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The Effects of Public Listing on the Performance of Banks in China

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Abstract

Chinese banks[1] have been pushing further commercialization, corporate restructuring and public listing in recent years. The ten largest commercial banks in China[2] have all been listed, among which nine went public in the past decade.[3] This paper conducts an empirical investigation on how public listing affects the performance of Chinese banks. Particularly, we examine the pre-listing restructuring effect and the different effects of public listing locations such as Shanghai and Hong Kong, which have not received much attention in the literature. Our sample covers all the 16 listed banks in China and 17 other unlisted banks over the period of 1997-2008. Using a pooled cross-section regression, we compare three modified models built upon Berger *et al.* (2005) to consider the following three effects: 1) the static governance effect; 2) the selection effect and 3) the dynamic effect. We found that the public listing effect should be modeled as a dynamic process rather than a sudden structural change at a cut-off point, thus it is important to compare the banks' performance during the pre-listing restructuring period with the after-listing period.[4] Moreover, the public listing in Hong Kong is found to have more positive and persistent effects on banks' performance in terms of both profitability and financial safety than the public listing in Mainland China. We also provide some tentative explanations for such different effects on banks' performance, and discuss the implications to both policy makers and market participants.

Keywords: Public Listing, Cross Listing, Bank Performance, Chinese Banks

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1 Refers to 'Mainland China' in the paper.

2 Ranking in tier-one capital according to <The Banker> in June 2010.

3 Including the Agricultural Bank of China listed in the Shanghai and Hong Kong Stock Exchanges in July 2010.

4 We set the two-year period before the IPO as the restructuring period for the banks in the sample.

1. Introduction

China's banking industry has by and large experienced five phases of development since 1949, with unique characteristic in each phase.[5]

The first phase (1949 to 1978) was when China was under the mono-bank system, with the People's Bank of China being both the central bank and policy lending bank.

The second phase (1979 to 1984) was marked by the beginning of the two-tier banking system. During this period, the four state-owned specialized banks (the Agricultural Bank of China, the People's Construction Bank of China, Bank of China and the Industrial and Commercial Bank of China, the Big Four hereafter) were set up to take over the lending role from the PBOC, mainly providing services to state-owned enterprises.

The third phase (1985 to 1997) witnessed the commercialization process of the Chinese banks, signified by the establishment of joint-stock banks since 1987. Then in 1994, three policy banks were set up to take over the policy lending function from the Big Four, so that the latter become more commercialized. One year later (1995), the "Law of the People's Republic of China on Commercial Banks" was implemented.

The fourth phase came in 1997. With the unfolding of the Asian financial crisis, China had its first National Financial Work Conference, and started to take various measures to restructure the banking system. There were three major policy measures. The first step was to set up an asset management company (AMC) for each of the Big Four to strip off non-performing loans (NPL). Second, the Urban Cooperatives were restructured into city commercial banks. Third, the China Banking Supervisory Commission was established, indicating a reform also in the regulatory regime. The restructuring of NPL and banks was done in several rounds and took many years, but the first-round took place from 1998 to 2001. We also see IPO activities of a few small joint-stock banks, and the introduction of strategic investors in some banks in the restructuring process. Therefore, this phase was when the first-round bank restructuring[6] took place.

The fifth phase occurred around 2002, when the second National Financial Work Conference was held, and banks in China consecutively went for public listing. Among the 16 currently listed banks,[7] thirteen

[5] We find different ways of defining the phases of banking reform in different research papers. In this paper we use mono-bank, two-tier banking system, commercialization, restructuring and public listing to define the unique characteristic of each period.

[6] We name the period as 'first-round restructuring' to distinguish it from 'pre-listing restructuring', which, as we discuss in the paper, normally happened two years before the banks' public listing.

[7] Agricultural Bank of China and China Everbright Bank are included in the sample of listed banks, while for data from 1997 to 2008 they were both unlisted.

were listed after 2002, and one bank listed before 2002 was again listed on another stock exchange afterwards. The publicly listed banks are large commercial banks (including the four state-owned banks, or the 'Big Four'), joint stock banks and city commercial banks. Most of the banks are listed in Shanghai or Hong Kong or both, except for the Shenzhen Development Bank, which was listed on the Shenzhen Stock Exchange. The ten largest commercial banks have now all been listed, and we expect to see more IPO activities for the few remaining joint stock banks and hundreds of city commercial banks in the near future.

This new wave of public listing has raised a lot of research interest on how and why public listing affects banks' performance, and the development of such effects over time. Apart from these questions, we are going to investigate the effects of public listing on banks from various aspects that are more specific to Chinese banks.

Cross listing of banks in China is becoming more and more common. Among the 16 listed banks, 8 were listed only in the Mainland (7 in Shanghai and 1 in Shenzhen). The other 8 were listed on both the Shanghai and Hong Kong stock exchanges. Among the dual-listed banks, two were first listed in Shanghai and later in Hong Kong with a 4-year and 9-year gap respectively; another two were first listed in Hong Kong and later in Shanghai with a 2-year gap; and the rest got listed in Shanghai and Hong Kong at around the same time.

We also noticed that most banks undertook reforms in share structure, financial structure and corporate governance when preparing for the IPO. Although NPL strip-off was mainly carried out in the state-owned banks as a financial restructuring measure, joint stock banks and commercial banks also reorganized their ownership structure to improve corporate governance and financial conditions. Such efforts were aimed for the IPO, and should also affect bank performances even they were made before the bank's public listing. We think it would be more appropriate to treat public listing as a process, and to assess its effect on the bank performance for both the after-listing period and the pre-listing preparation stage before the IPO. In line with such a view, this paper will study whether a different listing location affects bank performance differently, and what the impact of the restructuring before the IPO is.

Using a modified model originally developed by Berger *et al.* (2005), we are able to separately identify the static governance effects, selection effects, dynamic effect of public listing, and more importantly, the effects of different listing locations, which could help shed light on the restructuring effects before the initial public offering.

The rest of the paper is organized as follows: Section 2 conducts a review of related literature on bank performance after listing. Section 3 briefly introduces the stylized facts about the public listings of Chinese banks. Section 4 presents the empirical models, while Section 5 reports the empirical findings. Section 6 concludes the paper.

2. Review of the Public Listings of the Banks in China

By the end of 2008, the value of total assets of the banking sector in China amounted to RMB 62.4 trillion, with RMB 58.6 trillion in liabilities and RMB 3.8 trillion in owner's equity. China's banking industry consists of 5 large commercial banks (including the 'Big Four' and the Bank of Communications), 12 joint-stock commercial banks, 136 city commercial banks, 22 rural commercial banks, 163 rural cooperative banks, and other financial institutions such as policy banks, postal savings bank, asset management companies, etc.

Among the presently 16 listed banks 5 are large commercial banks, 8 are joint stock banks and 3 are city commercial banks. We will briefly review the development of public listings of the three categories of banks and the pre-listing restructuring process of the state-owned banks in this section.

2.1 IPOs of Large Commercial Banks

The five **large commercial banks**, namely ICBC, ABC, BOC, CCB and BOCOM accounted for a slightly more than half (50.9%) of the total assets in the whole banking sector. Among all the banks in China, ICBC ranked first in terms of the tier-one capital, total assets as well as pre-tax profit after its IPO on both the Hong Kong and Shanghai Stock Exchanges. BOC and CCB ranked second, with BOC ranking slightly higher than CCB in terms of tier-one capital, but CCB higher in assets and pre-tax profit. Appendix 2 shows the ranking of the banks.[8]

After 2002, as the Chinese government encouraged further transformation of the state-owned commercial banks into modern financial enterprises, the five large commercial banks began their journey of commercialization and corporate restructuring to prepare for the future public listing. Specifically the public listing of the "Big Four" was accompanied by capital injection and stripping off the non-performing loans.

Among the five large commercial banks BOCOM was the first to get listed. In June 2005, BOCOM issued its H shares and was listed on the main board of the Hong Kong Stock Exchange, which made it the first commercial bank in Mainland China to enter the international capital market. Later, the Hong Kong and Shanghai Banking Corporation (HSBC) became the second largest shareholder of BOCOM, holding around 19.9% of the stake, while the state continued to be the largest shareholder. In May 2007 BOCOM issued its A shares and got listed on the Shanghai Stock Exchange.

Following BOCOM, CCB listed its H shares on the Hong Kong Stock Exchange in October 2005. By then CCB's listing was the largest IPO in Asia excluding Japan, the largest in the banking industry globally and

[8] The ranking might have changed after the public listing of ABC and CEB in 2010.

the world's largest IPO since the beginning of the 21st century. CCB also entered strategic investment and cooperation agreements with the Bank of America (BOA) and an investment agreement with Asia Financial Holdings Pte. Ltd. (AFH), a subsidiary fully owned by Temasek Holdings. In September 2007 CCB got listed on the Shanghai Stock Exchange, marked as the largest initial public offering at the time in the A-share market in terms of capital raised.

BOC and ICBC got listed on both the Hong Kong and Mainland stock market in 2006. BOC was formally corporatized in Beijing as a state controlled joint-stock commercial bank in August 2004, which was listed on the Hong Kong Stock exchange in June 2006 and on the Mainland stock market one month later. ICBC was listed on both exchanges at the same time on October 27 2006, which was by then the largest offering in the history of the global capital market (just exceeded by the IPO of ABC in July 2010).

In October 2008, the State Council approved the "Overall plan of the joint stock reform of the Agricultural Bank of China". The bank's tier-one capital more than doubled in 2008 after a $19bn capital injection from China's sovereign wealth fund. Non-performing loans of the bank were reduced from 23.5% to a much healthier 4.32% after the restructuring. On January 15, 2009 ABC was officially transformed to a joint-stock company, the Agricultural Bank of China Limited. In July 2010 ABD got listed in Shanghai's A-share market, and was listed in Hong Kong's H-share market. By the end of August 2010 it had became the world's biggest IPO, surpassing the benchmark previously set by ICBC.

2.2 IPOs of Joint-Stock Commercial Banks

The second largest type of banks in China is **joint-stock commercial banks**. They differ from other small banks in that they operate nationwide, while most city commercial banks are restricted to conducting business in specified areas (but the situation is changing nowadays, where some city commercial banks are also allowed to operate across the nation). The aggregate assets of joint-stock commercial banks accounted for around 14.1% of the total assets of China's banking sector by the end of 2008. There are 12 joint-stock commercial banks in China, among which eight are listed.

Shenzhen Development Bank (SDB) was the first joint-stock bank to launch its IPO in May 1987, even before the establishment of the Shenzhen stock exchange in 1990. Its shares were formally listed and transacted on the Shenzhen Stock Exchange since April 1991.

It was not until almost ten years after the listing of SDB that the second joint stock commercial bank in China got listed. Shanghai Pudong Development Bank (SPDB) was established in October 1992, officially opened in January 1993 and listed on the Shanghai Stock Exchange in November 1999.

Forward into the 21st Century, six other Joint Stock Commercial Banks got listed on the Mainland stock market, three of which also got listed in Hong Kong. Among them are the China Minsheng Banking

Corporation (CMBC), China Merchants Bank (CMB), Hua Xia Bank (HXB), Industrial Bank (IB), China Citic Bank (CITIC) and China Everright Bank(CEB). CEB got listed most recently on the Shanghai Stock Exchange after China SAFE Investments Limited injected RMB 20 billion of equivalent in US dollars into CEB for holding around a 70.55% stake of the bank. Apart from the five large commercial banks, these six listed joint stock banks together with SPDB and the Bank of Beijing were also ranked from the sixth to the thirteenth largest Chinese banks.[9]

There are another four Joint-Stock Commercial Banks that have not yet been listed. Evergrowing Bank (EB), China Zhejiang Bank (CZB) and China Bohai Bank (CBB) were newly established in 2003, 2004, and 2005 respectively. The Guangdong Development Bank (GDB) was established in 1988. In 2006, it started introducing foreign strategic investors, and now Citigroup holds a 20% stake in GDB, while IBM holds 4.74%. It was also reported that GDB has been considering an initial public offering recently to help finance its expansion, but the location, size and timing of the listing are still unknown.

2.3 IPOs of City Commercial Banks

Besides the banks discussed above, three other banks were listed in China and they belong to another category: **city commercial banks**. They are the Bank of Nanjing, Bank of Ningbo and Bank of Beijing. All three were listed on the Shanghai Stock Exchange in 2007. Currently there are other city commercial banks preparing for public listing.

No banks in other categories are listed so far; therefore we will not discuss them in detail here. It should be noted that the China Development Bank (CBD), presently a policy bank, is also going through a commercialization process, evolving from merely a policy lender to a more commercialized financial institution. However, it denied any imminent plan to launch an initial public offering.

2.4 Pre-Listing Restructuring

With the Chinese financial industry's unique characteristics in mind, we include pre-listing restructuring as an indispensable part of public listing. For state-owned banks (the 'Big Four') and some banks that received a government bailout (such as CEB), those restructuring measures included capital injection from the central government or quasi-government vehicles and stripping-off of non-performing loans. For other commercial banks the restructuring measures included issuance of subordinated debts to improve capital adequacy, possible private offers before listing to improve shareholder structure and corporate governance, and auction or write-off of bad loans. In summary, the restructuring is aimed to make the banks satisfy the listing requirement or make them more attractive to investors in the capital markets.

[9] Reference to Appendix 2.

For example, a capital injection of USD 22.5 billion was granted to CCB by Central Huijin Investment Co. in 2003 before its listing in 2005. Central Huijin is a wholly state-owned entity which was established in 2003 specifically to make capital injections and hold shares of state-owned banks on behalf of the government. Central Huijin also injected USD 22.5 billion to BOC for its public listing. On the other hand, CCB and BOC together auctioned off RMB 278.7 billion worth of non-performing loan to China Cinda Asset Management Corporation in June 2004.

In April 2005, Central Huijin invested a total amount of USD 15.0 billion in ICBC. ICBC disposed of RMB 246.0 billion of non-performing loans classified under the loss category and certain impaired assets to China Huarong Asset Management Corporation in May 2005. It further transferred RMB 459 billion in doubtful loans to the four big asset management companies in June 2005. Moreover, a total of RMB 35.0 billion subordinated bonds were issued in August 2005 to strengthen the bank's capital base to meet the required capital adequacy for public listing.

China Everbright Bank launched a series of financial restructuring before its listing. In November 2007, CEB received a capital injection equivalent to RMB 20 billion from Central Huijin Investment Ltd. In 2008 and 2009 the bank disposed of non-performing assets, tackled historical left-over problems, introduced eight domestic investors and issued subordinated bonds, further increasing its core capital and lowering its bad loan ratio. In its 2009 annual report the bank reported that 'In 2009, the Bank enhanced its preparation efforts for IPO. At the end of the 2009, all of its technical indicators met the criteria for IPO and thus started the process for IPO approval'. In August 2010 CEB was listed on the Shanghai Stock Exchange.

These restructuring efforts vigorously implemented by the banks and strongly supported by the government are on one hand part of the financial reform plan, but on the other hand are also indispensable measures to prepare the banks for future public listing. In this sense, the public listing should be treated as a process rather than a sudden change in order to assess the performance in both the preparation stage and post-listing period.

3. Literature Review

Only a few researchers have analyzed the impact of public listing on China's banking sector, due to the relatively small number of listed banks and the short time series. However, on a broader basis there has been a lot of research into trying to find out and explain factors that affect bank performances. In this section, we briefly review some of the important works related to the determinants of bank performance, especially the research covering China.

3.1 Initial Public Offering and Bank Performance in China

How initial public offering affects a bank's performance is a question of both academic and practical interest.

One strand of research is to examine the bank performance before and after the IPO. Recently, Wu, Chen and Lin (2009) examined the impact of initial public offerings on China's banking sector, covering data from 1996 to 2004 and using the return on assets (ROA) and the return on equity (ROE) to measure the performance. Their results show that the operational performances of listed banks are inferior to that of unlisted banks, while the IPOs of Chinese banks have a significant positive impact on ROA. They attribute the inferiority of listed banks in operational performance to several factors, including unsatisfactory stock market regulation, weak corporate governance, limited financial innovation capabilities, insufficient risk control, etc. At the same time, Luo and Yao (2009) investigated whether IPO is effective in enhancing bank performance. Using the DEA (data envelopment analysis) approach on the data of the listed banks during 1999, they showed that on average bank efficiency increased by almost 10% after listing, and the previously inefficient state-owned commercial banks were catching up and reducing the efficiency gap with the joint stock banks.

Another strand of research studies different effects of IPO on both banks and firms in other industries. Chen and Shih (2003) investigated the performance of Chinese initial public offerings (IPOs) on 884 firms by using the data covering the period of mid-1995 to mid-1999, and suggested that listed firms did show better performance after the public listing. However, since there was only one bank public-listed before 1999 and it was included in the sample, one cannot draw a solid conclusion that public listing improves China's banks' performance in general.

The third strand takes the externality of public listing into account. An IPO of a large bank would sometimes bring a shock to the whole industry rather than just affecting the bank's own performance. Chen, Li, and Moshiran (2005) studied the reaction of the rival banks and non-bank financial institutions to the IPO announcement of the Bank of China Hong Kong (BOCHK). They found that some of the banks reacted negatively to the announcement. Their results also showed that HSBC, the largest bank in Hong Kong, had no significant reaction to the listing announcement, while the Hang Seng Bank, the third largest bank in Hong Kong, suffered a loss after the announcement. The BOCHK out-performed the rival banks and financial institutions in Mainland China one year after its IPO.

3.2 Ownership Structure and Performance in China and Foreign Countries

We also look into the literature on the relationship between bank ownership and performance because public listing almost always causes bank ownership structure changes. For previously wholly-owned state

banks, public listing will introduce minority private ownership and in overseas listing cases, foreign ownership.

Yao, Han, and Feng (2008) examined ownership reform, foreign competition and efficiency for Chinese national commercial banks by employing the DEA methodology to assess the efficiency of commercial banks. Their findings revealed that the Chinese national banks have become considerably more competitive in recent years, indicating that the national commercial banks have reacted positively and aggressively to ownership reform and foreign competition.

Berger, Hason, and Zhou (2007) analyzed the efficiency of Chinese banks over the period 1994-2003, and showed that state-owned commercial banks were the least efficient ones among banks of different ownership structure and foreign banks were the most efficient. Jiang, Yao, and Zhang (2009) examined the effects of governance changes on bank efficiency in China between1995-2005. The result showed that bank efficiency has improved overall, while joint-stock ownership was associated with better performance in terms of profitability than state ownership. Lin and Zhang (2006) assessed the effect of bank ownership structure on performance, and found that the Big Four (ICBC, ABC, BOC and CCB, by then all wholly owned by the state) were less profitable, less efficient and had worse asset quality than other types of banks.

Foreign strategic investor is another aspect in the bank ownership that attracted much research attention. The above three papers also took this aspect into consideration. Berger, Hason, and Zhou (2007) suggested that minority foreign ownership is associated with significantly improved efficiency. Jiang, Yao, and Zhang (2009) found that foreign acquisition might benefit domestic banks through efficiency gains in the long run, and initial public offerings appears to have only short-term effects. However, Lin and Zhang (2006) showed that only pre-event performance improvement is found in banks that underwent foreign acquisition.

In addition, Alicia García-Herrero and Santabárbara (2008) also found evidence that the Chinese banking system has benefited from the entry of foreign investors, indicated by higher profitability and increased efficiency of the banking system. Their study also pointed out that while strategic foreign investors help improve efficiency of the local banks, pure financial foreign investors contributed little to domestic bank performance.

While most people believe foreign strategic investors can enhance profitability of the local banks, some research found the opposite. Wu, Chen, and Lin (2007) examined the impact of foreign bank entry on the operational performance of the Chinese banking sector. The results showed that the return on assets (ROA) for those Chinese banks that have foreign shareholders is on average lower than the ROAs for banks that do not have foreign shareholders.

Besides the study of the effect of public listing on Chinese banks, there is also some related research on the relationship between ownership and performance of banks in foreign countries. Otchere (2009) analyzed the competitiveness and value effects of bank privatization in developed countries, and found that privatization of banks has indeed helped enhance operating performance significantly by improving the quality of their loan portfolios, with their asset quality reaching to the level of the industry counterparts eventually.

Research on the effect of bank privatization on performance in developing countries was far more controversial. Beck, Cull, and Jerome (2005) assessed the effect of privatization on performance in a panel of Nigerian banks for the period 1990-2001, and found evidence of performance improvement in nine banks that were privatized (among them some of the privatizations were implemented through flotation on the stock exchange while some were sold to the staff.). However, Otchere (2005) observed that the privatized banks in the middle- and low- income countries underperformed the benchmark index in the long run, documented only marginal improvements in the post-privatization operating performance of the privatized banks, and submit that perhaps the continued government ownership of the partially privatized banks might have hindered managers' ability to restructure the firms.

Bonin *et al.* (2004) also investigated the effects of ownership, especially by a strategic foreign owner, on bank efficiency for eleven transition countries and found that private ownership by itself is not sufficient to ensure bank efficiency in transition countries, and found no statistically significant evidence of an adverse effect between government ownership and private domestic ownership, while the participation of an international institutional investor has a considerable additional positive impact on profit efficiency.

In comparison with previous literature, our research contributes to the existing literature mainly in three aspects. First, we examined the effect of different listing places (Mainland and Hong Kong) on Chinese banks' performance, which is an important issue and has not been paid enough attention to. The empirical findings are of practical importance to policy makers and bankers to understand the implication of the IPO locations. It can also help the investors and shareholders of banks make more strategic investment decisions.

Second, we treat public listing as a dynamic process rather than a one-time phenomenon. Therefore, besides studying the performance change after listing, we also examine the effects during the pre-listing restructuring period of the IPO, which have seldom been looked into in previous research.

Third, we use data from 1997 to 2008 for both listed and some unlisted banks, while previous literature mainly applied data before 2005. This enables us to judge the effects in a longer time-span and more comparatively as most banks got listed in the past decade.

4. Empirical Models

We collect data for all the 16 listed banks from the *Bankscope* and *Chinese Almanac of Finance*, as well as 17 unlisted banks as the control group. Our sample period extends from 1997 to 2008 and contains nearly 400 observations. Since not all variables are available for all banks, fewer observations are included in some of the regressions (the number of observations in each regression is indicated in the result).

Our analysis focuses on the effects of public listing on the performance of banks, particularly the cross-listing effect presented in the Chinese banking sector. To address this question step by step, we employed three empirical models: one is the original model of Berger *et al.* (2005), and the other two are extensions based on it. The classical model of Berger would serve as a benchmark and lay a foundation for our modification later.

Model 1: Test of Dynamic Effect of Public Listing

Bank Performance Measure = Constant

+ α_i * Ownership Form Indicators
+ β_1*Selection Effect Indicator
+ β_2*Dynamic Effect of Public Listing
+ β_3*Number of Years Since Public Listing
+ β_4*Age of Bank
+ β_5*Log of lag Asset
+ Year Fixed Effect+ Error Term.

Performance Variables (Dependent Variables)

As stipulated in Article 4 of the <Law of the People's Republic of China on Commercial Banks>, 'the business operations of commercial banks shall be governed by the principles of safety, liquidity and efficiency'; we therefore use three measures to examine the different aspects of bank performance. First, following the most popular methodology, we use the return on asset ratio or ROA, defined as profit before tax divided by average assets, to measure a bank's profitability or profit efficiency. We use 'profit before tax' rather than 'after-tax profit' to avoid the effects caused by tax system changes. Second, we use the non-performance loan ratio or NPL, defined as the ratio of impaired loans to gross loans to measure a bank's safety. Third, we use the cost to income ratio or CIR, defined as the ratio of the operating costs (administrative and fixed costs, such as salaries and property expenses) to operating income, to measure cost efficiency. It is worth noting that some recent research pointed out that CIR might not be a suitable measurement for efficiency and may lead to distorted results (Burger, Moormann, and Sottocornola 2009).

Here we simply use CIR as a proxy since there are no other good alternatives due to data availability. Together with these three variables, we are able to examine the effect of public listing on bank performance from different perspectives.

Key Independent Variables

The Ownership Form Indicator indicates the types of ownership structure for a bank. We specify three types of ownership forms, namely large commercial bank, joint stock bank and city commercial bank. These variables equal 1 for all periods for a bank with the corresponding ownership form and 0 for all periods for all other banks. The coefficient α_i measures the static effect on bank performance of ownership structure over the long term.

The Selection Effect Indicator is a dummy variable indicating whether banks are listed over the entire sample period. Typically, it equals 1 for banks listed for all periods, and zero otherwise. The coefficient β_1 identifies the performance effects associated with being chosen to undergo public listing. It measures the pre-listing performance differences between listed and unlisted banks. In other words, for regressions with ROA, if the selection effect is positive, it means that the pre-listing performances of listed banks were superior to those of unlisted banks. It may be due to the fact that private investors tend to target better banks or the Chinese government selected better banks for public listing in order to attract foreign investors and avoid failure of the banking reform. Ignoring such an effect will cause selection bias in the results.

The Dynamic Effect of Public Listing variable equals 0 for a bank before the bank's public listing and equals 1 after this bank is listed, thus it is time-varying for the banks that got listed during the sample period. For those banks that were not listed in the whole sample period, this variable equals 0 for all periods. Including this variable can help capture the changes in performance that arise because of the public listing. (See Table 1)

The Number of Years Since Public Listing variable captures the long-term trend of the dynamic effect in the period after the public listing. This variable equals 0 before a bank's public listing and 1 starting the next year following the public listing and 2 for the second year and so on. The dynamic effect of public listing variable and the number of years since public listing variable focuses on short-term and long-term effects respectively.

Control Variables

The set of control variables include the age of the bank and the logarithm of lagged assets. In the original model of Berger (2005), the logarithm of lagged assets and lagged market share are the exogenous variables used as control variables, and they both prove to have a significant influence on the banks'

performance. We follow Berger by using the logarithm of lagged assets since large banks may have enjoyed performance advantages over relatively small banks. We also include the age of the bank as our control variable, since banks established for a longer time might have enjoyed performance advantages over relatively new banks because of more experience in market practice and solid customer relationship. By controlling for these exogenous variables, we expect to reduce the correlation of the error term and the dependent variable, and reach a more precise estimate of the effects caused by our key independent variables.

After controlling for the above bank specific factors, we still need to consider the macro environment that affects the performance of all the banks in China. In previous literature, GDP was one of the control variable used most often for the macroeconomic environment, and it is sometimes used with other variables such as market development index, which controls other aspects of the macro environment. Another more simple and reliable method, which we are going to use in our model, is to employ a fixed effect model to control for all the common factors that apply to all the banks in the same period, which was also adopted in the original model of Berger (2005).

We tried both the fixed effect and random effect models, and conducted Hausman tests for all the regressions. The results suggest that the fixed effect models perform better for all the regressions. All the following regressions are run with fixed effect. A detailed explanation of all variables in the models is given in Appendix 3.

Using this model, we can examine the short term and long term effect of the public listing in both Mainland and Hong Kong. Take the regression with ROA as an example, if $\beta_{2,}$ the coefficient of the Dynamic Effect of Public Listing reports to be positive and significant, then there is a positive effect of public listing on bank profitability; on the other hand, if it's negative and significant, then the effect on bank profitability is negative. The value and significance level of β_3 indicate the developing trend of the dynamic effect. A positive and significant result would indicate an improving trend of profitability over time, while a negative and significant result would suggest the profitability is declining over time, or the positive dynamic effect is weakening over time if β_2 is positive.

Similarly, for the regression with NPL, if $\beta_{2,}$ the coefficient of the Dynamic Effect of Public Listing is positive and significant, then there is a negative effect of public listing on bank safety (the higher NPL, the less safety); on the other hand, if the regression result is negative and significant, then it shows the public listing has a significantly positive effect on banks' safety. In same sense, a negative and significant result of β_3 would indicate a lasting improving trend of safety over time, while a positive and significant result would suggest the safety level is worsening over time, or there is a weakening trend of the dynamic effect if β_2 is negative.

For the regression with CIR, if $\beta_{2,}$ the coefficient of the Dynamic Effect of Public Listing is positive and significant, there is a negative effect of public listing on bank cost efficiency (the higher CIR, the less cost efficiency); on the other hand, if it's negative and significant, then the effect on bank cost efficiency is positive. A negative and significant result of β_3 would indicate an improving trend of cost efficiency over time, while a positive and significant result would suggest the cost efficiency level is worsening over time, or there is a weakening trend of the dynamic effect if β_2 is negative.

Model 2: Test of Listing Place Effect

Bank Performance Measure = Constant

+ α_{i*} Ownership Form Indicators
+ β_1*Selection Effect Indicator
+ β_2*Dynamic Effect of Mainland Listing
+ β_3*Dynamic Effect of Hong Kong Listing
+ β_4*Number of Years Since Mainland Listing
+ β_5*Number of Years Since Hong Kong Listing
+ β_6*Age of Bank
+ β_7*Log of lag Asset
+ Year Fixed Effect+ Error Term.

This model separates the effects of public listing on banks listed in Mainland from banks listed in Hong Kong stock market (as eight banks listed in Hong Kong stock market are also listed in the Mainland, they are actually all dual-listed). We keep other variables unchanged, and breakdown the Dynamic Effect of Public Listing variable Listing and the Number of Years Since Listing variable into Mainland and Hong Kong parts. We expect to see some difference in the results and significance levels in the coefficients of Mainland and Hong Kong variables.

Model 3: Test of Pre-listing Restructuring Effect:

Bank Performance Measure = Constant

+ α_i*Ownership Form Indicators
+ β_1*Selection Effect Indicator
+ β_2*Mainland Listing Restructuring Effect Indicator
+ β_3* Hong Kong Listing Restructuring Effect Indicator
+ β_4*Age of Bank
+ β_5*Log of lag Asset
+ Year Fixed Effect+ Error Term.

When a bank is poised to go public, it is common practice for it to have some restructurings beforehand to make it more investor-attractive, with measures ranging from finance to legal to ownership structure perspectives. We observe that a listed bank normally takes around 2 years in restructuring before its public listing, and we tend to analyze the performance changes in the two-year period. Model 3 enables us to test this hypothesis.

The two Restructuring Effect Indicators help us address the pre-listing restructuring effects of Mainland and Hong Kong public listing respectively.

5. Empirical Results and Analysis

As we discussed in section 4, we find it desirable to use a year fixed effect in our regression to control for the macroeconomic and political factors that have the same impact on all the banks in China. We ran Hausman tests in Stata for all the nine regressions, using the "sigmamore" option which is recommended by Stata when comparing fixed-effects and random-effects linear regression because it is much less likely to produce a non-positive-definite-differenced covariance matrix (although the tests are asymptotically equivalent whether or not one of the options is specified).

The results as shown in Table 2 suggest that all the regressions should be run using fixed-effect models.

5.1 Empirical Results of Model 1

Table 3 is the empirical results of Model 1. The first three columns show the results of the regressions using Model 1, with profitability, safety, and cost efficiency as the dependent variables respectively.

Starting with the ownership form variables, the coefficients for both OWN2 and OWN3 are significant at the 1 percent significance level in the regression with ROA. They are significant at higher significance

levels in the regressions with NPL and CIR. Based on the setting of the dummy variables and the sign of the coefficients, we find that city commercial banks perform better than joint-stock banks, while joint stock banks perform better than large commercial banks, especially reflected in the profitability performance. This is consistent with the findings in some previous literature regarding bank ownership and performance (e.g. Lin and Zhang 2006, Fu and Heffernan 2005, Jiang, Yao, and Zhang 2009, Berger, Hasan, and Zhou 2006), in which state-owned banks are found to be the least profitable.

The coefficients of the Selection Effect Indicator are also significant, and it is positive for the regression with ROA and negative for regressions with NPL and CIR, indicating that banks chosen for initial public offering already had better pre-listing performance than unlisted banks. In other words, these banks with outstanding performance were selected to undergo public listing, by the government and investors. The result is not surprising as previous literature regarding public listing or foreign acquisition had always found a strong selection effect (e.g. Lin and Zhang 2006, Jiang, Yao, and Zhang 2009), suggesting that governments choose to list better banks in order to attract foreign and private investors and to secure the success of the listing. At the same time we believe the selection effect is also partly due to the pre-listing restructuring measures that we will discuss later.

The coefficient of Dynamic Effect of Public Listing shows us the short-term changes in bank performance due to the public listing. It is positive and significant at a 1% level of significance for the regression with ROA, which means the overall bank performance on profitability improved after the public listing. The coefficient of Dynamic Effect of Public Listing is negative and significant at a 1% level for the regression with NPL, meaning the bank performance on safety improved as well after the public listing.

We actually observe a positive but insignificant coefficient of Dynamic Effect of Public Listing in the regression with CIR. One explanation for this could be the more internationalized salary scheme adopted by the listed banks might have increased the operating cost of banks, partly offsetting the profit efficiency improvement from listing.

The Years since Public Listing variable tells us how in the long run the effect of public listing develops. For the regression with ROA, the coefficient is negative and significant at the 1 percent level, meaning that in the long run the positive effect on bank profitability after IPO fades out. In the same sense, for the regression with NPL, there is also a dampening out of the short term effect, as the coefficient is positive and significant at a 1% level. While there is no significant short-term change of cost to income performance after the listing, the effect on CIR ratio also seems to have a weakening trend in the long term after the listing, as we observe a positive and significant coefficient of Yeas since Public Listing in the regression with CIR.

Previous literatures on the dynamic effect of public listing and the trend of the effect give somewhat contradictory results. For example, Lin and Zhang (2006) found little influence of public listing on bank

performances in both the short run and long run, while Jiang, Ya, and Zhang (2009) found that IPO only have some short-term effects. Wu, Chen, and Lin (2009) found a short-term positive impact on the return of assets, but over time, the impact on ROA became negative again. In comparison, the literature for similar issues of banks in developed countries did show that a public listing helps improve bank performance in the long run. We suppose the differences shown in the short-term effect and long-term effect of public listing of banks in China in some way show that the listed banks in China are not mature and developed enough and the bank reforms need to be continued and deepened after the banks' listings. Our later analysis on different listing places and pre-restructuring effect will help to analyze this further.

The control variable, Age of Bank, reports to be insignificant in all three regressions, indicating that age is not an influential factor determining the bank's performances. On the other hand, the coefficient of Log of lag Asset is positive and significant at a 5% level in the regression with NPL, while not significant in the other two regressions. This may suggest that when controlling for the ownership form, banks with larger assets tend to have more severe non performing loan problems. In some previous research, Wu, Chen, and Shiu (2007) found that the performance of large Chinese banks is inferior to that of the smaller shareholding commercial banks, however, their model did not control for the ownership form of the banks.

5.2 Empirical Results of Model 2 (Table 4)

In this model, we focus on the explanations of the dynamic effects of different market listings. As we discussed earlier, eight banks were listed only in the Mainland and the other eight were dual-listed in the Mainland and Hong Kong.

The coefficients of the ownership dummies are slightly different from results in Model 1 in NPL. In Model 2, we do not find significant NPL differences in different ownership structures. Selection Effect Indicator is significant at all significance levels, which is the same as what we found in Model 1. Similar to the result in Model 1, the coefficient of Age of Bank is insignificant in each of the three regressions, while the coefficient of Log of lagged asset is significant in the regression with NPL and ROA.

For the regression with the ROA performance measure, we see a very significant positive coefficient for Dynamic effect of Hong Kong listing, while the coefficient of Dynamic effect of Mainland Listing is positive but not significant at any significance level. This suggests that an initial public offering at the Hong Kong stock market has a significant positive impact on bank profitability, but an IPO at the Mainland stock Market seems not to.

The coefficients for Years since Listing also show favorable result for listing in the Hong Kong market. The coefficient for Years since Mainland Listing is negative and significant at a 5% level, indicating that the bank's profitability declines as time goes by, while the coefficient for Years since Hong Kong Listing is positive and insignificant.

The regression with NPL, the safety measure, also shows favorable results for Hong Kong stock market listing, similar to what we found from the regression with ROA. Both the coefficients of the Dynamic Effect Indicators for Mainland and Hong Kong are negative and significant at a 5% level. The coefficient for Years since Mainland Listing is positive and significant at a 1% level, while the coefficient for Years since Hong Kong listing is negative but not significant, meaning that the positive effect on the safety of a listed bank tends to weaken in a long-term perspective, but this is not the case with banks listed in Hong Kong stock market.

For regression with CIR, the results show that an IPO has no significant short-term influence on the cost efficiency of a bank either listed in the Mainland or Hong Kong, given that the coefficient for Dynamic Effect of Listing is not significant in either case.

Similar to that of the ROA performance, in a longer time perspective, the cost efficiency performance also seems to deteriorate a little bit for banks listed in the Mainland market, with the coefficient of Years since Mainland Listing being positive and significant at a 10% level. Meanwhile the coefficient for Years since Hong Kong listing is negative, but it is not significant at conventional levels.

We believe some factors might further explain why the public listing in Hong Kong seems to have more positive and persistent effects on bank performance in both profitability and safety.

First, the Hong Kong stock market is generally more mature and consists of a higher percentage of institutional investors than domestic stock markets. These investors tend to make their investment decisions based on fundamentals, and are generally more outspoken in communicating with management of banks. Their investment decisions might also attract funds towards better-performing banks. Therefore, we expect that the management of the Hong Kong listed banks might have made more of an effort to improve the performance indicators including ROA and NPL than their counterparts of domestically listed banks as they feel more market attention and pressure from institutional investors on these issues.

Second, we also expect that the Hong Kong stock market can provide more mature supervision and internationalized horizon which might help banks listed in HK to achieve better performance in the long run. For example banks listed in Hong Kong will submit their financial statements in accordance with the International Financial Reporting Standards promulgated by the International Accounting Standards Board and the disclosure requirements of the Hong Kong Companies Ordinance. International firms are also recruited to provide auditing and legal opinions. Moreover, banks listed in Hong Kong normally have more international exposure and overseas horizon, which may also help them learn some skills from their international peers.

Third, Hong Kong listed Banks generally have a higher foreign-investor ownership percentage than banks listed in the Mainland,[10] and that might also help bring better corporate governance to the banks. According to Berger, Hason, and Zhou (2007), minority foreign owners might take positions on the board or even in the management of banks and "leverage" these positions to improve the corporate culture and management. Take the Bank of China as an example, in 2006 after its listing in HK, among the 16 board members one is from the Royal Bank of Scotland, one of BOC's strategic investors, and another is from Temasek Holdings, another BOC investor. Moreover, there are four independent directors as board members, most of whom work overseas including one director as ex-chairman of the Hong Kong Securities and Futures Commission. In management's perspective from March 2005 to September 2006 the post of Chief Credit Officer of BOC was even taken by Lonnie Dounn who has worked at the HSBC for over 30 years. The participation in the corporate governance and management by foreign investors might help bring their experience to Chinese banks.

Besides better corporate governance, these foreign investors might also introduce more overseas business development opportunities to the banks. Take CCB as an example. In 2006 CCB purchased a 100% interest in the Bank of America (Asia) Limited and its subsidiaries, achieving a major breakthrough in its overseas expansion. According to the annual report of CCB, following the acquisition, the size of its operations in Hong Kong doubled. In terms of customer loans it climbed from sixteenth to ninth place in HK. After the acquisition the renamed CCB Asia became a platform for CCB to develop retail banking in Hong Kong and Macau. BOA is also a strategic investor of CCB. All said, higher percentages of foreign strategic investors and their efforts in helping improving corporate governance and risk management and brining new business opportunities might lead to the better performance effects of HK listed banks.

5.3 Empirical Results of Model 3 (Table 5)

This model is built to show the effect of pre-listing restructuring on Chinese banks. The coefficients of the Static Ownership Indicators are slightly different with Model 1 in NPL, but the Selection Effect Indicator and control variables all report similar results as before for all three regressions. Here we focus on the explanation of the two extra variables in this model, namely Mainland Pre-Listing Restructuring Effect and Hong Kong Pre-Listing Restructuring Effect.

For the regression with ROA, the coefficient of Hong Kong Pre-Listing Restructuring Effect shows a positive and significant result, indicating that banks listed on the Hong Kong stock market experience a significant profitability improvement before their public listing due to the pre-listing restructuring.

For the regression with NPL, the coefficients for Hong Kong Pre-Listing Restructuring Effect and the Mainland Pre-Listing Restructuring Effect both show a negative and significant effect, which means that

[10] Please see Appendix 4: foreign-investor ownership of listed banks.

the safety of banks listed on both domestic and Hong Kong markets improve substantially in the preparing stage for the initial public offerings.

For the regression with CIR, the coefficient of Mainland Pre-listing Restructuring Effect is positive and significant, implying that the cost to income ratio of banks listed on the Mainland stock market actually increases (meaning the cost increases more quickly than the income does) as banks prepare for their initial public offering. This phenomenon is not observed before a bank's public listing in Hong Kong, suggested by a negative and insignificant coefficient of Hong Kong Pre-Listing Restructuring Effect.

From the above results we mainly get two findings: First, most banks in China experienced profitability and safety improvement during the two-year pre-restructuring period. This reinforces our view that we should treat listing as a process rather than a cut-off date, and the restructurings brought about by and before public listing should be counted in when assessing effects of listing to banks in China. Second, we find more obvious pre-listing restructuring effects for the Hong Kong listed banks than Mainland listed banks. We expect two factors might explain the differences. First, before 2004 no banks in China were listed overseas and international investors normally had little idea about banks in China. Therefore, the banks that got listed in Hong Kong took more restructuring measures than their domestic counterparts; second, as we mentioned, the government carried out various restructuring measures mainly in state-owned banks from 1998 to 2004. In the end these banks all got listed in the Hong Kong market.

6. Conclusion

In this paper, we test the effects of public listing on the performance of the banks in China, particularly to examine whether there is a significant difference in the effects on the banks listed in different markets (Mainland or Hong Kong), and whether there are pre-listing restructuring effects. By employing the original model of Berger *et al.* (2005), we test the public listing of banks in both the Hong Kong and Mainland stock market as a whole. Furthermore, we extend the model, to separate the effects of public listing in the Hong Kong and Mainland stock market and include the pre-listing restructuring effects. We use data of 33 banks (including 16 listed banks and 17 unlisted banks) in a 12 year period from 1997 to 2008. We assess bank performances from three perspectives using profitability, safety and cost efficiency measures.

The empirical results of Model 1 confirm some of the previous findings in the banking efficiency literature, showing that better performing banks were selected to be listed, and different ownership forms have an influence on performance, particularly reflected in their profitability difference. It also suggests that the age of a bank is not a very significant factor influencing a bank's efficiency, while larger banks (measured by asset size) tend to have more non-performing loan problems after controlling the ownership form. Overall, a public listing has a positive influence on Chinese banks' profitability, but the positive effect

tends to weaken in the long run. We find a substantial and significant decrease in the NPL ratio in terms of the dynamic effect, meaning the safety of banks listed in both markets also improved in the short run, but the effect weakens in the long run as shown in the Years since Public Listing regression. While we do not find a significant change in the cost to income ratio in the short term, we do find an increasing trend of it in the long term, which is probably due to the more internationalized salary scheme adopted by listed banks. The results are basically consistent with most of the previous research.

Using Model 2, we find that a public listing in Hong Kong has more significant and long lasting improvements on bank performance than a listing in the Mainland. The regression result with ROA shows that only listing in the Hong Kong market significantly helps improve ROA performance in the short run, and the improvement proves to be long lasting in the long run, while for a listing in the Mainland, we only observe a worsening trend of ROA in the long run. For the regression with NPL, the safety indicator, while we find the relationship between NPL and listing insignificant both in the Mainland and HK, we actually find a significant negative long-run effect after Mainland listing, and there is no such relationship in Hong Kong. For the cost to income ratio, we find a similar result where there is a deteriorating trend of cost efficiency for banks listed in the Mainland but no significant evidence for banks listed in Hong Kong.

The overall picture favors a public listing in Hong Kong, compared with a listing in the Mainland. As we discussed, the reasons might lie in the following. First, Hong Kong-listed banks possibly made more effort to improve performance due to more market participation of the institutional investors, who focus more on the financial indicators, and make investment decisions based on fundamentals in a relatively mature stock market such as Hong Kong. In comparison investors in the Mainland stock markets are less experienced and more individual-based, possibly causing the management of the listed banks to pay less attention to the banks' performance. Second, the Hong Kong stock market might provide a better market supervision mechanism and more internationalized horizon to the listed banks compared with domestic stock markets. Finally, the higher foreign-investor ownership percentage of the Hong Kong-listed banks might bring better corporate governance and culture, more mature management experience and also more business development opportunities, through nominating members in the board and management team, helping overseas acquisition and co-operation, or simply making the banks' management become more open and transparent.

We find an obvious pre-restructuring effect for listed banks during the two-year period before IPO, and we also find that the effect seems more impressive in the Hong Kong listing than in the Mainland listing. For profitability and safety, we find a positive and much more significant effect resulting from the Hong Kong listing than from the Mainland listing. In cost to income ratio we find a significant and positive effect of the Mainland listing, while an insignificant effect for the Hong Kong listing. The differences may be explained by better preparation for overseas listing and more restructuring work for state-owned banks.

We believe there are three aspects to the policy implications for the policy makers. First, as we found a more favorable performance improvement in the Hong Kong market, it is highly encouraged that more unlisted and currently solely Mainland listed Chinese banks get listed in the Hong Kong market. Although this paper focuses on the performances of banks, it is reasonable to think that IPOs of other state-owned entities might also have similar effects.

Second, as we found out that a more developed and internationalized stock market can have a more preferable stimulation on the performance of listed banks, we would suggest the government keep developing the Mainland stock markets to make them more mature and transparent. As we discussed in the paper, some policies that are encouraged to be taken include allowing more participation of institutional investors, improving education of individual investors, requiring financial reporting of listed companies to be more transparent and generally accepted, and helping listed companies in the stock markets to be more open and internationally exposed.

Last but not the least, as we discussed in this paper, the public listing is not a cutting-off point. Instead it should be treated as a continuing process that starts ahead of the actual listing date and endures long after. To avoid the fading-out effect in the long run, the shareholders and management team of the listed banks should continue their effort of reforming and restructuring to really live up to the stated policy goal of 'transforming into internationally competitive joint-stock commercial banks with appropriate corporate governance structures, adequate capital, stringent internal controls, safe and sound business operations, quality services as well as desirable profitability'. Only then can the banks' performance be truly improved fundamentally and in the long run.

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Table 1. Major Dummy Variables in the Model

Banks		**Dummy Variables**				
				Ownership Dummies		
		Selection	**Dynamic**	**Own1**	**Own2**	**Own3**
Listed	**Listed for all period**	1	1	Equals 1 for state owned banks, 0 otherwise	Equals 1 for joint stock banks, 0 otherwise	Equals 1 for city banks, 0 otherwise
	Listed in the middle of the period	1	Equals 0 before listing, 1 after listing			
Unlisted		0	0			

Table 2. Hausman Test of the Regressions

Hausman Test						
	ROA		NPL		CIR	
	chi2(7)	prob>chi2	chi2(7)	prob>chi2	chi2(7)	prob>chi2
Model 1	60.29	0	30.71	0.0001	83.58	0
	chi2(9)	prob>chi2	chi2(9)	prob>chi2	chi2(9)	prob>chi2
Model 2	68.1	0	57.15	0	80.74	0
	chi2(7)	prob>chi2	chi2(7)	prob>chi2	chi2(7)	prob>chi2
Model 3	70.5	0	40.7	0	80.15	0

Table 3. Regression Results of Model 1

	Model 1		
	ROA	**NPL**	**CIR**
Constant term	-0.003	2.899	61.867***
	[-0.02]	[0.77]	[9.05]
OWN2	0.199***	-3.174*	-5.388*
	[2.69]	[-1.95]	[-1.78]
OWN3	0.536***	-0.507***	-10.738**
	[4.31]	[-0.22]	[-2.48]
Selection Effect Indicator	0.177***	-5.029***	-10.119***
	[3.02]	[-4.97]	[-4.80]
Dynamic Effect of Public Listing	0.213***	-3.757***	1.313
	[3.73]	[-3.37]	[0.87]
Years since Public Listing	-0.033***	0.565***	0.335**
	[-3.71]	[4.93]	[1.99]
Age of Bank	0.001	0.129	-0.241
	[0.17]	[1.00]	[-1.03]
Log of lag Asset	0.091	2.996**	-2.483
	[1.47]	[2.49]	[-1.15]
R Square	0.4454	0.4619	0.5253
Adjusted R Square	0.4106	0.4124	0.4955

Run with fixed effect, *, **, *** represents significance level of 10%, 5%, 1%, respectively.

Table 4. Regression Results of Model 2

	Model 2		
	ROA	**NPL**	**CIR**
Constant term	-0.041	2.694	63.125***
	[-0.22]	[0.70]	[8.95]
OWN2	0.258***	-3.977**	-6.467*
	[3.41]	[-2.02]	[-1.92]
OWN3	0.586***	-0.961	-11.865***
	[4.71]	[-0.39]	[-2.61]
Selection Effect Indicator	0.179***	-4.686***	-10.534***
	[2.92]	[-4.46]	[-4.82]
Age of Bank	0.003	0.183	0.267
	[-0.47]	[1.42]	[1.11]
Log of lag Asset	0.105*	3.098**	-2.724
	[1.71]	[2.55]	[-1.24]
Dynamic Effect of Mainland Listing	0.069	-2.629**	2.525
	[1.25]	[-2.41]	[1.51]
Dynamic Effect of Hong Kong Listing	0.332***	-4.257**	-1.697
	[3.34]	[-2.12]	[-0.77]
Years since Mainland Listing	-0.021**	0.445***	0.288*
	[-2.43]	[4.24]	[1.74]
Years since Hong Kong listing	0.010	0.051	-0.873
	[0.22]	[0.07]	[-0.87]
R Square	0.4742	0.4896	0.5274
Adjusted R Square	0.4371	0.4366	0.4940

Run with fixed effect, *, **, *** represents significance level of 10%, 5%, 1%, respectively.

Table 5. Regression Results of Model 3

	Model 3		
	ROA	**NPL**	**CIR**
Constant term	0.004	1.683	62.203***
	[0.02]	[0.44]	[8.95]
OWN2	0.226***	-3.14	-5.673*
	[2.89]	[-1.62]	[-1.75]
OWN3	0.569***	-0.785	-11.157**
	[4.43]	[-0.32]	[-2.48]
Selection Effect Indicator	0.150**	-3.389***	-10.512***
	[2.43]	[-3.17]	[-4.83]
Age of Bank	0.004	-0.147	0.406
	[-0.65]	[1.10]	[1.59]
Log of lag Asset	0.099	3.627***	-3.362
	[1.63]	[2.84]	[-1.52]
Mainland Pre-Listing Restructuring Effect	0.023	-1.711***	2.050**
	[0.83]	[-3.16]	[2.29]
Hong Kong Pre-Listing Restructuring Effect	0.201***	-2.641***	-1.822
	[5.32]	[-2.60]	[-1.42]
R Square	0.4745	0.5078	0.5253
Adjusted R Square	0.4415	0.4625	0.4955

Run with fixed effect, *, **, *** represents significance level of 10%, 5%, 1%, respectively.

Appendix 1. Names and Abbreviations of Banks Discussed in this Study

Abbreviations	Full names
ABC	Agricultural Bank of China
BOA	Bank of America
BOC	Bank of China
BOCOM	Bank of Communications
CBB	China Bohai Bank
CCB	China Construction Bank
CDB	China Development Bank
CEB	China Everbright Bank
CZB	China Zhejiang Bank
CITIC	China Citic Bank
CMB	China Merchants Bank
CMBC	China Minsheng Bank Corporation
EB	Evergrowing Bank
GDB	Guangdong Development Bank
HSBC	Hong Kong and Shanghai Banking Corporation
HXB	Hua Xia Bank
IB	Industrial Bank
ICBC	Industrial and Commercial Bank of China
PBOC	People's Bank of China
SDB	Shenzhen Development Bank
SPDB	Shanghai Pudong Development Bank

Appendix 2. Listed Banks in China

Banks	Established time	Listing Time	Listing Place	Characteristic	Ranking in China[1]
SDB	1987	1991	Shenzhen	Joint stock	16
SPDB	1992	1999	Shanghai	Joint stock	10
CMBC	1996	2000, 2009	Shanghai, HK	Joint stock	7
CMB	1987	2002, 2006	Shanghai, HK	Joint stock	8
HXB	1992	2003	Shanghai	Joint stock	13
BOCOM	1908, 1987[2]	2005, 2007	HK, Shanghai	Large	5
CCB	1954, 1979[3]	2005, 2007	HK, Shanghai	Large	3
BOC	1912, 1979[4]	2006	HK, Shanghai	Large	2
ICBC	1984	2006	HK, Shanghai	Large	1
IB	1988	2006	Shanghai	Joint stock	9
CITIC	1987	2007	Shanghai, HK	Joint stock	6
Bank of Nanjing	1996	2007	Shanghai	City	20
Bank of Ningbo	1997	2007	Shanghai	City	25
Bank of Beijing	1996	2007	Shanghai	City	12
ABC	1951, 1979[5]	2010	Shanghai, HK	Large	4
CEB	1992	2010	Shanghai	Joint stock	11

Notes:

1. Ranking in tier-one capital according to <The Banker> in June 2010. Among them ICBC, BOC and CCB were within the world's top fifteen banks in terms of tier-one capital (7th, 14th and 15th respectively).

2. Founded in 1908, BOCOM was one of four oldest banks established before 1949 (the other three were 'Central Bank', 'Bank of China' and 'the Peasant Bank of China'). In 1958, while the BOCOM Hong Kong Branch continued to operate, the Mainland business of BOCOM was merged with People's Bank of China. BOCOM was restructured in July 1986 and began operation anew in April 1987.

3. CCB was first established in 1954, while it was under the Ministry of Finance. In 1979 it was separated from the Ministry of Finance and became a specialized bank.

4. BOC was first established in 1912. In 1950 BOC was transferred under the management of the People's Bank of China. In 1979 BOC was separated and became a specialized bank.

5. ABC was first established in 1951. In 1965 it was combined with the People's Bank of China. In 1979 it was restructured to become a specialized bank.

Appendix 3. Variables in the Regression Models

Symbol	Definition	Mean	Stdev	Sample
Bank Performance Measures				
ROA	Return on asset; measures bank profitability; net profit before tax divided by total assets	0.6076	0.4256	322
NPL	Impaired loan to total loans; measures safety	6.4491	6.6783	207
CIR	Costs to operation income; measures cost efficiency	49.2511	15.5288	320
Exogenous Variables				
Model 1				
Ownership Form Indicators				
OWN1	Dummy indicating a state owned large bank. Equals 1 or 0 for all periods for a bank, exclude from the regression as the base case.	0.1515	0.3590	396
OWN2	Dummy indicating a joint stock bank. Equals 1 or 0 for all periods.	0.3636	0.4817	396
OWN3	Dummy indicating a city bank. Equals 1 or 0 for all periods.	0.4848	0.5004	396
Selection Effect Indicator	Dummy indicating a bank that underwent a public listing over the entire 1997-2008 interval. Equals 1 or 0 for all periods for a bank	0.4848	0.5004	396
Dynamic Effect of Public Listing	Dummy indicating the years following a bank's public listing. Equal 0 prior to a bank's pub listing and 1 starting the next year following the first change. Equals 0 for all periods for banks that did not undergo a public listing	0.1389	0.3463	396

Variables in the Regression Models (Continued)

Symbol	Definition	Mean	Stdev	Sample
Years since Public Listing	Number of years since a public listing. Equals 0 for all periods prior to a bank's public listing and starts with 1 for the year following the public listing and 2 for the second year and so on. Equals 0 for all periods for banks that didn't undergo a public listing	0.7020	2.3669	396
Age of Bank	The age of the bank since it is established	11.4872	6.3964	351
Log of lag Asset	Log of total assets in period t-1 for each bank	2.1543	0.7895	289
Model 2 (additional)				
Dynamic Effect of Mainland Listing	Same as Dynamic Effect of Public Listing except that it indicates dynamic effect of the public listing in Mainland stock market	0.1616	0.3686	396
Dynamic Effect of Hong Kong Listing	Same as Dynamic Effect of Public Listing except that it indicates dynamic effect of the public listing in Hong Kong stock market	0.0480	0.2140	396
Years since Mainland Listing	Same as Years since Public Listing except that it indicates the trend of dynamic effect in China Mainland stock market	0.6768	2.3603	396
Years since Hong Kong listing	Same as Years since Public Listing except that it indicates the trend of dynamic effect in China Mainland stock market	0.0556	0.3291	396
Model 3 (additional)				
Mainland Pre-Listing Restructuring Effect	Equals 1 for the second year before Mainland listing and 2 for the first year before listing and years after listing, and equals 0 for other periods.	0.2955	0.6870	396
HongKong Pre-Listing Restructuring Effect	Equals 1 for the second year before Mainland listing and 2 for the first year before listing and years after listing, and equals 0 for other periods.	0.1111	0.4418	396

Appendix 4. Foreign-Investor Ownership Percentage of Listed Banks[1]

Banks	Listing place	Main foreign strategic investor	Other foreign investors	Total foreign-investor ownership percentage
SDB	Shenzhen	Newbridge Asia AIV		16.76%
SPDB	Shanghai	Nil		0%
Bank of Nanjing	Shanghai	BNP PARIBAS	IFC	15.9%
Bank of Ningbo	Shanghai	OCBC Bank		10%
Bank of Beijing	Shanghai	ING Bank	IFC	20.1%
HXB	Shanghai	DEUTSCHE BANK		13.37%
IB	Shanghai	Nil		0%
CEB	Shanghai	Nil		0%
Average foreign ownership percentage of Mainland listed banks				**9.51%**
CMB	Shanghai, HK	Nil		18.1%
BOCOM	HK, Shanghai	HSBC		40.54%
CCB	HK, Shanghai	Bank of America	Temasek Holdings	25.15%
BOC	HK, Shanghai	Royal Bank of Scotland	Temasek Holdings, UBS and others	26.65%
ICBC	HK, Shanghai	Goldman Sachs	Alliance, American Express	20.6%
CITIC	Shanghai, HK	BBVA		20.7%
Average foreign ownership percentage of dually listed banks				**25.29%**

Notes:

1. The above data source is from 2008 annual reports of the listed banks. We did not include CMBC and ABC as both banks were listed in Hong Kong after 2008.