergers and Acquisitions on the Efficiency and Profitability of EC Credit Institutions. Journal of Banking and Finance 20(9): 1531-1558.

Wall Street Journal, 2004. Shenzhen Development Bank Co.: Two Americans are appointed to chairman, president posts, (Eastern edition). New York, N.Y.: Dec 16, 1

Wei, Y., Wang, L., 2000. Studies of Chinese commercial banks' efficiencies: A nonparametric analysis, Journal of Financial Research 237 (A Chinese journal, Jingrong Yanjiu), 88-96.

Xiao, Y., 2004. Analysis of tax burdens of Chinese banks and Advice on the reforms, working paper.Lin, Huawei, 2003, Ten years of uneasy reforms in loan classifications, Caijing Magazine, Issue 89 (15), online version.

Xu, S., Zhang, X., 1995. Profound background of the 1994 fiscal tax reform in China, draft prepared for the fifth Tax Revenue Policy and Reform in Asian-Pacific Regions Symposium, Jakarta, Indonesia, December 1995.

Yao, S., Feng, G., Jiang, C., 2004. The empirical analysis of Chinese banks' efficiencies, Economic Analysis (Chinese journal, Jingji Yanjiu) 8, 4-15.

Yildirim, H.S., Philippatos, G.C., 2003. Efficiency of banks: Recent evidence from the transition economies of Europe 1993-2000. EFMA 2004 Basel Meetings Paper.

Zhuo, S., 2005. What kinds of foreign strategic investors do the state-owned banks need? Jin Rong Shi Bao (Financial News), Nov 23, 2005, online version.

Table 1
Total Observations

This table shows the distributions of our sample across years, by various majority ownership groups and by bank size. Our overall sample is an unbalanced panel which consists of 266 observations (38 Chinese banks), covering ten years period - 1994 to 2003. In this table and throughout this paper, majority state-owned banks refer to those banks whose state ownership (including stake held by state-owned enterprises, i.e., both directly or indirectly owned by the state) is greater than 50% of total ownership. Majority state-owned banks are divided into three groups: Big Four state-owned banks, non-Big Four majority state-owned banks without minority foreign ownership, and non-Big Four majority state-owned banks with minority foreign ownership. By the same token, majority privated domestic banks refer to those banks whose private domestic ownership is greater than 50% of total ownership, and majority foreign banks refer to those banks whose foreign ownership is greater than 50% of total ownership. Mixed ownership group, therefore, includes those banks which are not fall within any of above groups. The bank size is defined based on total assets (inflation-adjusted, at constant price level of 1994) of the bank at year t, and the bank is a small bank if its assets are less than or equal to US $1 billion, medium bank if the bank's assets are greater than US $1 billion but less than or equal to US $20 billion; large bank if the bank's assets are greater than US $20 billion. Sources of Data: Bankscope, annual issues of Almanac of China's Finance and Banking, 1994-2004; individual bank's financial statement, etc.

	Total	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total Bank Observations	266	16	20	21	25	27	32	33	33	31	28
Observations According to Ownership											
1. Majority State-owned	189	13	16	16	19	19	20	23	24	21	18
a. Big Four banks	40	4	4	4	4	4	4	4	4	4	4
b. Non-Big Four Majority State-owned banks *without* foreign minority	104	5	8	8	10	11	11	14	15	13	9
c. Non-Big Four Majority State-owned banks *with* foreign minority	45	4	4	4	5	4	5	5	5	4	5
2. Majority Private Domestic	43	1	1	2	2	3	7	7	6	7	7
a. Majority Private domestic banks *without* foreign minority	36	1	1	2	2	3	7	7	5	5	3
b. Majority Private domestic banks *with* foreign minority	7	0	0	0	0	0	0	0	1	2	4
3. Majority Foreign	21	1	2	2	2	3	3	2	2	2	2
4. No majority ownership	13	1	1	1	2	2	2	1	1	1	1
Market share of assets by ownership groups											
1. Majority State-owned	0.965	0.998	0.997	0.996	0.994	0.993	0.982	0.975	0.970	0.935	0.914
a. Big Four banks	0.847	0.934	0.918	0.903	0.878	0.878	0.863	0.836	0.813	0.791	0.771
b. Non-Big Four Majority State-owned banks *without* foreign minority	0.093	0.055	0.068	0.077	0.095	0.095	0.085	0.102	0.111	0.116	0.099
c. Non-Big Four Majority State-owned *with* foreign minority	0.029	0.009	0.012	0.015	0.020	0.020	0.034	0.039	0.044	0.029	0.043
2. Majority Private domestic	0.031	0.002	0.002	0.004	0.005	0.006	0.018	0.023	0.031	0.065	0.086
a. Majority Private domestic *without* foreign minority	0.018	0.002	0.002	0.004	0.005	0.006	0.018	0.023	0.030	0.042	0.023

b. Majority Private domestic *with* foreign minority	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.023	0.063
3. Majority Foreign	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
4. No majority ownership	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Observations according to bank size											
Small Banks: assets < US $1 billion	79	5	5	6	8	9	12	10	9	8	7
Medium Banks: US $1 billion<assets< US $20 billion	120	6	10	10	12	13	15	17	16	13	8
Large Banks: assets > US $20 billion	67	5	5	5	5	5	5	6	8	10	13
Market share of assets by bank size											
Small Banks	0.002	0.002	0.001	0.003	0.002	0.002	0.003	0.003	0.003	0.002	0.002
Medium Banks	0.066	0.027	0.043	0.054	0.072	0.076	0.090	0.098	0.084	0.073	0.036
Large Banks	0.931	0.969	0.956	0.943	0.926	0.923	0.905	0.899	0.911	0.925	0.963

Table 2
Variables Used in Profit and Cost Efficiency Estimations

This table shows the descriptive statistics of basic variables used in the profit and cost efficiency estimations. In our translog based estimations of profit (cost) efficiency levels, output variables considered are total loans, total deposits, liquid assets, and other earning assets, and the input variables are: unit interest cost of deposits, defined as interest expenses to total deposits, and unit price of physical inputs, defined as noninterest expenses to total fixed assets. The outputs are normalized by total earning assets. All financial values are inflation-adjusted to the base year 1994.

	Mean	Standard Deviation	Median	Minimum	Maximum
Profit (Cost) (in billion US$)					
Total Profits	0.076	0.128	0.027	-0.081	0.844
Total Costs	2.708	8.861	0.191	0.001	69.797
Output Quantities (in billion US$)					
Total Loans (y1)	24.285	53.295	1.578	0.005	293.437
Total Deposits (y2)	35.854	78.127	3.049	0.002	427.082
Liquid Assets (y3)	9.073	20.703	1.047	0.005	142.941
Other Earning Assets (y4)	14.362	30.319	1.684	0.005	146.719
Input Prices					
Unit Interest cost of deposits (w1)	0.057	0.088	0.035	0.006	0.726
Unit Price of physical inputs (w2)	1.188	0.974	0.868	0.304	8.000

Table 3
Bank Efficiency by Ownership Type

This table shows the descriptive statistics of profit efficiency levels, profit efficiency ranks, cost efficiency levels, and cost efficiency ranks of the full sample and for subsamples grouped by majority ownership categories. The definition of majority ownership is the same as described in Table 1. Profit efficiency level is calculated based on the stochastic frontier estimation of translog function of four outputs and two inputs, as shown in Table 2. Profit efficiency rank is defined in the following way: the efficiency level are put in rank order for a year and converted to a uniform scale over the [0,1] interval to make the ranks comparable across years; More specifically, the efficiency level of each observations are ranked in ascending order and converted to a uniform scale over [0,1] using the formula (order - 1)/(n - 1), where order is the place in ascending order of the banks residual in that year and n is the number of sample banks in the year. The bank with the highest residual has the best rank of 1 [(n - 1)/(n - 1)], and the bank with the lowest residual has the worst rank of 0 [(1 - 1)/(n - 1)]. Cost efficiency rank is calculated in the similar manner. Standard deviations are shown in parentheses below the estimated mean.

	Profit Efficiency		Cost Efficiency	
Ownership Type	Profit Efficiency Level	Profit Efficiency Rank	Cost Efficiency Level	Cost Efficiency Rank
1. Big Four banks	0.234	0.222	0.892	0.454
	(0.212)	(0.230)	(0.068)	(0.242)
2. Non-Big Four majority state-owned banks	0.480	0.495	0.915	0.587
	(0.198)	(0.267)	(0.042)	(0.273)
a. Non-Big Four majority state-owned banks without foreign minority	0.421	0.410	0.906	0.528
	(0.161)	(0.200)	(0.045)	(0.280)
b. Non-Big Four majority state-owned banks with foreign minority	0.617	0.694	0.938	0.722
	(0.209)	(0.296)	(0.023)	(0.200)
3. Majority Private domestic	0.589	0.642	0.828	0.235
	(0.215)	(0.305)	(0.076)	(0.309)
a. Majority Private domestic without foreign minority	0.558	0.599	0.802	0.109
	(0.219)	(0.312)	(0.050)	(0.114)
b. Majority Private domestic with foreign minority	0.748	0.868	0.964	0.884
	(0.089)	(0.119)	(0.009)	(0.068)
4. Majority foreign	0.692	0.797	0.915	0.563
	(0.086)	(0.109)	(0.041)	(0.281)
5. No majority ownership (mixed ownership)	0.454	0.458	0.896	0.427
	(0.234)	(0.331)	(0.048)	(0.228)
Full sample	0.476	0.500	0.897	0.500
	(0.231)	(0.300)	(0.062)	(0.300)

Table 4

Regressions on the Relative Importance of Ownership Determining Profit Efficiency

This table shows the OLS regressions of profit efficiency (level and rank), with standard errors clustered at the bank level. The definitions of profit efficiency rank ratios, majority ownership dummies, and size dummies are the same as described in Table 2. Majority private domestic is considered as an omitted variable in the regression. Absolute values of t-statistics of the coefficients of the independent variables are shown in the parentheses, and the standard errors are clustered at the bank level. ***, **, * are significant at 1, 5, and 10 percent significance levels respectively.

	Profit Efficiency Level				Profit Efficiency Rank			
	1	2	3	4	1	2	3	4
Constant	0.589***	0.576***	0.558***	0.495***	0.642***	0.614***	0.599***	0.499***
	(8.55)	(5.69)	(7.17)	(5.90)	(6.60)	(4.21)	(5.41)	(4.17)
Big Four	-0.355***	-0.304***	-0.324***	-0.250**	-0.421***	-0.366**	-0.377***	-0.292**
	(4.60)	(3.08)	(3.80)	(2.48)	(3.90)	(2.70)	(3.14)	(2.08)
Non-Big Four Majority State	-0.109*	-0.108*	-0.137*	-0.134*	-0.147*	-0.145*	-0.189*	-0.186*
	(1.71)	(1.73)	(1.73)	(1.76)	(1.76)	(1.76)	(1.80)	(1.77)
Majority Foreign	0.102**	0.116**	0.133*	0.196**	0.155**	0.183*	0.198*	0.298**
	(2.47)	(2.14)	(1.70)	(2.36)	(2.57)	(1.75)	(1.78)	(2.50)
No Majority	-0.135	-0.122	-0.104	-0.041	-0.184	-0.156	-0.140	-0.041
	(1.58)	(1.07)	(1.12)	(0.42)	(1.45)	(0.93)	(1.02)	(0.28)
Majority State, Minority Foreign			0.196***	0.220***			0.284***	0.321***
			(2.92)	(3.19)			(3.01)	(3.18)
Majority Private, Minority Foreign			0.190***	0.221***			0.269***	0.302***
			(2.98)	(3.45)			(2.81)	(3.37)
Medium banks		0.029		0.089*		0.048		0.136*
		(0.36)		(1.70)		(0.41)		(1.78)
Large banks		-0.037		-0.011		-0.027		0.015
		(0.34)		(0.12)		(0.17)		(0.11)
N	266	266	266	266	266	266	266	266
Number of clusters	38	38	38	38	38	38	38	38
F-statistics	50.78	33.69	42.25	0.0000	45.24	30.02	38.88	33.39
R-square	0.2736	0.2811	0.3737	0.3997	0.2447	0.2515	0.3685	0.3984

Table 5

Regressions on the Relative Importance of Ownership Determining Cost Efficiency

This table shows the OLS regressions of cost efficiency, with standard errors clustered at the bank level. The definitions of profit efficiency rank, majority ownership dummies, and size dummies are the same as described in previous tables. Majority private domestic is considered as an omitted variable in the regression. Absolute values of t-statistics of the coefficients of the independent variables are shown in the parentheses, and the standard errors are clustered at the bank level. ***, **, * are significant at 1, 5, and 10 percent significance levels respectively.

	Cost Efficiency Level				Cost Efficiency Rank			
	1	2	3	4	1	2	3	4
Constant	0.828***	0.817***	0.802***	0.788***	0.235***	0.187**	0.109***	0.035
	(45.21)	(41.45)	(71.26)	(50.47)	(2.99)	(2.05)	(4.76)	(0.59)
Big Four	0.064***	0.035	0.090***	0.075***	0.219**	0.112	0.345***	0.306***
	(2.81)	(1.30)	(5.13)	(3.91)	(2.38)	(0.88)	(6.47)	(4.17)
Non-Big Four Majority State	0.088***	0.090***	0.105***	0.103***	0.352***	0.358***	0.419***	0.415***
	(4.63)	(4.85)	(7.60)	(7.37)	(4.02)	(4.21)	(7.27)	(7.00)
Majority Foreign	0.087***	0.098***	0.114***	0.127***	0.328**	0.376***	0.454***	0.528***
	(3.75)	(4.02)	(6.23)	(5.99)	(2.70)	(2.85)	(4.73)	(4.77)
No Majority	0.068***	0.079***	0.094***	0.108***	0.192**	0.240**	0.318***	0.392***
	(3.53)	(3.84)	(7.50)	(6.50)	(2.45)	(2.64)	(13.92)	(6.60)
Majority State, Minority Foreign			0.032***	0.037***			0.194***	0.222***
			(3.25)	(3.65)			(2.88)	(3.52)
Majority Private, Minority Foreign			0.162***	0.153***			0.775***	0.746***
			(15.40)	(12.93)			(24.96)	(16.17)
Medium banks		0.007		0.016		0.034		0.089
		(0.45)		(1.20)		(0.40)		(1.25)
Large banks		0.040*		0.029**		0.155		0.113
		(1.74)		(2.13)		(1.29)		(1.56)
N	266	266	266	266	266	266	266	266
Number of clusters	38	38	38	38	38	38	38	38
F-statistics	6.12	4.76	71.01	40.01	5.59	4.07	121.68	86.42
R-square	0.2628	0.2924	0.4468	0.4605	0.1832	0.2012	0.3800	0.3917

Table 6: Changes in Average Efficiency after Taking on Minority Foreign Ownership Relative to Peer Groups

The table compares the average change in efficiency after taking on minority foreign ownership during the sample period relative to peer groups with the same majority ownership type that do not take on foreign investors. We do comparisons separately for majority private domestic banks and majority state-owned banks (other than the Big Four), and explicitly exclude Big Four banks, majority foreign-owned banks, no majority banks, and banks with minority foreign ownership prior to the start of the sample period in 1994. "Before taking minority foreign ownership" period is defined as $T-4 \leq t_{before} < T$; and "After taking minority foreign ownership" period is defined as $T \leq t_{after} \leq T+4$, where T is year when the bank took on foreign investors. t-statistics for differences of means are also reported. ***, **, * represent 1, 5, and 10 percent significance levels respectively.

Panel 1: Majority Private Domestic Banks

		Profit efficiency		Cost efficiency	
	Obs	Level	Rank	Level	Rank
Banks that take on minority foreign ownership during the sample period					
(I): Before taking minority foreign ownership	14	0.589	0.627	0.842	0.235
(II): After taking minority foreign ownership	14	0.740	0.860	0.960	0.855
Difference A: (II) - (I)		0.150***	0.233***	0.118***	0.620***
t-statistic		4.972	4.200	8.573	19.860
Peer group					
(III): Before taking minority foreign ownership	32	0.554	0.562	0.796	0.097
(IV): After taking minority foreign ownership	32	0.428	0.417	0.811	0.051
Difference B: (IV) - (III)		-0.127***	-0.145***	0.015**	-0.046***
t-statistic		6.271	3.477	2.413	3.534
Difference C: (Difference A) - (Difference B)		0.277***	0.377***	0.103***	0.667***
t-statistic		7.618	5.446	6.855	19.676

Panel 2: Non-Big Four Majority State-owned Banks

		Profit efficiency		Cost efficiency	
	Obs	Level	Rank	Level	Rank
Banks that take on minority foreign ownership during the sample period					
(V): Before taking minority foreign ownership	24	0.544	0.554	0.938	0.748
(VI): After taking minority foreign ownership	24	0.714	0.864	0.956	0.880
Difference D: (VI) - (V)	24	0.170***	0.310***	0.019*	0.132*
t-statistic		8.614	14.598	2.000	1.979
Peer group					
(VII): Before taking minority foreign ownership	155	0.351	0.364	0.900	0.491
(VIII): After taking minority foreign ownership	155	0.427	0.403	0.910	0.528
Difference E: (VIII) - (VII)	155	0.075***	0.039**	0.010***	0.037
t-statistic		5.442	2.322	2.834	1.578
Difference F: (Difference D) - (Difference E)		0.095***	0.271***	0.009*	0.095*
t-statistic		3.928	10.046	1.872	1.850