

Has minority foreign investment in China's banks improved their cost efficiency?

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Abstract

Since 2001, foreign investors have been permitted to acquire minority ownership stakes in China's banks. This paper assesses whether there is any evidence of a cost efficiency payoff in those banks that have taken on foreign investment. Data Envelopment Analysis is first used to generate measures of cost efficiency for China's banks over the period 2001-2006. A second stage regression is then performed to determine whether foreign investment has an impact on cost efficiency. The results indicate a positive impact, although one that is only marginally significant. Policy implications are discussed.

JEL codes - C24, D24, F21, G21,

Key words – China, banking, foreign investment, cost efficiency

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1. Introduction

Since the Open Door Policy was embarked upon in 1979, China has emerged as a leading host of foreign investment. This foreign investment has not, however, been evenly distributed across economic sectors. While the Open Door Policy liberalized foreign ownership in some sectors, notably manufacturing, the services sector, including banking, remained largely off limits. This state of affairs changed considerably after China joined the WTO in 2001. Firstly, China committed to extending national treatment to foreign banks by the end of 2006. Secondly, foreign investors were given permission to acquire minority ownership stakes in China's banks. Current regulations permit a single foreign investor to acquire up to a 20 per cent ownership stake and total foreign ownership can reach 25 per cent. In 2001, HSBC became the first foreign investor to take advantage of these changes when it negotiated the purchase of an 8 per cent stake in Bank of Shanghai. The list of banks to have since brought in "strategic foreign investors", as the Chinese government labels such investors, has expanded considerably and now includes four of China's five largest banks (Table 1).

Insert Table 1 here

For foreign investors, acquiring an ownership stake in a Chinese bank provides them with access to one of the world's fastest growing banking markets. Total deposits in financial institutions in China grew from RMB14.3 trillion at year-end 2001 to RMB37.0 trillion at the end of the second quarter of 2007. While foreign banks also now have the option of establishing their own branch networks in China, this is a slow and costly process.

Regulations issued at the end of 2006 state that for a foreign bank to be extended national treatment and so to obtain access to the local RMB market, it must establish a bank incorporated in China. This requires registered capital of at least RMB1 billion (equivalent to about \$US135 million). Moreover, it must then allocate an additional RMB100 million (equivalent to about \$US13.5 million) for each branch it opens. Such capital requirements mean that currently only the largest and most committed foreign banks are seeking to build their own branch networks with the hope of competing in the retail market. Even these banks are tending to adopt a dual-pronged strategy. For example, HSBC has established the most extensive branch network amongst foreign banks operating in China. As of mid-2007, this network consisted of 15 branches and 25 sub-branches. By way of comparison, Industrial and Commercial Bank of China (ICBC), China's largest domestic bank, had more than 21,000 branches. This gap helps to explain why at the same time as building up its own branch network, HSBC has also acquired minority ownership stakes in local banks such as Bank of Shanghai and Bank of Communications (BOCOM).

From the perspective of China's banks, foreign investment is a potential source of fresh capital and advanced technology. The need for China's banks to improve their efficiency is mounting now that they are operating in an increasingly competitive and liberalized banking environment. It was not so long ago that fears were expressed that their poor efficiency levels might cause them to collapse under the weight of competition from foreign banks, post-WTO entry (Bonin and Huang, 2001). Historically, China's banks have been undercapitalized (Lardy, 1998) and while the central government has shown a

willingness to inject fresh capital into the biggest banks (see Ma, 2007), many others have been driven to seek alternative sources. The need to act has been heightened by the banking regulator, China Banking Regulatory Commission (CBRC), requiring that all banks meet a minimum capital adequacy ratio of 8 percent, the international standard, by 2007. Advanced technology can be defined broadly to include assistance with strategic management decision-making, operational practices and financial product innovations. At the time of injecting fresh capital, it has become common for minority foreign investors to also commit to “technical assistance packages”, such as the ANZ Banking Group agreed to when it recently took a 20 per cent stake in Shanghai Rural Commercial Bank (China Daily Online, 2006).

This paper considers whether an efficiency payoff is evident in those banks that have taken on minority foreign ownership. While Leigh and Podpiera (2006) and Hope and Hu (2006) took stock of the rise of minority foreign investment in China’s banks and discussed the potential for it to help reform the banking system, to our knowledge there has not yet been any quantitative assessment of its efficiency impact to date. An empirical assessment is particularly important because in theoretical terms the impact of minority foreign investment on efficiency is unclear. On the one hand, efficiency may well be bolstered by the injection of fresh capital and advanced technology. On the other hand, because foreign investors have only been permitted to acquire minority stakes that often do not provide them with any management control, the size of the capital injection has been relatively modest and this might also have had the effect of reducing their ability and incentive to transfer technology. From their position as minority owners, it would be

difficult for foreign investors to retain control over technology they transferred and they would also not get to capture the majority of benefits if their invested Chinese bank did become more efficient. Other issues that arise are whether the technology that foreign investors have is appropriate to the Chinese market and the challenges that are involved in integrating two very different corporate cultures. Indeed, there is already a precedent for such concerns. In 1995, when China Construction Bank (CCB) and Morgan Stanley joined forces to create the joint-venture, investment-banking firm, China International Capital Corporation (CICC), it was considered a coup for both parties. Morgan Stanley's 35 per cent stake was considered more than sufficient to provide it with the ability and incentive to transfer the technology the Chinese side was lacking. It also gave Morgan Stanley an enviable point of entry into a fast growing investment banking market. However, shortly after CICC's establishment, management clashes emerged and the relationship degenerated to the point of collapse (McGregor, 2005). In 2002, Morgan Stanley was left with little choice but to hand over complete management control to its Chinese partner and while it retains its equity stake, this has been converted to an entirely passive holding. Bringing in minority foreign investors is also not the only channel through which China's banks can acquire fresh capital. For example, ICBC, CCB, Bank of China (BOC), BOCOM, CITIC Bank, Industrial Bank (IB), Bank of Beijing, Bank of Nanjing and Bank of Ningbo all successfully raised multi-billion dollar amounts on the Shanghai Stock Exchange in 2006 and 2007. Banks can also sell ownership stakes to domestic investors, such as when the Ping An Insurance Group beat out numerous foreign investors for the ownership of Shenzhen Commercial Bank (IHT, 2006). China is also particularly fortunate in that it can count amongst its territories an international

financial center in Hong Kong, SAR, through which it can gain access to world financial markets and numerous Chinese banks have taken this route in recent years.

Thus, whether there has been an overall and discernable efficiency payoff in those banks that have taken on minority foreign investment is an empirical question and one that awaits confirmation. This paper aims to fill this gap in the literature. Section 2 provides a brief review of some of the key existing studies that examine the impact of foreign ownership on bank performance. Section 3 outlines the methodology we use to derive measures of efficiency for China's banks and presents the results. Section 4 assesses whether there is a statistical relationship between these measures of efficiency and foreign investment and the policy implications associated with results are discussed. Section 5 summarizes the findings.

2. Literature Review – foreign ownership and bank performance

An earlier and often-cited study that considers the impact of foreign ownership, amongst other factors, on bank performance is Demirgüç-Kunt and Huizinga (1999). Using international panel data covering the period 1988-1995, they found that foreign-owned banks – defined as those banks in which foreigners held more than 50 per cent of equity – performed better than domestically-owned banks in developing countries but worse in developed countries. In the developing country context, it was conjectured that the superior performance of foreign-owned banks might be attributable to them enjoying a technology advantage over their domestic counterparts and because they might also be exempt from unfavorable domestic banking regulations. In the developed country context,

it was conjectured that foreign-owned banks no longer enjoy a technological advantage over their competitors and they might suffer from information deficiencies relative to their domestic competitors. A more recent study that also utilizes international panel data is Lensink and Naaborg (2007). In this study a negative relationship was found to exist between the proportion of a bank's equity that was foreign-owned and performance. In explaining this result, the authors draw on the "home field advantage" theory of Berger, et al. (2000). This theory posits that banks with more domestic ownership will be at a competitive advantage because of the distance between the principal and the agent and differences in language, culture and regulatory and supervisory structures.

While results from studies using international panel data are interesting, perhaps more relevant to the Chinese context are several recent studies that have been conducted using data from other transitional economies. Bonin, et al. (2005) considered the impact of ownership type on bank performance using a dataset that covered the period 1996-2000 for 11 Eastern and Central European transitional economies. Aside from specifically focusing on transitional economies, another innovation of this study is that bank performance was measured using efficiency scores generated by Stochastic Frontier Analysis (SFA) rather than simple accounting ratios such as the return on assets (ROA). A second stage regression was then performed in attempt to explain the variation in these efficiency scores. It was found that banks that were majority foreign-owned – defined as those banks in which foreigners held more than 50 per cent of equity - were more efficient than majority domestic privately-owned banks, which in turn were more efficient than majority domestic government-owned banks. Grigorian and Manole (2006)

considered the determinants of bank performance in 17 Eastern and Central European economies over the period 1995-1998. They also first compute efficiency scores - except using Data Envelopment Analysis (DEA) rather than SFA - before performing a second stage regression. The impact of foreign ownership was captured using a dummy variable that took a value of one when more than 30 per cent of a bank's equity was foreign-owned. The 30 per cent cut-off point was chosen on the basis that foreign owners need not hold more than 50 per cent of a bank's equity to exert a controlling influence. Foreign ownership was again found to be positively related to bank efficiency. Findings of the likes of Bonin, et al. (2005) and Grigorian and Manole (2006) serve to provide optimism regarding the impact that foreign investment might have had in the Chinese context. They do not, however, allow strong *a priori* expectations to be formed given that no Chinese bank has sold more than 30 per cent of its equity to foreign investors. As can be seen in Table 1, the largest foreign ownership share is 25 per cent and it has typically been less than 20 per cent.

In the case of China, we are not aware of any published study that has sought to investigate the efficiency impact of minority foreign investment since 2001. Chen, et al. (2005) used DEA to calculate efficiency scores for China's banks over the period 1993-2000 but the possible impact of ownership type on these efficiency scores was not considered. Fu and Heffernan (2007) used SFA to calculate efficiency scores for the big four state-owned banks and 10 joint-stock banks over the period 1985-2002 but a subsequent second stage regression simply included a dummy that took a value of one if the bank was a joint-stock bank. In the closest study to ours, Berger, et al. (2007) used

SFA to calculate efficiency scores for China's banks based on a dataset that covered the period 1994-2003. These efficiency scores were then regressed on various dummies of ownership type and size. Four main ownership types were considered including majority state-owned banks, majority domestic privately-owned banks, majority foreign-owned banks and banks with no majority ownership. Majority ownership was defined as these owners holding more than 50 per cent of equity. Relative to majority domestic privately-owned banks, it was found that majority state-owned banks were significantly less efficient, majority foreign-owned banks were significantly more efficient and banks with no majority ownership were not significantly different. As with Bonin, et al (2005) and Grigorian and Manole (2006), it is difficult to draw implications from these results for the potential impact of minority foreign investment. Another potential problem is that the regulatory environment differed markedly amongst banks of the above ownership types. Majority foreign-owned banks, for example, did not compete in the retail market because they were not permitted to collect RMB deposits from Chinese individuals and companies. Thus, including all of the above ownership types in the same frontier analysis may be problematic because SFA and DEA generate efficiency scores by comparing banks with each other. Aside from the four main ownership types mentioned above, the authors also further disaggregated ownership into majority state-owned banks with minority foreign investment and majority domestic privately-owned banks with minority foreign investment. The coefficients to these ownership dummies were positive and significant. However, how much weight can be assigned to these results is not clear given that the dataset used only covered the period to 2003. As can be seen in Table 1, at this time only three Chinese banks had taken on minority foreign investment.¹

¹ Berger, et al. (2007) notes that prior to 2001, international organizations such as the Asian Development

3. Measuring Bank Efficiency

In order to evaluate the impact of foreign investment, an appropriate measure of bank performance must first be arrived at. Accounting-based performance ratios such as the ROA are the simple choice but as noted by O'Donnell and van der Westhuizen (2002), at least as measures of efficiency, which is what we have in mind in this paper when thinking about bank performance, such measures are theoretically deficient because they are only partial in nature. That is, a bank may appear to be performing well based on one measure but poorly with respect to another measure. To test whether such partial measures give consistent indications of performance amongst China's banks, we collected data on four popular accounting-based measures - the ROA, the impaired loan ratio (ILR), the total capital ratio (CR) and the cost to income ratio (CIR). Data relating to these variables was obtained from the *Bankscope* database for a large sample of Chinese banks. The dataset we use in this paper is discussed in more detail later in the context of our preferred measure of bank performance. The correlation matrix for the above accounting-based performance measures is given in Table 2.

Insert Table 2 here

The concerns of O'Donnell and van der Westhuizen (2002) are very much in evidence.

The correlation coefficient between performance measures is typically low and in the one case where it is greater than 0.5, the correlation is actually negative.

Bank and International Finance Corporation took small equity stakes in three Chinese banks. However, this type of investment was different in nature to the sale of minority stakes to strategic foreign investors that only became permissible after 2001.

Rather than using partial performance measures, we instead make use of Data Envelopment Analysis (DEA), a technique that can provide a more complete measure of a firm's efficiency and one that has already been used extensively in the banking literature. While DEA has predominantly been applied in the context of developed countries (see Burger and Humphrey, 1997), it has also been used to measure bank performance in transitional economies, including China (Chen, et al., 2005) and those in Eastern and Central Europe (Grigorian and Manole, 2006). DEA first requires the specification and collection of data relating to outputs, inputs (costs) and input prices for a sample of firms. It then uses linear programming to generate a frontier of "best practice" or "efficiency" from amongst this group of firms. Where a particular firm lies relative to this frontier determines its own efficiency score. If a firm lies on the frontier – that is, data from this firm forms part of the frontier - it is deemed to be fully efficient and will receive an efficiency score of one. DEA can calculate scores relating to technical efficiency (TE), allocative efficiency (AE) and cost efficiency (CE). A firm is said to be technically efficient if it produces a given set of outputs using the smallest possible amount of inputs. It is said to be allocatively efficient if it selects an input mix that minimizes the cost of producing this given set of outputs. It is said to be cost efficient if it is both technically and allocatively efficient. Since CE is the encompassing efficiency measure and ultimately determines how competitive a bank will be, it is the measure of efficiency we use in this paper.²

² For a more detailed discussion of these various efficiency concepts, the interested reader could consult O'Donnell and van der Westhuizen (2002) for an excellent review.

The DEA model we use follows that of Chen, et al. (2005). Banks are deemed to be producing three outputs - loans, deposits and non-interest income. The reason that loans and non-interest income are included as outputs is relatively straightforward. However, the inclusion of deposits is less so. On the one hand, deposits might be considered an input in producing loans and other assets, not as an output in itself. On the other hand, as Chen, et al. (2005) point out, deposits also provide liquidity, safekeeping and payments services to depositors. Cavallo and Rossi (2001) suggest dealing with this problem by taking a dual approach in which the volume of deposits is considered an output while the cost of deposits - the bank's interest expenses - is considered an input cost. Non-interest expenses are included as a second input cost. The price of interest expenses is calculated as interest expenses divided by deposits. The price of non-interest expenses is calculated as non-interest expenses divided by assets. The latter input cost and price is admittedly less than ideal as it encompasses several inputs (e.g., labour and capital). However, unfortunately more disaggregated data for China's banks is not available.

This model is estimated using the DEA software, *DEAP Version 2.1* (Coelli, 1996). The variable returns to scale option is checked given that there can be no presumption that the banks in our dataset are already operating at an optimal scale.

All data used in the DEA was obtained from the *Bankscope* database. We use pooled data covering the period 2001-2006. Prior to this time, foreign investment in China's banks was not permitted and hence there are no benefits to be gained from extending the dataset further back. All nominal data was converted to real terms using the GDP deflator.

Pooled rather than cross-sectional data was used because through pooled data we are able to obtain 267 observations for the DEA. The sample comprises the big four, ex-state-owned banks, the dozen or so national and regional joint-stock commercial banks and more than 50 city commercial banks (see Table 3). Unlike Chen, et al. (2005), data relating to trust and investment companies was not included. This is because in our evaluation these financial institutions differ considerably from commercial banks in nature (see Lardy, et al., 1997). Given that DEA determines a particular firm's efficiency score by benchmarking it against other firms in the sample, including data relating to trust and investment companies might bias the results. Data on foreign banks in China also did not form part of the data set because it was not available in *Bankscope* and also because it was not until the end of 2006 that some foreign banks began to be extended national treatment.

The average CE score for each bank in our sample is presented in Table 3. We stress that caution should be exercised when interpreting the CE score of an individual bank or when comparing CE scores amongst banks because of differences in data availability (see column 2). For example, China Bohai Bank, a new bank formed with capital contributed by both domestic and foreign investors, only has data available for 2006. Its CE score for this year is low at just 0.19 but this might simply reflect start-up costs that have not yet had sufficient time to produce outputs rather than being evidence of inefficiency in a more fundamental sense. Changes in the external environment facing banks might also have an impact on CE scores in one year versus another. For example, in recent years the People's Bank of China (PBC), China's central bank, has been increasing the bank

reserve requirement in order to control the growth in the money supply. This might impact upon a bank's ability to produce outputs such as loans. While we later control for the impact of such changes on CE, Table 3 simply presents the raw DEA output. Finally, we also caution against interpreting a low CE score as being evidence that a bank is poorly managed. This may be the case but not necessarily. For example, a bank's CE score may be impacted upon by government regulations. By way of illustration, city commercial banks are restricted to opening branches within their own city's boundaries (KPMG, 2007). This might have an impact on their CE scores relative to national-wide banks, particularly for those that are located in smaller, less prosperous cities, because they are less able to achieve economies of scale and spread risk. Similarly, larger banks may receive a high CE score not because they are particularly well managed but rather simply because they benefit from economies of scale. Again, later we control for the impact of such possible influences on CE scores but the data in Table 3 does not.

Insert Table 3 here

Although some banks received a CE score of 1 in some years, Table 3 shows that no bank could claim to have been at the efficiency frontier across all the years for which data was available. With the mean CE score being 0.63, DEA points to the average bank still having considerable scope for efficiency improvements. Specifically, the average bank could reduce its input costs by 37 per cent if it adopted the best practice from amongst its high-performing peers and became both TE and AE. One factor likely influencing the sizeable scope for efficiency improvements is the restricted competition that has occurred

in China's banking sector to date. For example, in the period covered by the DEA, foreign banks were barred from competing with domestic banks in the retail market and city commercial banks, although many in number, largely did not compete with each other because of geographical restrictions on their operations.

4. Foreign Investment and Cost Efficiency

Following the approach of O'Donnell and van der Westhuizen (2002) and Gregorian and Manole (2006), a second stage regression is now performed to determine if foreign investment has explanatory power with respect to CE. Given that CE is bounded between 0 and 1, a TOBIT regression model rather than standard OLS is used. The TOBIT model is specified as follows –

$$CE_{it} = \alpha_0 + \beta_1 FI_{it} + \beta_2 ASSETS_{it} + \beta_3 LIST_{it} + \beta_4 CB_{it} + \alpha_1 D(2001) + \dots + \alpha_6 D(2006) + \varepsilon_{it} \quad (1)$$

- CE_{it} is the CE of bank i in year t .
- FI_{it} is a dummy variable that takes a value of one if bank i had foreign investment in year t . If foreign investment has resulted in efficiency payoffs, the coefficient to FI_{it} should be positive and significant.
- $ASSETS_{it}$ is the real value of total assets (in RMB billion) of bank i in year t .

This is included as a control variable to capture the fact that larger banks may reap efficiency benefits from, for example, economies of scale or being better able to spread risks. The coefficient is expected to be positive.

- $LIST_{it}$ is a dummy variable that takes a value of one if bank i was publicly listed in year t . This is included as a control variable to capture the fact that listed companies may reap efficiency benefits from better corporate governance, as has been suggested by some academics within China (China Daily, 2007). The coefficient is expected to be positive.
- CB_{it} is a dummy variable that takes a value of one if bank i was a city commercial bank in year t . This is included as a control variable to capture that the fact that, for example, government regulations and policies may differ between national-wide banks and city commercial banks and this might impact on their efficiency. The coefficient is expected to be negative.
- D 's are time dummies for the years 2001-2006 to account for the fact that pooled data was used in the DEA and, for example, government regulations and policies affecting efficiency may change from year to year.
- ε is an error term.

Table 4 presents the correlation matrix for the above independent variables. The highest correlation coefficient is just -0.55 and so no multicollinearity problems are expected.

Basic descriptive statistics are presented in Table 5. The means values indicate that the majority of China's banks are still without minority foreign investment and are not publicly listed.

Insert Table 4 here

Insert Table 5 here

Before presenting the TOBIT regression output, it is worth commenting on the possibility that *FI*, the independent variable of most interest, and *CE*, our assumed dependent variable, might suffer from an endogeneity problem. For example, foreign investors may be reluctant to invest in inefficient banks, in which case causality would run from *CE* to *FI*. However, endogeneity is unlikely to be a problem in our model for several reasons. The first reason is a technical one. *CE* is an efficiency measure that we have constructed. It has not been available to foreign investors when making investment decisions in the same way that partial efficiency measures based on accounting ratios such as the ROA have been. Endogeneity might still be a problem if *CE* were highly correlated with those partial efficiency measures but Table 6 shows this is not the case.

Insert Table 6 here

The second reason is based on the motivations of foreign investors. Observation strongly suggests that what foreign investors most want is market access, not necessarily a bank that is already efficient. A poignant example here is the case of Guangdong Development Bank (GDB). In 2005, GDB was all but insolvent and the central and provincial authorities were reluctant to provide it with fresh capital. As a result, GDB sought to bring in foreign investors. In early 2006, a Citigroup-led consortium began aggressively pursuing an 85 per cent stake. Citigroup itself was seeking a 40 per cent stake – more than double the regulatory maximum that a single foreign investor could acquire. At the same time, a consortium led by another foreign investor, Société Générale, also made a

competing bid. In commenting on the Citigroup proposal, *Business Week* (23/01/2006) observed that if the deal did receive regulatory approval, GDB,

“...would certainly need a complete overhaul in lending practices, information technology, and customer service. But once it cleaned house, Citi could make a go of distributing its array of loan and credit card products and build a nationwide branch network.”

That is, GDB was far from being considered efficient, but its existing branch network of 520-plus branches made it attractive to foreign investors nonetheless.³

Another independent variable that might appear to suffer from an endogeneity problem is *LIST*. That is, rather than whether a bank is listed or not being a determinant of *CE* via the channel of corporate governance, *CE* might determine whether which banks can list. However, once again, the partial efficiency measures that the regulatory authorities use to assess applications for listing (e.g., profitability, capital adequacy) are not those we use in our model to measure efficiency.

The TOBIT model is estimated using the econometric software package, *EVIIEWS 5.0*.

The Huber / White robust covariance option is checked to ensure that standard errors are robust to heteroskedasticity. Table 7 presents the regression output.

Insert Table 7 here

³ In late 2006, a Citigroup-led consortium did win the bid for an 85 per cent equity stake in GDB. To do so however, Citigroup itself was forced to reduce its own stake to 20 per cent - the regulatory maximum for a single foreign investor. Other domestic institutions made up the remaining 65 per cent.

While the R^2 indicates that the overall explanatory power of the model is modest, several of the variables that were included out of a specific interest emerge as being significant. With the exception of *CB*, which has a very small and insignificant coefficient, the coefficients to all other independent variables take their expected signs. Discussed in more detail later, the coefficient to *FI* is positive and narrowly misses statistical significance at the 10 per cent level. The coefficient to *ASSETS* is positive and significant at the 1 per cent level, thus confirming that larger banks tend to be more efficient than smaller ones. This finding has potentially important policy implications, although we do not discuss them in detail here because our focus is on *FI*. For example, the regulations that confine city commercial banks to operating within their own city's boundaries is likely to be damaging to their efficiency because it prevents many from achieving economies of scale and effectively spreading risk. Another example is that efficiency might be boosted if consolidation amongst China's many banks was encouraged. The coefficient to *LIST* is also positive and significant at the 5 per cent level, thus pointing to public listing being a potentially useful channel through which corporate governance in China's banks might be improved. The time dummies are insignificant.

Returning to the coefficient to *FI*, the result deserves comment on two fronts – firstly, why the coefficient might miss out on higher levels of significance, and secondly, why the coefficient is nonetheless positive and nearly double the size of its standard error.

One obvious candidate to explain why *FI* is not significant at higher levels is that foreign investors have been restricted to minority ownership stakes. Theory and existing

empirical evidence in other countries' banking sectors does suggest that foreign investment will often be accompanied by a technology transfer. However, the ability and incentive that foreign investors have to transfer technology will be strongest when they have majority, or at least controlling stakes. Of course, the Chinese government has more considerations to take into account when setting the regulatory environment surrounding foreign investment than just efficiency. For example, allowing foreign investors to take controlling stakes might lead to job losses, and the social costs of these job losses might be deemed to outweigh any efficiency gains. The Chinese government would also be aware that it will take time for foreign banks to establish branch networks that will allow them to compete more effectively with Chinese banks in the retail market. Thus, more dramatic changes in the regulatory environment such as allowing foreign investors to take controlling stakes may not be considered necessary because Chinese banks do not need to raise their efficiency to the level of international best practice overnight. The marginal significance of *FI* might also reflect the fact that the impact of foreign investment is one that is net of many factors, as alluded to in section 1.

The most compelling explanation of why the coefficient to *FI* is nonetheless positive, and only just misses out on significance at the 10 per cent level, relates to technology transfer. This is because the capital contribution made by foreign investors has been modest and if it is just fresh capital that China's banks need, this can also be obtained from domestic sources. The reasons that foreign investors may at least transfer some technology and commit to "technical assistance packages" from their position of only being minority owners are several. Firstly, even if they do not retain control over the technology they

transfer or get to capture the majority of benefits from their Chinese invested bank becoming more efficient, the sheer scale of China's banking sector might still be sufficiently large to compensate them for doing so. Foreign investors would also be aware that if they do not transfer technology while their foreign investor competitors do, their invested Chinese bank is likely to lose relative competitiveness. Secondly, foreign investors may consider that they also receive a technology transfer in the form of local knowledge that compensates them for any technology transfer they make, at least in part. This local knowledge might be put to good use when building their own branch networks. Thirdly, foreign investors might look upon transferring technology as a way to build their reputation with Chinese banks and the Chinese government. Even if the short-term payoffs that accrue to them from transferring technology are limited, the long-term returns may be more substantial and those investors with good reputations will be best positioned to capture these returns. Fourthly, Chinese banks are often in a strong negotiating position to extract concessions regarding technology transfer. As the experience of GDB highlighted, even poorly performing banks often find themselves being courted by multiple suitors. Finally, the positive relationship between *FI* and *CE* might also be as a result of those banks taking on foreign investment being more eager students, at least on average. That is, those banks that take on foreign investment have a willingness to improve their efficiency but lack the knowledge to do so, and hence when technology is transferred it diffuses with minimal impediment throughout the organization.

5. Conclusion

In 2001, the Chinese government began opening up the domestic banking sector to foreign investment. Aside from making entry by foreign banks more attractive by offering national treatment, foreign investors were also given the opportunity to take minority ownership stakes in China's banks. Numerous local banks now have minority foreign ownership, including four of the five largest. This paper sought to assess whether an efficiency payoff was evident in those banks that have taken on foreign investment. DEA was first used to generate cost efficiency estimates for China's banks over the period 2001-2006. A second stage TOBIT regression analysis was then performed in an attempt to determine whether foreign investment had explanatory power with respect to cost efficiency. A positive and marginally significant relationship was found to exist between foreign investment and cost efficiency. Other variables such as size and whether or not a bank was publicly listed were significant at higher levels.

Now that foreign banks can establish their own branch networks in China, the banking sector will be characterized by steadily increasing levels of competition, particularly in financial centers such as Shanghai. Thus, the pressure on China's banks to improve their efficiency will only mount. Overall, the findings of this paper suggest that taking on minority foreign investors can be a useful strategy to help achieve this. However, to the extent that improving the efficiency of China's banks is considered by the Chinese government to be important, the results also suggest that other factors may be more fundamental. Banking regulators may also wish to consider removing the geographical constraints that currently apply to city commercial banks and promoting consolidation in the banking sector more generally. Facilitating the public listing of more banks might

also act to raise their efficiency by improving corporate governance.

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