The Competitiveness of State-owned Commercial Banks in China

Jianlu Shang

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Abstract

China has undertaken a series of comprehensive economic and banking reform programs over the past three decades. As part of the WTO agreement, the domestic financial sector is fully open to foreign investors from WTO member countries in 2006. To answer the challenges, the policy makers and management of SOCB have been introducing two major steps to improve the Competitiveness of the commercial banks: transfer the bad debts to asset management companies and inject foreign exchange reserves to capital. However, the qualitative study shows that the general performance of the state-owned commercial banks is unstable during this period. It is high time that the consequences and efficiency of the reform were examined on an objective basis. This research offers a careful and rigorous examination of the condition and determinants of banking efficiency and competitiveness in China, with the focus on the state-owned commercial banks. The key contribution of this study is to develop a comprehensive empirical framework to measure and explain the performance of the state-owned commercial banks during the crucial transitional period from 1998 to 2003.

This research examines the banking market conditions on the basis of a synthesis of the traditional Structure-Conduct-Performance paradigm and other alternative hypotheses. The thesis reveals that the state-owned commercial banks still dominate in both retail and business banking markets. The interest earnings remain the dominant source of commercial revenues. Due to the special relationship with government and their operational characters in the financial market, the state-owned commercial banks are not sensitive to monetary policy adjustments. The competition from other type of commercial banks has been strengthening, but the impact is rather limited.

The main contribution of this study to the empirical literature on the Chinese banking market is the employment of the Data Envelopment Analysis to measure the efficiency of the state-owned commercial banks at provincial level, followed by a panel econometric investigation into the differences in banking efficiency across the stat-owned commercial banking groups as well as individual provinces. The results show that the level of banking efficiency was generally very low and there was a significant extent of input surplus among the provincial branches. The source of inefficiency is different among individual banking groups. The econometric study reveals that the SOCBs benefit from the concentrated market structure and strong complementary relationship with their traditional business areas. The empirical results have also shed light on further policy measures to enhance banking competition and performance in China.

List of figures and tables

Acronyms and Abbreviations

ABC   Agriculture Bank of China

ABIS   Agricultural Bank of China Integrated Banking System

ACFB   Almanac of China's Finance and Banking

AMC   Asset Management Company

ATM   Automatic teller machine

BOC   Bank of China

BOCOM   Bank of Communications

CASS   Chinese Academy of Social Science

CAMEL   Capital Adequacy, Asset Quality, Management Quality, Earnings Quality and Liquidity

CBRC   China Banking Regulatory Commission

CCB   China Construction Bank

CDB   China Development Bank

CEB   China Everbright Bank

CIRC   China Insurance Regulatory Commission

CRn   n-bank concentration ratio

CRS   Constant returns to scale

CSRC   China Securities Regulatory Commission

DEA   Data Envelopment Analysis

DFA   Distribution-free approach

DMU   Decision making unit

DRS	Decreasing returns to scale
ES	Efficient Structure
FDH	Free disposal hull
FISIM	Financial Intermediation Services Indirectly Measured
GDP	Gross Domestic Product
HHI	Herfindahl-Hirschman Index
HKD	Hongkong Dollar
HSBC	Hong Kong Shanghai Banking Corporation Limited
Huijin	China SAFE Investments
ICBC	Industrial and Commercial Bank of China
IFRS	International Financial Reporting Standards
IPO	Initial Public Offerings
IRB	Internal Rating-based
JSCB	Joint-stock Commercial Banks
MPC	Monetary Policy Committee
NPL	Non-performing Loans
OECD	Organisation for Economic Co-operation and Development
OMO	Open market operations
PB	Policy Banks
PBC	People's Bank of China
RCC	Rural credit cooperative
RMB	Renminbi

RMP	Relative-market power
SCP	Structure-Conduct-Performance
SETC	State Economic and Trade Commission
SFA	Stochastic Frontier Approach
SGE	Shanghai Gold Exchange
SNA	System of National Accounts
SOCB	State-owned Commercial Banks
SOE	State-owned enterprise
SME	Small- to medium-sized enterprise
TFA	Thick frontier approach
UCC	Urban credit cooperative
USD	US Dollar
WTO	World Trade Organisation

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Chapter I. Introduction

1.1 Background of the current study

After three decades of market-oriented reform, the Chinese banks are considered to be successful facing the financial crisis in 2008. The three floated Chinese banks (ICBC, BOC and CCB) "are now the world's largest by market value after the financial crisis destroyed the value of most US and European banks" (BBC news, 2009). An increasing amount of theoretical and empirical studies have examined the challenges and opportunities facing the Chinese banking industry from 1990s (e.g. Xu, 1998; Lardy, 1998; Huang, 1998; Chen, et. al., 2005; Fu and Heffernan, 2007). A critical analysis of the Chinese banking sector in the broad context of China's accession to the WTO and economic reform is highly significant.

A large body of theoretical and empirical studies have established that greater financial development fosters growth and that financial development is related to a country's institutional characteristics, including its legal framework (Levine and Haubrich, 2004). A cross-country literature has found that growth in external dependent sectors is faster with more-competitive banking systems (Claessens and Laeven, 2004). Well-developed financial markets make it easier for firms to attract needed financing (Rajan and Zingales, 1998) as well as for improving the overall economic efficiency through risk-taking, risk-sharing and risk-reduction mechanisms offered by the modern banking and financial facilities. Although some

of the relationships between competition and banking system performance have been analysed in the theoretical literature and even empirically in some country studies, cross-country empirical research has so far mainly investigated the effects of regulations and specific structural or other factors on banking performance. For example, in a broad survey of rules governing banking systems, Barth et al. (2001) document for 107 countries various regulatory restrictions that were in place in 1999 on commercial banks, including various entry and exit restrictions and practices. Using this data, Barth et al. (2004) document (among other things) that tighter entry requirements are negatively linked with bank efficiency, leading to higher interest-rate margins and overhead expenditures, and that restricting foreign bank participation tends to increase bank fragility.

The importance of a modern banking and financial sector is vividly illustrated by the historical experiences in both the developed and developing countries. At the beginning of the 1990s, the sudden stagnation of the bubble-inflated Japanese economy was predated with the collapse of the banking and financial markets. Japan's high growth period came to an abrupt end. Japanese banks faced a massive overhang of bad loans. It is suggested that absence to undertake a number of "unconventional and bold" monetary policy measure put a drag on the economic recovery and an inefficient banking system is one of the central factors underlying the Japanese "lost decade" in the 1990s (Saxonhouse and Stern, 2003). In contrast, the Organisation for Economic Co-operation and Development (OECD), which

groups together the world's most advanced economies, assesses the British economy as among the strongest in the developed world in 1990s (OECD, 2001). Prior to the 2008-2009 global financial and economic crisis, the UK economy enjoyed significantly lower unemployment and inflation rates and higher GDP growth rate than most of the developed countries for the previous two decades (Riley, 2006). Rajan and Zingales (1998) examined the relation between economic growth in different industries and countries and the interaction of financial development of countries and the financial dependence of industries. Their report showed that there is a particularly strong relation when accounting standards are used as the measure of financial development of countries. They conclude that their results "suggest that financial development has a substantial supportive influence on the rate of economic growth and this works, at least partly, by reducing the cost of external finance to financially dependent firms" (Rajan & Zingales, 1998, p584).

In the developing world, several waves of bank crises have hit the Latin American countries' banking system since the 1980s. Many countries take a series of measures to reform their malfunctioned banking system, including financial liberalisation and strengthened regulatory regimes (Park and Wang, 2001). In many cases, these reforms were successful in strengthening banking system and averting banking crisis. Transparent and prudential regulatory and supervisory frameworks played an important role in the successful countries (Hilbers et. al, 2005). In others such as the

case in Argentina, however, the efforts were less successful and the banking and financial systems suffered repeated crises in the new millennium.

The Chinese banking industry has started to be restructured with the establishment of the Construction Bank and Bank of China since 1978. Many packages of reform have been introduced in stages to fundamentally strengthen the efficiency and competitiveness of the Chinese domestic banks, especially the state-owned commercial banks, over the past three decades. However, the measures that have been taken do not seem to have resulted in the desired effects. According to the official estimates, the rate of non-performing loans in the big four state-owned commercial banks, which stood at 2.5 trillion Yuan (equivalent to US$3.0 trillion at the current exchange rate) by the end of 2004, was 14.98% of the total bank loans (Liu, 2005). This figure is deemed to be underestimated because of the devious rating system. The inefficient allocation system, personnel management system and operational mechanism make many important reform measures sterile. The Chinese banking system needs a comprehensive shakeup.

The prospect of economic growth and gigantic amount of deposits are fascinating to international investors. The growth target of the Chinese economy is 8% per annum, as announced in the Prime Minister's government operational report (Wen, 2009). This rate of growth is believed by some analysts to be feasible for the next ten to twenty years (Liu, 2009). The currently stable political environment is regarded to be

conducive for the realisation of the growth potential for the foreseeable future. The amount of deposits was 25.3 trillion Yuan by the end of 2004 (PBC, 2005). China's entry to the WTO provides the international investors ample opportunities to tap into the huge potential in the Chinese market. According to the WTO agreement, within five years after accession to the WTO, foreign financial institutions will be permitted to provide services in China without restriction on either clients or geographic coverage. Some foreign banks have already staked out the ground. In 2004, HSBC took a 19.9% stake in the Bank of Communications (HSBC, 2004). In the year before, Citigroup owned 4.62% of Pudong Development Bank (Citigroup, 2003). The international shareholders make the domestic bank to take more prudential operational strategies. According to an official source from the Pudong Development Bank, the banking group has benefited from the Citigroup's interpellation since 2003 (Pudong Development Bank Annual Report, 2004). Moreover, some city banks are preparing to issue share on the stock market. The government injected US$ 45 billion of foreign exchange reserve to the Bank of China and the Construction Bank to enhance their capital adequacy ratios (ACFB, 2005). The State Council established a new regulatory institution, China Banking Regulatory Commission, to supervise the commercial banks.

1.2 Research aims and objectives

In the light of the recent trends in both the world and Chinese economies, especially the banking sector, also given the overwhelming dominance of the state-owned

commercial banks in China, the aims of the current research are to define, measure and evaluate the factors underlying the competitiveness of the Chinese state-owned banking sector in the context of recent economic and banking reforms from 1998 to 2003. More specifically, the current study attempts to achieve the following objectives:

➢ To examine the evolution of the functions and market structure of the Chinese banking sector over the period of economic reform.

➢ To reveal the efficiency of the Chinese state-owned commercial banks at provincial level.

➢ To assess how the competitiveness of the Chinese state-owned banking sector is affected by economic, market, bank-specific and institutional factors.

1.3 Research methods

The structure of the remainder of the thesis is as follows. Chapter 2 provides an overview on the economic and banking reform process in China in the past three decades. The focus is on the banking regulatory framework, general banking market conditions and market structure. Chapter 3 examines the internal organisation, competitive strategies, business models and general financial performance of individual banking groups. Chapter 4 reviews the main theoretical literature on the measurement and determination of banking performance. Details of the empirical research on the Chinese state-owned banks and the main research findings are presented in Chapters 5 and 6. The final chapter concludes.

The current study provides a synthesis and critical review of the literature on banking efficiency measurement and determination. In light of the theoretical controversy surrounding the definition and measurement of banking output, market conditions and data limitations, this thesis adopts a bank production function approach to examine the efficiency of the Chinese SOCBs over the period 1998-2003. Applying Data Envelopment Analysis (DEA) and decomposition analysis, this thesis conducts a thorough investigation into the technical input efficiencies of the Chinese SOCBs at the provincial level. Subsequently, a panel econometric approach is adopted to determine the significant factors underlying the differences in banking efficiencies across the state-owned banking groups as well as the Chinese provinces. For the econometric model, a random individual effects model is found to be best suited for the empirical investigation through rigorous empirical testing. Alternative theoretical hypotheses about the relationship between market condition, market structure, bank conduct and performance are incorporated into the econometric model and empirically tested. To the best knowledge of the author, the current study represents the first attempt to examine the Chinese state-owned banking sector at the provincial level.

1.4 Main findings

The empirical results show that, despite decades of rigorous efforts by the Chinese central government to reform the banking sector, the level of efficiency for the whole

state-owned commercial banking sector remained very low throughout the study period. As a result, there was a significant extent of input surpluses: even by 2003, around 50% of the main inputs to the banking production process, e.g., bank branches, number of employees and bank cards could be cut to achieve the most efficient levels of banking outputs. The empirical results also reveal significant differences in banking efficiency across the banking groups as well as the 31 Chinese mainland provinces. In trying to explain such differences, the empirical tests lend strong support to the institutional complementarity and the traditional structure-conduct-performance hypotheses and in the mean time reject the relative market power hypothesis. It appears that the SOCBs benefit from a concentrated market structure and the strong relationship with the traditionally established areas of businesses. Such relationships confer a significant advantage on a particular banking group at the expense of the other groups. The empirical results also led to some conclusions about policy implications.

Chapter II. Evolution of the Chinese Banking Industry

2.1 The overall banking system in China

Before 1979, the People's Bank of China (PBC) was the only bank in China. It played the dual role of being both the Central Bank and the commercial bank. The Chinese government began to reconstruct the banking system with the establishment of specialised banks and entry of foreign banks from 1979. The four specialised banks, including the Industrial and Commercial Bank (ICBC), Construction Bank (CCB), Bank of China (BOA) and Agriculture Bank of China (ABC), were set up from 1979 to 1984. As the separate business scope gradually diminished, these banks became commercial banks in the late 1980s. Foreign banks began to operate in 1979, led by the Bank of East Asia. The joint-stock commercial banks, city commercial banks and asset management banks were set up in the 1990s. By the end of 2006, the institutions of Chinese banking system included 5 state-owned commercial banks, 3 policy banks, 12 joint-stock commercial banks, 4 asset management companies, 113 city commercial banks, 78 urban credit cooperatives, 19348 rural credit cooperatives, 13 rural commercial banks, 80 rural cooperative bank, 70 Business groups affiliated finance companies, 54 trust and investment companies, 6 financial-leasing companies and 1 Postal Savings Bank and. In addition, there were also 209 foreign bank branches and 242 foreign representative offices (ACFB, 2007).

Even before China's accession to the WTO in 2001, the government began to

reconstruct the banking system. Four asset management companies were set up in 1998 and 1999 specifically to resolve the huge amount of non-performing loans of the four state-owned commercial banks. They took over about 1.4 trillion Yuan (equivalent to US$170 billion at the current exchange rate) of non-performing loans (ACFB, 2001) (an extensive evaluation of non-performing loans in the banking sector under the 'performance section' in Chapter 3). The China Banking Regulatory Commission (CBRC) was set up in 2003, specializing in the supervision and management of commercial banks, asset management companies and other deposit financial institutions. The government recapitalized the Bank of China and the Construction Bank in 2004 (ACFB, 2005) and the Industrial and Commercial Bank in 2005(ACFB, 2006). They are all listed on both the Shanghai and Hong Kong stock markets. CCB, BOC and ICBC were listed on Hong Kong stock market in October 2005, June 2006 and October 2006, on Shanghai stock market in September 2007, July 2006 and October 2006(ACFB, 2006-2008). On the other hand, the foreign banks are interested in investing in the opening market. HSBC, headquartered in London, took nearly 20 percent stakes in China's Bank of Communications (Yi, 2009). A few foreign banks have shown their interest to float on the Shanghai stock market (Cai, 2009).

Over the past five years, capital injections, tax exemptions and the introduction of foreign investors have mended the pace of the reform of the Chinese banking system. The major Chinese commercial banks have improved their capital and asset structures

remarkably (ACFB, 2007). Three of the four SOCBs, ICBC, CCB and BOC, have changed their ownership structure after the successfully IPOs on Hong Kong and Shanghai stock exchanges (the details of ownership structure will be discussed in section 5 in this chapter). Their financial performance has been dramatically improved after the stock market flotation. All of the four SOCBs claimed they have achieved a significant business success in 2007 (ICBC, ABC, BOC and CCB's Annual Report, 2008). ABC was the most profitable bank in 2007(ABC's Annual Report, 2008). The joint stock commercial banks have also developed their business aggressively, although a number of them are still facing serious deterioration in their balance sheets (A brief introduction to the joint stock commercial banks will be provided in section 6). So far, the Chinese banking system has turned down the fears that it will fall into serious disarray in the near future and the SOCBs have become the world's largest banks in the last two years (BBC news, 2009). On the other hand, the Chinese banks have started to invest in the foreign capital market. But most of the investments have turned out to be unsuccessful (Jiang, 2008). The Chinese banks still have a long way to go to strengthen the modern functions of risk management, corporate governance and new banking businesses on both domestic and international markets.

Most recently, the main thrust of banking reform has been directed at the competitive capabilities and efficiency within individual banking groups of the SOCBs. Significant amounts of resources and efforts have been deployed to increase their business scope, improve banking and financial services, strengthen the internal

management and risk control systems, and increase operational autonomy. Since 2002 the SOCBs have gained more autonomy in deciding their deposit and lending rates (Bi, 2006). More recently, apart from the traditional wholesale and retail banking businesses, the Chinese SOCBs have also adopted the universal banking model to venture into other fee-based or capital-gains-based banking and financial investment activities (apart from investing in the stock market). Due to the increasing complexity and risk of modern banking, the SOCBs have implemented measures to instil an independent credit culture and equip the credit managers with modern systems to monitor various elements of risks. This includes the adoption of 5-cateloge loan classification system (ACFB, 2003) and plans to set up the internal rating-based (IRB) loan systems (consistent with Basle II regulations). The risk management function has been separated from the business function. Internal audit and compliance systems have also been strengthened to safeguard against fraud through system upgrading and staff training. At the operational level, the SOCBs have implemented changes to consolidate operations and increase efficiency. During 2002-2005 the number of branches of the big four has declined by 27 percent while the number of employees has declined by 7 percent (shown in Table 5). How successful such efforts are in improving banking efficiency and competitiveness within individual banking groups remains an open question. Finding a sensible answer is the key task of the current study.

Despite the relative decline, due to their vast banking infrastructure as well as political

and historical reasons, the SOCBs still dominate the retail banking market and the business banking market for the state-owned enterprises. In 2005, the SOCBs accounted for a market share of 63 percent of consumer deposits and 70 percent of consumer loans. On the corporate side, the SOCBs shared 75 percent of the deposits and about 70 percent of corporate loans in 2005. As China's bond and equity markets are still at the nascent stage, the SOCBs remain the most important source of finance for Chinese non-financial institutions (see Table 1 below) and the largest employers of banking employees (56 percent in 2005)[1].

Table 1. Source of finance for China's domestic economy (percent)

	2001	2002	2003	2004	2005	2006H1
Bank loans	75.9	80.2	85.1	82.9	78.1	86.8
Government bonds	15.7	14.4	10	10.8	9.5	1.4
Corporate bonds	0.9	1.4	1	1.1	6.4	6.1
Equity issuance	7.6	4	3.9	5.2	6	5.6
Total	100	100	100	100	100	100

2006 H1: first half of 2006

Note: The figures are derived out from ACFB 2002-2007. The shares are the amount of the bank loans, government bonds, corporate bonds and equity issuance divided by the total amount of the source of the domestic economy respectively.

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[1] Unless stated otherwise, all the figures in this section are derived from the data contained in the Almanac of China's Finance and Banking.

2.2 Stages of reforming the Chinese SOCBs

The People's Bank of China (PBC) was incorporated by North China Bank, North Sea Bank and Northwest Peasantry Bank in 1948 (PBC, 2004a). Before 1979, China's economy operated under a central planning system and the PBC played the dual role of being both the central bank and commercial bank. As a matter of fact, the PBC was not functioning as a normal banking institution but rather as an auxiliary resource allocation mechanism in a central-planning economy. The amounts and destinations of bank loans as well as the interest rates were all determined by the State Planning Commission together with the central fiscal and monetary authorities (Ministry of Finance and the PBC). As a major plank of the market-oriented economic reform programmes that started in 1979, the Chinese government began to reform and restructure the banking system. As the Chinese banking reform programme concerning the whole sector has been extensively discussed in the literature (see, e.g., Li, et al., 2001; Chen, et. al., 2005; Fu and Heffernan, 2007, 2009; Lin and Zhang, 2008), this section only attempts to map out the key milestones in the reform process concerning the state-owned banks. Based on the history of the reform and Fu and Heffernan's literature, the reform process can be divided into the following four key stages.

i).   Separation of the People's Bank of China (PBC) from commercial banking and establishment of specialised state-owned banks (1979 – 1993). The focus of the early stage of the banking reform was on the establishment of the PBC exclusively as the central bank, together with the establishment of

state-owned specialised banks and the acceptance of entry by foreign banks from 1979. The specialised banks, including the Industrial and Commercial Bank (ICBC), China Construction Bank (CCB), Bank of China (BOC) and Agriculture Bank of China (ABC), were set up from 1979 to 1984 to serve the specific needs that arose from the implementation of the Chinese government economic plans in designated areas. They are the so-called "big four" in banking industry in China. Bank of East Asia was the first foreign bank operated in 1979. The ICBC, CCB, BOC and ABC were all allowed to accept deposit and to engage in lending in the mid-1980s. This is the beginning of commercialisation of the "big four" (PBC, 2004b).

ii). Commercialisation of the big four state-owned specialised banks (1994 – 1998). In order to separate policy needs from commercial considerations within the state-owned specialised banks, several policy-oriented banks such as China Development Bank, the Export-import Bank of China and Agricultural Development Bank of China were set up under the direct control of the State Council in 1994 (ACFB, 1995). The restriction on each banking group to operate in designated areas of business was also removed. The financial supervision institutions were being specialised in this period, including China Securities Regulatory Commission and China Insurance Regulatory Commission. The PBC is still the only supervisory authority in banking industry.

iii). Management of assets and especially non-performing loans of the SOCBs

(1998 – 2002). Throughout the 1980s and 1990s, since the SOCBs were obliged to lending almost exclusively to the inefficient state-owned non-financial sectors, a significant amount of bad loans had accumulated. Towards the end of the 1990s, the official estimate of the proportion of bad loans among the SOCBs was over 25 percent (ACFB, 2001). So a pressing agenda for the subsequent reform programme was to make the SOCBs commercially viable. Four asset management companies (AMCs) were set up in 1999 specifically to resolve the huge amount of non-performing loans of the SOCBs. They took over about 1.4 trillion Yuan (equivalent to US$170 billion at the exchange rate of 1999) of non-performing loans (NPLs), which amounted to 15.6 percent of the total assets of the four banks (ACFB, 2001). Each AMC had a charter of ten years and was supposed to recover as many of the NPLs as possible through debt-to-equity swap, bankruptcy and debt-restructuring. Nevertheless, the official figure for the proportion of non-performing loans among the SOCBs still stood at 25 percent at the end of 2002(ACFB, 2003).

iv). Partial flotation and strategic alliance with foreign financial institutions (2003 – present). With China's accession to the WTO in 2001, the Chinese government's effort to reform the banking and financial services also sped up. Another significant step taken by the government to make the SOCBs commercially viable was to recapitalise them before listing them on the stock markets. Over the period 2004 - 2005, the Chinese government injected

US$60 billion of foreign exchange reserves into the capital of BOC, CCB

and ICBC before these banks were successfully listed on the Hong Kong

Stock Exchange in 2005 and 2006(ACFB, 2006-2007). The floatation of

these banks attracted unprecedented level of interests, including interest from

foreign financial institutions that were eager to enter the potentially lucrative

Chinese banking market. Legions of well-known international banking and

financial institutions, having gained incremental access to the market since

China's admission to the World Trade Organisation, are buying minority

stakes in Chinese banks (and other Chinese financial institutions) as well as

expanding their limited branch networks in the country. Currently,

restructuring of the ABC is underway and it is likely to be floated in the near

future. On the other hand, the SOCBs are made look like profitable. It is

surprising that ABC became the most profitable commercial bank in China in

2007.

At the same time as establishing state-owned market-oriented commercial banks, the

Chinese government has also gradually opened up the Chinese banking market to

competition from banks of alternative ownership structure, such as private banks,

domestic joint-stock banks formed by local governments and corporations,

domestic-foreign joint-stock banks, and foreign banking and financial institutions.

Currently there are twelve national shareholding banks, more than 100 city

commercial banks, and tens of thousands of urban and rural credit unions. These latter

types of banks compete aggressively with the SOCBs in the household retail banking market as well as the business banking market for the non-state-owned and local collectively-owned industries and businesses, particularly the fast growing, highly efficient and profitable small- to medium-sized enterprises (SMEs). It is no surprise that the SOCBs have been steadily losing market share over recent years. For example, the SOCBs' shares of total banking assets, loans and deposits were 84.9 percent, 84.3 percent and 88.5 percent respectively in 1998. By 2005 these shares dropped to 56.1 percent, 50.1 percent and 79.9 percent. In the same period, the assets of joint-stock commercial banks trebled and their market share increased from 13 percent to 15 percent (ACFB, 1999-2006).

2.3 The evolution of monetary policy

A survey conducted by Pollard (2004) shows that 79 out of 88 central banks across different countries conducted their monetary policy by special experts-led committees. In China, the Monetary Policy Committee (MPC) was set up in 1997. According to the PBOC Monetary Policy Committee Bill (PBC, 2006), the Committee comprises 13 members, including the PBC's Governor and two Deputy Governors, a Deputy Secretary-General of the State Council, a Vice Minister of the State Development and Reform Commission, a Vice Finance Minister, the Administrator of the State Administration of Foreign Exchange, the Chairman of China Banking Regulatory Commission, the Chairman of China Securities Regulatory Commission, the Chairman of China Insurance Regulatory Commission, the Commissioner of National

Bureau of Statistics, the President of the China Association of Banks and an expert from the academia. MPC performs its functions through its regular quarterly meeting. An *ad hoc* meeting may be held if it is proposed by the Chairman or endorsed by more than one-third of the members of the MPC. From the first quarter of 2001, the PBC publishes the monetary report quarterly on its website and China's Financial Publishing House issues a bilingual report in hardcopy.

In 1986, the PBC has begun to use interest rate as a monetary policy instrument before the MPC was set up. The PBC has to rely on adjusting its own balance sheet to manage the monetary base before 1998. Since then, the PBC has tried to use other monetary policy instruments. In China, the monetary policy instruments mainly include open market operation, reserve requirement ratio, central bank base interest rate, rediscounts rate, central bank lending and so-called "other" policy instruments specified by the State Council. The most used three policy instruments are: open market operation, central bank base rate and reserve requirements ratio.

i). Open market operations (OMO) are the means of implementing monetary policy by which a central bank controls its national money supply by buying and selling governments securities, or other financial instruments. Monetary targets, such as interest rates or exchange rates, are used to guide this implementation. In China, the foreign currency OMOs started in March 1994; Renminbi OMOs resumed on May 26th, 1998 (ACFB, 1999). Since 1999, the OMOs have become an important instrument for PBC's day-to-day

monetary policy operations. The OMOs have played a positive role on controlling money supply, liquidity ratio and interest rate in money market. The PBC has a dedicated OMO trading room managed by the PBC's Monetary Policy Division. The PBC has developed a primary security market that includes 40 commercial banks in 1998 (ACFB, 1999). In early 2004, 6 non-bank financial institutions were added as primary dealers (ACFB, 2005). From 2005 onwards, the PBC's Monetary Policy Division publishes the list according its evaluation to the dealers. In the most recent published list 2 foreign banks were added as dealers in 2008 (PBC, 2008a). In the primary security market, the dealers can use treasury bonds and policy financial bonds to deal with the PBC as trading tools to OMO. At first, the PBC only engaged in one OMO a week. In the early days, cash bond trading was the most common means of adjusting the monetary base. After a short period, it was replaced by bond-based repo transactions. From February 25th, 2003, the central bank has engaged in two or more OMOs a week (ACFB, 2004). It has also developed a liquidity management system, which now provides a daily update on banks' liquidity positions.

ii).   The interest rate tools adopted by the PBC include the central bank base interest rate and deposit and loan interest rates. The base interest rates include re-lending interest rates, rediscount rate, deposit reserve rate and excess reserve rat. The interest rate reached the zenith twice between 1986 and 1996: once in 1989 when the saving rate reached 11 percent and other

occasion was in 1993 when it reached 10.9 percent (ACFB, 1986-1996). The interest rate went down to 2 percent with the soft landing of the Chinese economy after 1996 (ACFB, 1997). However, due to the dominance of the SOCBs and the limited autonomy by these banks in deciding on their own deposit and lending interest rates, the role of the central bank's base rate as a lever in the banking and financial market is still severely restricted.

iii). The official reserve requirement ratio sets the minimum reserves each bank must hold to customer deposits and notes. These reserves are designed to satisfy withdrawal demands, and would normally be in the form of fiat currency stored in a bank vault (vault cash), or with the PBC. It is used as a tool in monetary policy, influencing the country's economy, borrowing, and interest rates. Western central banks rarely alter the reserve requirements because it would cause immediate liquidity problems for banks with low excess reserves; they prefer to use OMOs to implement their monetary policy. The PBC has continuously increased deposit reserve ratio 17 times from 2003 to 2008(Wang & Wang, 2008). In 2007 alone, the PBC changed the reserve requirement 10 times (PBC, 2008b). The ratio remained at 15.5 percent in 2008 (Kang, 2009), which is significantly above the normal official reserve requirement ratio in the developed countries. For example, as of 2006 the required reserve ratio in the United States was 10 percent on transaction deposits (component of money supply "M1"), and 0 percent on time deposits and all other deposits (Qiao, 2008).

At present, the monetary policy instruments are not effective in regulating either the banking market or the real economy (Li & Zhai, 2007). Many academic studies show that adjustments on the level of interest have minimal impact on the demand for money (Lu, 2007). Technically, the reasons can be explained as:

i). Banks are not very sensitive to the adjustments of interest rates and reserve requirement ratios. The amount to loans and deposit is till increasing steadily after the central banks basic interest rates has been decreased 8 times from 2001 to 2008 (PBC, 2008c). One reason for this is the high level of excess reserves. In the United States, bank's excess reserves are only 0.5 to 1 percent of deposits (Sun, 2008), since the Federal Reserve usually manages to keep liquidity in the banking system tight. The figure in China was 3% in China in 2007(ACFB, 2008). Flushed with cash, most Chinese banks do not need to borrow from the money market and are therefore not sensitive to money market rates. The other reason is that the PBC pays a higher interest rate to reserves in the central bank. The commercial banks prefer a less risky way to keep their assets. The PBC has tried to reduce the excess reserve ratio since 1996, and it fell from 9 percent in 1996 (ACFB, 1997) to 3 percent in 2007 (ACFB, 2008).

ii). As the most important intermediary in the money market, the commercial banks are not able to absorb and pass changes in the cost of money market funds to their customer appropriately. This involves training credit officers, building data systems, developing the ability to put together portfolios of

loans (which would allow banks to disperse risks). China's banks are only beginning to learn how to price risk. In a survey taken in 2003/04 the PBC found serious deficiencies in bank's ability to price loans and manage risk (Monetary Policy Report, 2004Q3). It found that banks did not have databases on the risk profiles of their customers or of the industries these customers operate in and have few analytical tools for assessing credit risk. Many of China's banks have employed overseas consultants to help them design and roll out such systems, but these improvements take time to be understood, absorbed, and extended over the whole banking industry.

iii). The operation of monetary policy is not sufficiently transparent. This is because the operation is "under the guidance of the State Council" (PBC, 2006), in other words, it is a highly political system. Perhaps the most powerful monetary policy is the so-called "other policy instruments" (PBC, 2006), including ordering banks to increase or decrease the size of loans-regardless of the current interest rate- as well as suggestion on how to use the loans.

In fact, the monetary policy is under control of the government. Therefore, the government will do everything it can to achieve its economic growth target. The key to understanding China's monetary policy is not to place the conduct of monetary policy in the general framework of regulating market incentives to prevent market failure in achieving economic efficiency, but to understand the government's

orientation to prevent social and political instability that might be caused by a significant slowdown in the economy and the associated mass unemployment problem.

2.4 The improvements of banking regulatory regime in recent years

The specialisation of the financial authority started in the 1990s. The PBC was set up as the central bank in 1983. This was the setup of financial regulatory institutions. The supervision right on stock market was separated from the PBC in 1992 and supervision right on insurance was separated in1998. The China Banking Regulatory Commission was set up in 2003. With the completion of this separation and specialisation programme, the modern Chinese financial regulation and supervision system came into shape. The new system is called "one bank and three committees", including the People's Bank of China (PBC), the China Banking Regulatory Commission (CBRC), the China Securities Regulatory Commission (CSRC), the China Insurance Regulatory Commission (CIRC). The setup of CBRC is a landmark of reform on financial regulatory regime but more effort is required. Substantial improvements in banking regulation have been made in recent years, including in the critical areas of asset classification and provisioning and capital adequacy.

1) The new capital adequacy requirements, which require banks to fully provision for their non performing loans (NPLs) and maintain at least 8 percent of aggregate capital adequacy were adopted in 2004 and became

fully binding as of 2007(CBRC, 2007). Strengthening capital adequacy requirements was a major step in creating a standard regulatory environment, but it will be a major test for the CBRC to ensure that all banks achieve compliance and that no precedent of forbearance is created. By the end of 2007, the capital ratios of all the SOCBs and JSCBs stood above the required level. In 2007, the CBRC also issued and revised a number of other regulations and took steps to strengthen on-site examinations and monitoring of large exposures and connected lending, introduced a risk based supervisory system for city commercial banks.

2) The regulatory capability and quality have improved substantially since 2000. One of the more visible improvements over the past few years has been the improving regulatory capability and quality. Considering that the CBRC was only set up in 2003, it has made tremendous progress. The CBRC and PBC have been successful in encouraging almost all Chinese banks to adopt a 5-category loan classification system (as opposed to the previous payment-overdue system). The CBRC has stepped up banks' reporting requirements with special focus on timely monitoring of asset quality. It has also setup an early alert on large-client exposure and loan concentration. These measures have helped the banks to improve the degree of information transparency and reduced the loan risk level.

3) The CBRC has introduced guidelines on assigning supervisory ratings for commercial banks, based on a CAMEL model (CAMEL stands for Capital

Adequacy, Asset Quality, Management Quality, Earnings Quality and Liquidity) (ACFB, 2007). It is considered as the best available method for evaluating bank performance and health position of the bank since it considers all areas of banking operations. In addition to this, the CBRC carried on with the traditional on-site examinations. This is a trend to improve the situations of risk controlling.

4) The CBRC now publishes quarterly information on NPL ratios, NPL disposal by the state Asset Management Companies (AMCs), and total assets and liabilities of banks. This promotes financial disclosure among individual banks, and greatly enhances confidence among investors who are interested in investing in Chinese banks. In addition a national database on consumer credit came into operation at the beginning of 2006, providing record on borrowing history including mortgage and credit card information (ACFB, 2007). The database is comprehensive and covers almost all outstanding consumer credits. There is a plan to set up a similar database for corporate borrowers, but it has yet to become fully operational. The database will be managed by the PBC.

China's banking supervision has made substantial progress in the past few years. However, it should be noted that China's current banking risks are still very prominent. There are also many problems in banking supervision sector. It is very significant for maintaining financial stability to enhance the effectiveness of banking supervision.

The main problems of the current banking supervision are as follows.

1) The lack of relevant law and regulation. At present, there are 15 financial laws, more than 40 financial regulations and more than 1,000 pieces of relevant regulatory documents (ACFB2008). But the existing law system still lags behind the development of banking industry. For example, the definition on "loans" is not clearly classified in the Guiding Principles on Loan Classification. The result is that each commercial bank has different business scope on the five categories. And the classification criteria are very vague. As a result, the understanding of classification standards is different between the supervisory authority and commercial banks.

2) The database for the banking sector is not accurate. First, there are different Statistics departments in the banks, like accounting, statistics and credit control. The data from these departments are inconsistent. Moreover, banks do not strictly implement statistical and accounting rules, such as the rule requiring that the merger of statements does not exclude internal exchanges and inflated assets. Further, some banks misunderstand the policies and systems so that the understanding of five-category classification criteria differs across banks. The data are also subject to political manipulation as well.

3) The on-site supervision lacks continuity and pertinence. A large number of on-site examinations of the project are a temporary arrangement. And the supervision is over once the report is turned in. There are no following-up

actions to improve the situation.

As a summary, the regime of banking supervision in China has improved significantly over the recent years. Nevertheless, more work is required to establish a modern efficient system, which will take time and a great deal of effort as such a system is only beginning to take shape.

2.5 Growth of banking and finance in recent years

2.5.1   Growth of banking sector

The role of the banking sector in the modern economy can be examined by the ratio of the bank assets to the Gross Domestic Product (GDP). The table below shows the changes of banking sector in the whole economy in China from 2000 to 2005.

Table 2. Growth of Banking Vs Growth of GDP in China (percent)

Index / Year	Growth Rate of GDP	Growth Rate of Banking Assets	Banking Asset /GDP	Lending /Total banking assets	Growth Rate of deposits	Growth Rate of Lending
2000	7.9	4.4	151.8	73.4	13.8	6.0
2001	7.3	9.2	154.2	76.0	16.0	13.0

2002	8.0	46.7	217.0	60.5	19.0	16.9
2003	9.1	27.4	236.6	57.5	21.7	21.1
2004	9.5	14.3	232.0	56.4	16.0	12.1
2005	9.9	18.6	245.2	55.2	18.9	16.2
AGR*	8.6	20.1	-	-	17.6	14.2

*AGR=Average Growth Rate.

Note: The figures are derived from ACFB 2001- 2006 and CSY 2001- 2006.

As shown in the table above, the growth rate of Chinese GDP has increased from about 8 percent in 2000 to 10 percent in 2005. In contrast, the growth rate of total banking assets varied from 4 percent to reach the peak at about 47 percent in 2002. The growth rate slowed down to about 20 percent from 2003 to 2005. The average growth rate of banking assets is significantly faster than that of GDP. The growth rates of banking assets are more volatile than that of GDP, especially in 2002 when the growth rate reached 46.7 percent. The main reason for the explosion of the growth in banking assets was the relaxation of restrictions on lending to private companies in that year (ACFB, 2003). The growth rate was generally below 20 percent in the other years.

The ratio of banking assets to GDP increased steadily from 151.8 percent in 2000 to 245.2 percent in 2005. This ratio is at a very high level compared with international experience. For example, the banking assets to GDP ratio in the Euro area was on

average around 230 percent in 2003 (Sladkovsk ý, 2004). In the transitional countries in Eastern Europe, the most advanced countries such as Cyprus and Malta have a ratio that is 200 to 300 percent; Poland, the Czech Republic and Hungary recorded 57.66 percent, 106.79 percent and 66.56 percent in 1996 respectively (Havrylchyk and Jurzyk, 2003).

Figure 1. Bank assets to GDP in Eastern Europe (Percent)
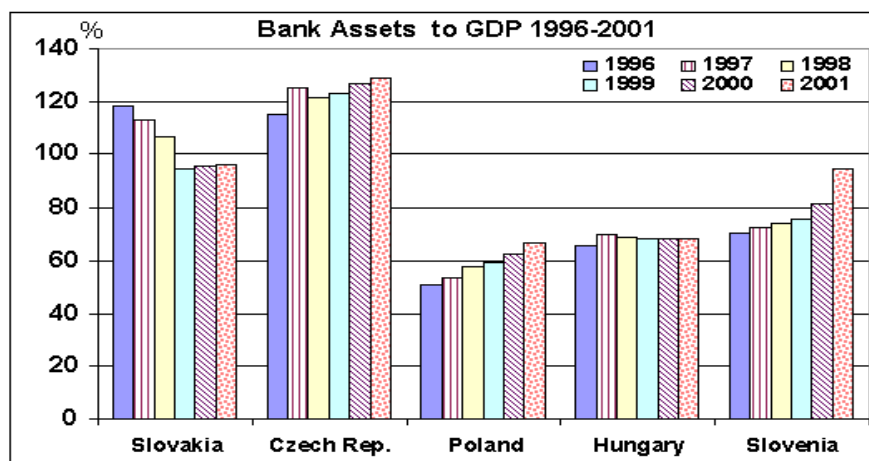
Source: Kohutikova, E. (2002)

As it has been documented in the literature, when GDP grows by 1 percent the lending volume increases by 1.45 percent on average in Poland (Havrylchyk and Jurzyk, 2003). The average growth rates of GDP and lending were 8.6 percent and 14.2 percent in China. The proportion is 1:1.65, which is higher than Poland's. The high growth rate of lending shows the liquidity of Chinese financial system is very high.

2.5.2 Composition of banking assets

The structure of China's banking sector has remained largely unchanged since 2000 in terms of key players. The SOCBs continue to command the highest market share, although there has been a marginal decline. As is shown in table 3, the big four accounted for 52.5 percent of the banking sector's assets in 2005, down from 68.6 percent in 2000. Mirroring the decline in market share of the SOCBs is the increase in market share of the JSCBs, which accounted for 15.5 percent of the banking sector's assets, up from 13.1 percent in 2000. This seems to suggest that joint stock banks are expanding at the expense of the SOCBs. The latter have been constrained by their large non-performing loans legacy, which prevents them from expanding lending activities as quickly as their competitors.

City commercial banks accounted for another 5.7 percent of the sector's assets as of 2006, up slightly from 5.3 percent in 2000. The share of assets held by other financial institutions has remained largely unchanged at around 26 percent (policy banks: 8 percent, rural credit cooperatives: 11 percent, postal savings: 4 percent, foreign banks: 2 percent, other: 1 percent) (ACFB, 2006). Going forward, it is likely that the composition of China's banking sector assets will continue to be fought between the SOCBs and the JSCBs. The relevance of other domestic institutions will, at best, remain stable. Rural credit co-operatives will be undergoing a major consolidation exercise, which may see their market share decline further. Policy banks, meanwhile, are unlikely to show a big market share increase since the central

government's policy thrust has been to reduce their role in the financial system. In contrast, foreign banks' share only increased slightly after the remaining restrictions on RMB businesses are lifted by WTO accession requirements in December 2006 (ACFB2008).

Table 3. Composition of Banking Assets

Index / year	Total Banking Assets (Trillion US$)	Assets of SOCBs (Trillion US$)	SOCB/ Total (percent)	Assets of JSCBs (Trillion US$)	JSCB/ Total (percent)
2000	1639.6*	1125.5*	68.6	214.7*	13.1
2001	1789.7*	1223.1*	68.3	260.5*	14.6
2002	2626.0*	1658.6*	63.2	374.7*	14.3
2003	3346.2	1839.5	55.0	474.2	14.2
2004	3825.5	2049.9	53.6	568.7	14.9
2005	4536.3	2379.9	52.5	703.7	15.5

* Data are figured out from ACFB 2001- 2006

The policy banks include China Development Bank, Export-Import Bank of China and Agriculture Development Bank. The aim of China Development Bank is to

marshal funds from society to support the construction of infrastructure, basic and pillar industries, high-tech and new technology industries and other projects, to support these and other sectors that the government deems to be in dire need of development. The main mandate of Export-Import Bank of China is to implement the state policies in industry, foreign trade and economy and finance to provide policy financial support so as to promote the exports of Chinese mechanical and electronic products and high- and new-tech products. The Agricultural Development Bank of China is in charge of loans to the agriculture sector.

The eleven joint stock commercial banks (JSCBs) include the Bank of Communications, CITIC Industrial Bank, China Everbright Bank, Huaxia Bank, Guangdong Development Bank, Shenzhen Development Bank, China Merchants Bank, Shanghai Pudong Development Bank, Industrial Bank, China Minsheng Banking Co. and Evergrowing Bank. Among the JSCBs, Shenzhen Development Bank, Shanghai Pudong Development Bank, Minsheng Bank, Merchants Bank and Huaxia Bank have listed on China's A share stock market. They are called joint stock banks because the initial core capital of the banks was jointly raised by a number of state-owned corporations.

2.5.3 Ownership structure

Three of the four SOCBs – BOC, CCB and ICBC – have changed from a wholly state-owned bank to a shareholding one. Other shareholders besides the Chinese government are now allowed to hold shares of these banks, but the state remains the largest shareholder. As the table 4 shows, the commercial banks, including JSCBs are still controlled by the government.

Table 4. The Ownership Structure of Chinese Banks 2008 (percent)

	Ministry of Finance	Central Huijin Investment	State-owned enterprises	Foreign Investments
ICBC	43.3	43.3	5.0	8.5
BoA	*	67.5	6.1	26.4
Merchants Bank	*	*	46.6	*
HuaXia Bank	*	*	9.3	14.0
SZDB	*	*	8.7	17.9
SPDB	*	*	45.8	4.2
Minsheng Bank	*	*	42.1	3.9

Source: ACFB, 2008.

SZDB= ShenZhen Development Bank

SPDB= Shanghai Pudong Development Bank

*The remaining shares of the JSCBs are not allowed to be traded on the stock market.

Due to incomplete information, the full picture of the ownership structure of Chinese banks is still unavailable. Therefore, Table 4 only presents a partial picture. As mentioned earlier, all the banks in China were state-owned before 1984 except the foreign capital banks. With the establishment of Joint-stock Commercial Banks and city commercial banks, the local government and state-owned enterprises started to share the ownership of the commercial banks. Most of the city commercial banks are supported by the local governments. Therefore, to a significant extent the operation of the city commercial banks is controlled or influenced by the local governments. It is hard to figure out the percentage of the ownership by central government, local government or state-owned enterprises. The information presented in Table 4 is only made available because of the information disclosure requirement for a bank to be listed on the stock market. Therefore, it is high time that the Chinese banks adopted a common consistent standard concerning accounting practices and information disclosure.

2.6 A brief introduction to the Joint-stock commercial banks

As the second biggest group of commercial banks, the JSCBs are expected to play an important role in stimulating the competiveness in the Chinese banking industry. The JSCBs hardly have the power to compete with the SOCBs nationwide. However, they have been working hard to expand their business in the central cities and more

developed area in China. It is necessary to have a brief review on the JSCBs' business and strategy.

Bank of Communications (BOCOM), which is founded in 1908, is one of four oldest banks in China and one of the early note-issuing banks of China. In 1958, while the Hong Kong Branch continued to operate, the mainland business of BOCOM was merged with People's Bank of China and the People's Construction Bank of China on BOCOM's foundation. BOCOM was restructured on July 24, 1986 with approval from the State Council and began operation anew on April 1, 1987, thus becoming China's first state-owned shareholding commercial bank. Its head office was in Shanghai. In June 2004, with the banking reform in China well under way, the Sate Council approved BOCOM's general plan on deepening the reform of its shareholding structure in a bid to further develop BOCOM into a modern banking enterprise under a century old national brand with improved corporate governance, adequate capital, strict internal controls, safe operations, excellent services and return, and strong international competitiveness. Through the reform, BOCOM has completed financial reorganisation, successfully introduced mainland and overseas strategic investors like HSBC, the national Social Security Fund and China SAFE Investment Ltd., and enhanced its organizational structure. On June 23, 2005, BOCOM was listed in Hong Kong, the first China based commercial bank of its kind to get listed outside of the Chinese mainland. As the fifth largest bank, BOCOM has branch in most of the provinces, except Qinghai and Tibet.

China Everbright Bank (CEB), which is established in August of 1992, completed joint-stock reform in January 1997, thus becoming the first nation-wide joint-stock commercial bank with State Government as controlling shareholder and equity investment from international financial institutions. As at the end of 2003, China Everbright Bank had established over 370 banking offices in 36 major cities throughout 23 provinces, autonomous regions and city provinces throughout the country, and has become a nation-wide joint-stock commercial bank with considerable influence on the economic and social development of China.

Huaxia Bank is established in October, 1992, which started joint-stock reform by the approval of PBC in 1995. It was listed in Shanghai Stock Exchange on 12 September, 2003. The influence of its business is limited to some central cities.

Guangdong Development Bank, as was announced in December 2005, is going to be the first public bank in China which is going to be acquired by a foreign bank. The bank was founded in 1988. After a year of battling, a joint bid group led by Citigroup, IBM and China Life Insurance Company won the bid at mid November of 2006.

Shenzhen Development Bank is established in 1999, which is the first listed commercial bank in stock market in China.

China Merchants Bank, is founded on April 8, 1987 with its head office in Shenzhen, China Merchants Bank is the first share-holding commercial bank wholly owned by corporate legal entities. Since its establishment, the bank has undergone capital enlargement by 3 times, and launched IPO with the issuance of 1.5 billion common shares in March 2002, and was successfully listed in Shanghai Stock Exchange on April 9, 2002. It is the first listed company passed external auditing appraisal based on the international accounting standard. After the conversion of capital reserve to share capital in May, 2004, The Bank's total shares have been increased to 6.4 billion. At present, the total asset of China Merchants Bank is above RMB 600 billion. It is China's sixth-largest commercial lender by assets.

Shanghai Pudong Development Bank, SPDB, incorporated on January 9, 1993 with the approval of the People's Bank of China (28th, August, 1992), is a joint-stock commercial bank with its headquarters located in Shanghai. Shanghai Pudong Development Bank launched a 400 million A-share offer on September 23 on the Shanghai Stock Exchange becoming the first shareholding commercial bank to list with both central bank and China Securities Regulatory Commission's approval since the enforcement of "Commercial Bank Law" and "Securities Law". Thus the

registered capital reaches RMB2.41 billion and 320 million shares of the issue were listed on the Shanghai Stock Exchange on November 10, 1999.

Industrial Bank was the old short name that was more commonly used in China from June 2001 thru March 3, 2003 for Industrial Bank Co. The former Fujian Industrial Bank was established on August 26, 1988, and had its first name change in June 2001, renaming itself as Fujian Industrial Bank Joint-Stock Corporation, Limited, The bank was referred by others in China simply as Industrial Bank instead. The bank had yet another name change on March 3, 2003 to finally settle for its current name Industrial Bank Joint-Stock Corporation, Limited.

China Minsheng Bank is established in January, 1996, and is national joint stock commercial bank approved by State Council and the People's Bank of China with a registered Capital of 1.38 billion RMB, and with the headquarter in Beijing.

Evergrowing Bank is established in October, 1987, known as Yantai Residents saving bank. The bank is joint-stock reformed in 2003 and named as EVERGROWING BANK CO., LTD.

Some of the JSCBs have been developing very fast after 2000. But their expansion mainly focuses on the eastern provinces. They have been competing with the SOCBs

in this area. More or less, the SOCBs have been facing the pressure from these banks. The JSCBs are seen as having lighter debt burdens and are expected to achieve better financial performance. The major operational aims of the JSCBs are to develop business in central cities. In fact, they have achieved a relative successful performance in some of the central cities comparing to the SOCBs. But the JSCBs have their own weaknesses. Their business is limited to the traditional loan-deposit business. The non-interest income in the seven listed SOCBs only accounted for 8.47 percent in 2006. The figure is lower than the SOCBs' 10.06 percent in average. The share of JSCBs' total assets was 12.34 percent in 2006. Meanwhile, the share of SOCB's total assets was 51.3 percent. The four SOCBs are still having the most important impact on the market.

2.7 The current competitive environment and market structure

A central purpose of banking reform in China over the past three decades is to encourage competition among banks within the state-owned sector as well as across the entire banking sector. The extent of competition in the Chinese banking market is fundamentally determined by the structure of the banking market, policy intervention and the historical and institutional factors underlying banking operations in China. As the ultimate owner of the SOCBs, the government still have the most profound impact on their business.

2.7.1 The extension of the SOCBs in banking market

In terms of the structure of the banking market, it is immediately clear that the SOCBs dominate in every measure of banking operations, including banking infrastructure and share of total deposits and loans.

Table 5 shows total number of branches in the SOCBs, as compared with the other banks (including central bank and policy banks), has dropped from around 1.7 million, 63 percent in 1998 to1.3 million, 55 percent in 2004. The total number of employees has dropped from 144 thousand, 71 percent to 78 thousand, 65 percent. If only commercial banks counted, the weights of SOCBs in both figures will be over 70 percent (Guo, 2002). It shows the SOCBs have the most extensive network in the market. The SOCBs have been closing down some non-profitable branches and reducing the number of employee in some area. At the same period, the Chinese government has been encouraging the other types of commercial banks to compete with the SOCBs.

Table 5. Number of workers and number of branches in Chinese banking sector (1998 to 2004)

	1998	1999	2000	2001	2002	2003	2004
Number of workers							
PBC	182326	179427	169302	166984	165945	160020	140450
PB	58494	53989	54189	62664	63859	64762	55417
SOCB	1667784	1601649	1493630	1421566	1467849	1415214	1284088
JSCB	92034	96485	67914a	71353a	129852d	13678d	129893
Others	645285	887792	937270b	902741b	701295c	879615e	707742f
Total	2645923	2819342	2722305	2625308	2528800	2533289	2317590
Number of branches							
	1998	1999	2000	2001	2002	2003	2004
PBC	2290	2251	2222	2228	2224	2199	2189
PB	2409	2318	-	-	2327	2328	2321
SOCB	144148	135704	120909	109212	97952	88489	77992
JSCB	4501	4753	-	-	5128d	5786d	4171
Others	49997	43004	10756b	105113b	96591g	91393e	33731f
Total	203345	188030	133887	216553	204222	190195	120404

Source: ACFB 1999- 2005

PB=Policy Banks, include China Development Bank, Export-Import Bank of China and Agriculture Development Bank.

a: including Bank of Communications, CITIC Industrial Bank, China Everbright Bank, Huaxia Bank and China Minsheng Banking Co.

b: including rural credit cooperatives and rural commercial banks

c: including rural credit cooperatives, rural commercial banks and city commercial banks

d: including Bank of Communications, Shanghai Pudong Development Bank, CITIC Industrial Bank, China Everbright Bank, China Minsheng Banking Co., Huaxia Bank, China Merchants Bank, Guangdong Development Bank, Industrial Bank, Shenzhen Development Bank, and Evergrowing Bank.

e: including rural credit cooperatives and postal savings

f: city commercial banks, urban credit cooperatives, rural commercial banks, rural cooperative bank, rural credit cooperatives, trust and investment companies, finance companies and financial-leasing companies.

g: rural credit cooperatives and rural commercial banks

2.7.2 The market concentration of Chinese banking sector

The extent of market concentration is usually measured by the n-bank concentration ratio (CRn) or the Herfindahl-Hirschman Index (HHI) (Berger, et al. 2004). One commonly used concentration ratio is the four-firm concentration ratio, or CR4,

which consists of the market share, as a percentage, of the four largest firms in the industry. The HHI is the sum of the squares of individual firms' market shares, expressed mathematically as: $HHI = S_1^2 + S_2^2 + S_3^2 + \ldots + S_k^2 = \sum_{i=1}^{K} S_i^2$ (where K is the number of firms in the industry, Si is the market share of firm i). The HHI approximates 0 for a perfect competitive industry and equals 10,000 for a monopoly. In general, the more firms there are in an industry, the lower is the value of the HHI.

The SOCBs are the top four commercial banks in the Chinese banking market. The study adopts the data for CR4 and HHI in the national-wide commercial banks (including SOCBs and JSCBs) to measure the market concentration. The indexes include ratios on assets, deposits, loans and net profit over the years 1998 to 2004.

Table 6. The concentration ratios and HHI over recent years (1998-2004) (percent)

Year	Index	Assets	Deposits	Loans	Net profit
1998	CR4	79.45	78.10	76.96	37.19
	HHI	24.10	18.16	17.38	13.22
1999	CR4	78.55	77.23	75.30	59.88
	HHI	20.79	17.53	16.73	16.11
2000	CR4	73.36	76.15	72.67	54.45

	HHI	15.19	16.87	15.45	16.87
2001	CR4	74.70	85.48	73.82	55.43
	HHI	15.59	19.95	16.23	12.71
2002	CR4	73.32	83.87	72.66	52.41
	HHI	14.93	19.13	15.56	16.12
2003	CR4	74.03	82.65	72.39	83.70
	HHI	14.95	19.40	15.11	22.60
2004	CR4	72.38	78.48	69.90	67.41
	HHI	14.37	17.63	14.45	26.54

*The figures are derived from ACFB 1999-2005

The banks include ICBC, ABC, BOC, CCB, Bank of Communications, CITIC Industrial Bank, China Everbright Bank, Huaxia Bank, Guangdong Development Bank, Shenzhen Development Bank, China Merchants Bank, Shanghai Pudong Development Bank, Industrial Bank, China Minsheng Banking Co. and Evergrowing Bank. The other types banks are not includes due to the small market share and lack of data.

The high concentration ratio shows the degree of competition among the commercial banks. As is shown in table 6, the SOCBs took over 79 percent of assets, 78 percent of deposits and 77 percent of loans in 1998. The figures remained a high level in 2004 (72 percent of assets, 78 percent of deposits and 70 percent of loans). JSCBs have increased their market share on loans in this period. On the other side, the share

of deposit in the SOCBs has increased among these years. The reason for this is the loan/deposit ratio is lower in the SOCBs than that in the JSCBs. Compare to other index, the share of net profit in SOCBs was viable, from 37 percent in 1998 to 52 percent in 2002 then jumped to nearly 84 percent in 2003. The net profit of CCB and BOC jumped to 22.3 billion and 28.7 billion in 2003(the figure was 4.3 billion and 9.4 billion in 2002, the data are different in ACFB 2004 and 2005, this study use the data from ACFB 2005). They were floated in the stock market this year. The SOCBs are forced to improve their financial performance under the pressure of shareholders.

The HHI index needs to time 10,000 in practice. According to the practice in other countries: If the HHI is greater than 1800, the market is seen as highly concentrated; if HHI is between 1000 and 1800, the market belongs to a moderate concentration market; if HHI is smaller than 1000, the market fall into a lower concentration catalogue. (Guo, 2002) In table 6, all of the figures are greater than 1200: the figures were greater than 1800 on assets in 1998 and 1999, on deposits in 1998, 2001, 2002 and 2003 and on net profit in 2003 and 2004. It shows the Chinese commercial banks are in a highly concentrated market. The figures have been dropping steadily on assets and loans from 1998 to 2004. It shows the same trends with the concentration ratios. The high net profit in 2003 and 2004 is due to CCB and BOC floated in stock market in 2003.

To summarise, the Chinese banks operate in a highly concentrated market. In urban areas, the SOCBs account for 70 percent of the market share in the major business: loans and deposit. The concentration ratios have been decreasing from 1998 to 2004. The degree of competition is increased. Even though the government has devoted a great deal of effort to encourage the other types of commercial banks to compete, the SOCBs are still the main players in the market. The SOCBs have been trying to improve their financial performance by cutting off the number of staff and branches. How effective are such efficiency-enhancement policies remain an open question.

Chapter III. Internal Organisation, Competitive Strategies and Performance of the Banking Groups

Having examined the macroeconomic environment and the market conditions that determine the competitiveness of Chinese domestic banks, this chapter turns to investigate the internal factors that affect the competitiveness of individual banking groups. In particular, the internal organisation and competitive strategies adopted by the state-owned commercial banks will be examined in detail. In the meantime, empirical evidence will be presented to give a general qualitative indication of the performance of the banking groups, whilst a formal assessment of the performance will be conducted and presented in some later chapters.

To examine the performance of the banking groups, it is useful to evaluate the internal organisation and risk management system. Since the market-oriented economic reform in 1978, China has entered into a stage of financial deregulation and liberalization. With the growth of the national economy, more and more financial institutions are set up, which brought great changes in the financial structure. From recapitalisation of three big SOCBs to the current trend in liberalisation through stock market floatation, the process of reform is being accelerated.

3.1 Internal organisation and management

In the spirit of Chandler's historical research (Chandler, 1962), Williamson and Bhargava (1972) classifies the organisational structure into three basic types: unitary structure, holding structure and multidivisional structure. Unitary structure is a highly centralized to the functional structure applicable to small and middle-scale enterprise with a single business. The holding structure is a diversification holding company structure. Its subsidiary companies have disparate businesses with each other. Their products are unrelated. They may have more independence in their business operations. The multidivisional structure is developed from the unitary and holding structures. Multidivisional structure has a higher degree of centralisation, but outstanding overall coordination functions. It has become the mainstream structure of international companies, particularly large companies in Europe and the United States.

To examine the organisational and management structure of the Chinese banks, it is useful to categorise the banks operating in China by their administrative territory. The first group consists of nation-wide banks including the four SOCBs, three policy banks, some of JSCBs and the postal savings and Non-bank Financial Institutions. The second group covers the territorial banks, including city commercial banks, rural commercial banks, urban credit cooperatives (UCCs) and rural credit cooperatives (RCCs). The third group is the foreign-funded financial institutions.

The branches are set up in accordance with administrative divisions. The basic setting mode is: the head offices are located in the Chinese political and cultural capital- Beijing; the provincial branches are located in the province capitals; the city-level branches are located in the district central cities; the county-level branches are located in the county centres. The sub-branches and savings offices under city-level and county-level branches are the main business-dealing institutions. There are three management levels: head office, provincial and city (or county) level management offices. The main business dealing institutions are the sub-branches and the saving offices. The different management levels have different decision-making rights. One of the advantages is that it can reduce the management risk. But it increases the management cost and reduces efficiency.

To strengthen banking supervision, China set up a new cabinet-level agency—China Banking Regulatory Commission (CBRC) in March 2003, which took over the functions of banking supervision from PBC and headed by Liu Mingkang, the reform-minded former chairman of Bank of China. CBRC is the primary banking regulatory authority in China in contrast to the multiple and overlapping regulatory agencies in the US. Since then, it has made strenuous efforts to establish and improve China's banking supervisory standards and practices. A key goal of the agency is to bring Chinese rules on capital adequacy, loan classification system, and risk management and corporate governance standards substantially more in line with international norms. For example, the minimum capital requirement is 8 percent

according to the *Market Risk Management of Commercial Banks Guidelines*, published by CBRC in 2004. Loans are classified according to the so-called 5-category grading system: normal, attention, substandard, doubtful and loss, with the latter three categories classified as non-performing loans (NPL). Comparing the old 3-category grading system, the new system is a great progress. In addition to establishment of a mandatory reporting system, CBRC conducts on-site bank examination to evaluate banks' financial health and adequacy in internal control and risk management. Despite the resource constraints and the lack of experience, CBRC has done an impressive job in strengthening China's bank supervision and improving the bank sector's soundness.

In early 2003, the State Council also accelerated the reform to banking industry. Vice Premier Huang Ju oversaw the overall banking reform program, and Zhou Xiaochuan, the governor of PBC, led the task force on a day-to-day basis. In December 2003, the State Council injected US$ 45 billion in fresh capital into Bank of China and China Construction Bank to strengthen their capital base. The capital injection was accomplished through a newly set up PBC arm—China SAFE Investments (Huijin), and the source of funding is China's official foreign exchange reserves. In August 2004, Huijin joined the Ministry of Finance and National Social Security Fund to help re-capitalise Bank of Communications. And in May 2006, Huijin and Ministry of Finance jointly contributed US$ 30 billion to recapitalize ICBC-China's largest bank. As part of the bank restructuring plan, there were further carve-outs of

non-performing loans from these banks. Following the capital injection and NPL carve-outs, these banks' balance sheet showed dramatic improvements, with substantially lower NPL ratios and much higher Tier 1 capital adequacy ratios.

As an integral part of the banking reform program, the Chinese government has since 2003 promoted foreign strategic investment in the banking industry. China hopes that foreign investors will bring about badly needed banking expertise and risk management technology as well as capital. In light of the widely known problems plaguing the Chinese banking sector, and the restrictive ownership cap of 20 percent for any single foreign investor (25 percent for combined foreign interests), the outcome has defied even the most optimistic predictions. Within just three years, more than 20 international financial institutions have made equity investment totalling US$ 16 billion. In 2005 alone, China attracted US$ 14 billion in foreign investment into its banking sector. Bank of Communications was the first mainland-based bank to successfully launch an IPO of US$ 2.2 billion overseas, its shares were listed in the Hong Kong Stock Exchange in June 2005. It was followed by the IPO of US$ 9.2 billion in October 2005 for China Construction Bank, also in the Hong Kong Stock Exchange. Since the debut of BOCOM in international capital markets, Chinese banks' share performance has been nothing short of spectacular. BOCOM's share rose by 95percent since IPO, CCB by 53 percent, and BOC (Hong Kong) which was listed in 2002, by 94 percent (ACFB, 2003). All three banks are traded at a hefty premium over their Asian and international peers. BOCOM's 2006 price-to-book ratio, at 2.6

folds (ACFB, 2006), for example, is higher than its strategic investor institution—HSBC whose shares are trading at a multiple of 1.9 folds (Xinhua news, 2006). The strong performance of Chinese banks and public market valuation reflect rising investor confidence in China's banking sector and represent a strong endorsement to the country's banking reform. As Table 4 in Chapter 2 shows, for the newly listed banks, only about 10 percent of the shares are allowed to be traded on the market.

Issuing shares is a precarious solution to the Chinese bank's problems due to the incomplete development of the security markets. The high price-to-book ratio reflects the government intervention in the market. The bankers have realized the importance of internal risk management. Jiang Jianqing, the president of ICBC, advocated establishing the head office-branch organisation model to shorten the management chain (CBRC, 2006). He also stated the state-owned commercial banks should achieve multidivisional management system to raise management efficiency of the commercial banks.

3.2 Competitive strategies by individual banking groups

The banks in China were all state-owned before 1984 except the foreign capital banks. With the establishment of Joint-stock Commercial Banks and city commercial banks, the local government and state-owned enterprises started to share the ownership of the commercial banks. Most of the city commercial banks are

supported by the local governments, and thus the local governments are still highly influential in the decision-making process of these banks. The current organisational structure of Chinese banks resembles the unitary organisational structure, which is set according to the regionalism transversely and business functions breadth-wise. China's state-owned commercial banks adopt the branch system. Their branches spread throughout the country. In recent years, they establish a number of branches (office) abroad eventually. They have huge amount of workers and branches. As shown in the tables below, the number of workers and branches in ICBC and ABC remain much higher than these in BOC and CCB. Some analysts (e.g., Li, et al., 2001; Chen, et. al., 2005) ascribe the poor performance of ICBC and ABC to the excessive amount of workers and branches. The SOCBs have implemented changes to consolidate operations and increase efficiency. During 1998-2005 the number of branches of SOCBs has declined by 46 percent while the number of employees has declined by 23 percent.

Table 7. Share of workers in SOCBs (percent)

	1998	1999	2000	2001	2002	2003	2004
ICBC	34.01	33.81	31.54	30.23	27.63	27.49	29.26
ABC	31.45	33.67	34.12	34.54	32.76	36.14	38.11
BOC	11.84	12.27	12.87	12.98	11.92	12.14	12.79
CCB	22.70	20.25	21.47	22.25	27.69	24.23	19.83
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

The figures are derived from ACFB 1999-2005

Table 8. Share of branches in SOCBs (percent)

	1998	1999	2000	2001	2002	2003	2004
ICBC	27.74	27.20	26.19	25.95	26.50	27.27	27.21
ABC	40.56	41.66	41.80	40.67	39.09	40.84	39.75
BOC	10.56	10.59	10.69	11.47	12.34	13.12	14.50
CCB	21.14	20.55	21.31	21.90	22.07	18.77	18.54
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

The figures are derived from ACFB 1999-2005

We focus on the four SOCBs, which is the major part of the banking system in China. Officially, the four SOCBs have become financially independent commercial banks. Nevertheless, the SOCBs are more like the combination of speciality banks and commercial banks due to the characteristic of the Chinese banking system, as they are still obligated to provide credit to the state-owned corporations.

At the end of 2005, the four SOCBs accounted for 52.5 percent of banking system assets. As shown in the table below, the lending account for 65 percent, 64.5 percent, 48.5 percent and 53.2 percent in ICBC, ABC, BOC and CCB of the total bank assets. These shows lending is still the main business of the SOCBs. There are slight differences across the banking groups.

Table 9. The asset structure of Chinese State-owned Commercial Banks 1998-2005 (percent)

Type of asset	Year	ICBC	ABC	BOC	CCB	Average
Loans	1998	70.14	69.50	53.03	67.40	63.74
	1999	68.57	69.85	43.49	54.56	56.75
	2000	60.74	66.98	42.83	54.76	55.22
	2001	61.59	65.12	47.99	54.46	56.22
	2002	62.48	64.27	49.13	57.29	58.29
	2003	63.87	64.92	53.73	59.71	60.56
	2004	67.20	64.53	50.26	55.59	59.40
	2005	44.64	59.30	47.12	52.23	50.82
Security and investment	1998	8.45	8.37	11.91	8.47	9.3
	1999	9.15	7.89	15.07	22.76	13.72
	2000	19.94	10.80	22.26	24.64	19.41
	2001	18.40	11.82	28.13	25.62	18.49
	2002	20.97	14.12	26.37	27.17	22.16
	2003	22.33	16.49	26.39	23.85	22.27
	2004	24.42	19.26	28.91	28.33	25.23
	2005	31.91	26.35	33.29	30.83	30.60
	1998	0.77	0.77	0.49	0.80	0.69
	1999	1.21	1.45	1.08	1.5	1.34

Cash	2000	0.74	1.13	0.64	0.96	0.90
	2001	0.59	0.86	0.69	0.85	0.75
	2002	0.59	0.78	0.65	0.81	0.71
	2003	0.56	0.73	0.72	0.83	0.71
	2004	0.59	0.69	0.67	0.69	0.66
	2005	0.46	0.64	0.60	1.56	0.82
Deposit in Central Bank	1998	10.83	10.54	4.35	12.77	9.32
	1999	8.61	10.74	5.00	10.41	8.71
	2000	7.44	10.11	4.95	9.30	8.08
	2001	8.06	10.80	4.97	10.66	8.62
	2002	8.69	10.86	6.62	8.27	8.61
	2003	8.16	10.32	7.55	8.63	8.67
	2004	9.49	9.81	6.66	9.53	8.87
	2005	8.11	9.00	6.68	9.54	8.33

Note: The figures are derived from ACFB 1999 to 2006. Security and investment includes central bank bonds，government bonds, financial securities and financial bonds.

The main assets include cash, deposit in central bank, loans and security and investment. In general, 60 percent of the assets are loans. The primary function of SOCBs is financial intermediation between depositors and borrowers. Apart from loans, the share of securities and investment operations increased from 9.3 percent to 30.6 percent. The securities here refer to treasury securities, corporate bonds and

financial securities. Treasury securities take most proportion of the investment as it is relative safer than other securities. The SOCBs have been trying to improve the asset structures. This is helpful to control the market risk. As the Chinese central bank pay interest to the commercial bank's deposit, the weight of deposit in Central Bank is rather stable at around 8 to 9 percent. Cash holdings have fallen from 1.34 percent in 1999 to 0.66 percent in 2004. This shows the SOCBs' profit requirement has been strengthening after they were floated in the stock market.

Three out of the four SOCBs, except ABC, have reduced the weights of loans in their assets. They turned to invest in security market. The table shows the change of competition strategies among the SOCBs. They are more concerned about their profit before and after floating in stock market. As they are not allowed to trade in stock market, they invest in security market. This kind of asset portfolio makes their assets safe when the financial crisis came in 2007.

3.2.1 Industrial and Commercial Bank of China (ICBC)

The bank was created on January 1, 1984. It was formed from the vast branch network of the People's Bank of China. It is China's largest financial institution. At the end of 1985, the Bank's first full year of operation, its total loans outstanding were 300.8 billion Yuan (Almanac of China's Finance and Banking 1986, p. III-28). That was 51 percent of total bank lending of 590.5 billion Yuan (Almanac of China's Finance and Banking 1986, p. II-24). Its personnel of more than 405

thousand members of staff were distributed over a geographically far-flung network consisting of more than 21.5 thousand branches and savings stations (Almanac of China's Finance and Banking 1986, p. II-46). Despite the creation of a number of new banks in the 1980s and the 1990s, the Bank continued to be by far China's largest financial institution. By the end of 2004, the Bank has nearly 21 thousand branches and 376 thousand employees (Almanac of China's Finance and Banking 2005). More importantly, its assets have grown by more than 15.7 times to reach US$ 686.5 trillion (Almanac of China's Finance and Banking 2005). However, due to restructuring of the public sector in recent years, the number of branches and staff members in 2004 declined by 45percent and 34percent respectively from the top of 38.6 thousand and 570 thousand in 1995 (Almanac of China's Finance and Banking 1996).

On April 21, 2005, the Chinese government formally approved ICBC's plan of shareholding structural reform and injected US$ 15 billion. ICBC afterwards successfully completed the financial structuring and international audit. On October 28, 2005, ICBC was officially transformed from a state-owned commercial bank into a share holding company and renamed as Industrial and Commercial Bank of China Limited. The new entity has a registered capital RMB 248 billion and 248 billion shares, with a face value of RMB 1 per share. The Ministry of Finance and Central SAFE Investments Limited are its two shareholders holding 124 billion shares respectively. Through financial restructuring, issuance of long-term

subordinated bonds and asset portfolio optimization, ICBC has substantially improved its capital management and, in turn, its capital adequacy. By the end of 2005, ICBC had seen distinctively higher quality in its assets. The core capital adequacy ratio has reached 8.11percent, and capital adequacy ratio 9.89percent.

ICBC runs the largest corporate banking business in China and supports many infrastructural construction, primary industries, pilot projects, key enterprises as well as small and medium-sized enterprise development. In 2005, ICBC had endeavoured to construct a standardized marketing platform and multi-hierarchy marketing system. Focus had still been laid on marketing efforts in core primary industries such as petroleum and chemicals, public utilities, telecom, road and railways, civil aviation and ports and infrastructure construction. Loans towards urban infrastructure construction, high-tech zone construction, real estate development had been moderately and discriminatively increased. More loans had been directed to modern manufacturing, logistics, environmental protection and new service sector, cultural undertakings, medical and healthcare services in a selective manner. ICBC had also ambitiously explored the multinationals and small and medium-sized enterprises credit market. Thus it had continued to optimise its industrial structure and clientele. Apart from its effort in traditional business lines, ICBC had proactively expanded many high-growth, high-tech and high value-added services such as cash management, investment banking, asset trust and other finance products. It had also developed high-end businesses including syndicate loans, financial

advisory, structural financing, comprehensive financial service solutions, optimizing its product and yield structure.

By the end of 2005, its Bank-to-Bank deposit balance had reached RMB 2,543.8 billion and Bank-to-Bank loan balance had reached RMB 2,762.2 billion which mainly consisted of medium- and long-term loans and instrument financing (ACFB, 2006). ICBC had newly added gap-filling loans, stand-by loans and import guarantee plus export loan services. Its domestic syndicate loans had amounted to RMB 72.3 billion (ACFB, 2006). The bank has entered into all-round cooperation agreements with 12 insurance companies at home and abroad. It has also signed various partnership agreements with over 140 securities and futures companies and formed correspondent relationships with 45 domestic banking institutions (ACFB, 2006). Its agent payment and collection business and agent clearing services have been expanding and the Bank-Customs Link, Bank-Money Link, Online Bank-Money Link and Bank-Tax Link system are constantly improving.

In 2005, ICBC remained in the first position in RMB settlement. Its RMB settlement services amounted to RMB 185trillion (ACFB, 2006). It also launched the Smart Finance brand products to provide integrated services and promote the brand value. By the end of 2005, its cash management customers had amounted to 17,663(ACFB, 2006). ICBC has reported the investment banking revenues of RMB 2.018 billion. It is among the first few financial institutions that have been granted the qualification

as the lead underwriter for short-term financing and has already successfully underwritten three financing bonds.

By the end of 2005, its trust assets had amounted to RMB 213.2 billion and trust services revenue RMB 263 million (ACFB, 2006). ICBC has remained as the market leader in securities investment fund trust area. Its insurance asset trust, enterprise annuity trust and QFII trust services are expanding. It is the first banks that has provided securitized trust services and among the first few domestic trust banks that have passed the SAS70 International Control Audit Certification. ICBC has also been awarded the 2005 Best Trust Bank in China by Global Trustee and Financial Capital. In 2005, ICBC had granted trust loans of RMB 43 billion, provided the agent service for the State Development Bank to supervise loans and cash settlement of RMB 32.1 billion and for China Import and Export Bank with export seller credit and settlement services of RMB 13.7 billion (ACFB, 2006). ICBC provides agent cash clearing services for 85 out of 128 members of Shanghai Gold Exchange (hereafter refers to SGE) (ACFB, 2006). The total amount of cash clearing was RMB 54.2 billion, ranking first in the total cash clearing in SGE. It has 130 gold agent accounts, with agent gold trading volume of 29 tons and agent platinum trading volume of 3.2 tons (ACFB, 2006). ICBC is among the first few that has been granted the qualification as enterprise annuity fund account manager and trustee and is the only institution in the domestic commercial banks that has acquired two

qualifications. By the end of 2005, ICBC had managed 296,000 personal accounts and annuity trust funds of RMB 4.3 billion (ACFB, 2006).

Personal banking business. The bank has put in place a personal intermediary business system focusing on personal settlement, bank card services and personal finance products. ICBC has the largest customer base in personal finance and bank card services. In 2005, ICBC continued to dominate the market in various retail banking service areas including resident savings, personal loan, personal intermediary services and bank cards. Its clientele structure has been improving; the core competency of its business offices and multi-channel application capability has substantially enhanced. ICBC has consecutively been elected as the Best State-owned Retail Bank in China by the Asian Banker magazine for three years.

By the end of 2005, its savings deposit balance had amounted to RMB 3,116.6 billion and personal loans balance RMB 527.4 billion in which personal housing loans balance totalled RMB 459.3 billion (ACFB, 2006). Its personal loans continued to rank the first among its peers.

In 2005, ICBC reported the net personal commission income of RMB 5.993 billion, accounting for 56.8 percent of its total commission income (ACFB, 2006). Personal settlement, bank card services and personal finance product sale constituted the main source of its personal intermediary service income. Targeted at the high-end

personal banking clients, ICBC had introduced a number of new functions and services such as SMS Bill, Finance Classroom, and Bank Keeper. By the end of 2005, the Elite Club accounts had totalled 1.88 million, a year-on-year increase of 51.6 percent (ACFB, 2006). ICBC remains as the market leader in major agent services areas. It occupies 31.2percent of the certificate T-bond brokerage market and is the largest distributor. It sells open-ended funds of RMB 70.7 billion and insurance products for the premium totalling RMB 32.2 billion (ACFB, 2006). By the end of 2005, ICBC had issued 145.22 million bank cards with a total consumption amount of RMB 241 billion and bank card services revenue of RMB 2.346 billion. It had developed the EMV multi-functional credit card based on the chip which further improved the security of credit cards (ACFB, 2006).

Cash Management. ICBC also actively participate in cash operations in the inter-bank market, instrument market, bond market and forex market. In 2005, ICBC was among the first that acquired the qualification as the lead underwriter for corporate short-term financing. It conducted the first bond forward transaction in the Chinese market, launched the ICBC Bond Market Link (a legal person RMB personal finance product), and issued the first batch of subordinated bonds of RMB 35 billion.

For the year of 2005, ICBC loaned out RMB 1,613.1 billion by means of inter-bank repurchase and borrowing, borrowed in RMB 140 billion. Its central bank

instrument trade volume totalled RMB 661.9 billion in which the spot transactions accounted for RMB 188.6 billion (ACFB, 2006). In 2005, its annual instrument financing transactions amounted to RMB 1,007.6 billion, for the first time in history exceeding RMB 1,000 billion (ACFB, 2006). Its balance of instrument discount services was RMB 392.8 billion, accounting for 11.9percent of total loan balance. Its instrument discount interest income amounted to RMB 9.045 billion (ACFB, 2006). In 2005, ICBC had a bond interest income of RMB 44.084 billion and bond investment spread yield of RMB 429 million (ACFB, 2006).

Internet Banking. ICBC's e-banking service system consists of self-service banking, telephone banking, mobile banking and internet banking. As the largest internet banking service provider in the domestic market, in 2005 ICBC had reported an internet banking trade volume of RMB 46.8 trillion, accounting for 26 percent of the total trade volume of its overall operations (ACFB, 2006). Its operation profit amounted to RMB 421 million, a year-on-year growth of 79.1 percent (ACFB, 2006). More than a quarter of ICBC's operations are conducted over-the-counter. ICBC is the largest e-commerce online payment service provider in China. In 2005, ICBC introduced a number of new products including online banking professional version Bank-Enterprise Interlink and One-Stop Payment, as well as such brand products as ICBC e-Fortune Link and USB Shield. All the local and other regional online bank accounts have been placed under central management. Online banking transactions amounted to RMB 42.2 trillion, personal and corporate online bank accounts

amounted to 14,860,000 and 320,000 respectively. E-commerce online payment transactions amounted to RMB 11.6 billion, a year-on-year growth of 100 percent (ACFB, 2006). It is the third consecutive year that ICBC has been elected the Best Personal Internet Bank in China by the Global Finance magazine, as well as many other awards by the domestic online banking survey and polls. ICBC is the first bank in China that has introduced the telephone banking pan-China interactive travelling services within the mainland China as well as between Hong Kong and the mainland. Two tele-banking trust systems (north and south) have been set up and 26 institutions already included in the ICBC's integrated tele-banking system. By the end of 2005, ICBC had owned a total number of 18,270 ATMs and 1,473 self-service bank offices. There are 141 million transactions processed by the self-service banking network, with the trade volume of RMB 134 billion (ACFB, 2006).

International Banking. ICBC has constantly boosted its cross-border operations and tried to achieve a balance between RMB and Forex business and between domestic and overseas business. It commits to delivering credit and financing services for more and more enterprises competing in the global market. As of December 31, 2005, its total forex assets amounted to US$ 61.2 billion, EBIT from its overseas branches and agencies was US$ 180 million (ACFB, 2006). Total forex deposits balance was US$ 29.1 billion and net forex loans were US$ 29.1 billion (ACFB, 2006). ICBC has set up the international instrument settlement centre with a

capacity of US$ 292.8 billion per annum. In 2005, its agent forex cash transaction volume was US$ 143.2 billion in which the forex settlement and sale was US$105.2 billion, agent forex trade US$ 30.4 billion, and agent finance and risk management transactions US$ 7.6 billion (ACFB, 2006). ICBC is among those first financial institutions that were granted the qualification as the inter-bank forex market maker. As of December 31, 2005, ICBC had entered into partnership with 1,165 banks in 114 countries and territories and had or controlled 106 branches and subsidiaries in major financial centres around the globe (ACFB, 2006). As of December 31, 2005, Industrial and Commercial Bank of China Asia Limited (ICBC Asia) had annual average ROE of common stocks 11percent, average ROA 0.9percent, capital adequacy ratio 15.7 percent, bad debts percentage 0.9percent. In October 2005, ICBC Asia announced that its merger with Belgian Bank was completed (ACFB, 2006).

3.2.2 Agricultural Bank of China (ABC)

This bank was recovered in February 1979. At the beginning, it was appointed as a specialised bank, which was in charge of rural finance (ACFB, 1986, p. II-9). As the separate business scope gradually diminished, the bank has developed rapidly in the urban financial market since the 1980s. By the end of 2004, the Bank has nearly 31 thousand branches and 489 thousand employees, and its asset reached US$ 485.9 trillion (ACFB, 2005).

ABC has set up branches in Singapore and Hong Kong, established the offices in London, Tokyo, and New York, etc. The scope of business has developed from the original rural credit and settlement to a wide range of financial businesses with RMB or foreign currencies. Except over-the-counter services, the bank operates telephone banking, online banking and self-service banking as well.

ABC has established the largest financial electronic network in China. In 2004, ABC's correspondent banks extend to 101 countries; the total number of correspondent banks reaches 983 (ACFB, 2005). The data operation centre at the Head Office that deals with data integration has a daily transaction number of about 8 million, accounting for one fourth of the total daily transaction amount of the Agricultural Bank of China Integrated Banking (ABIS) system of ABC. By the end of 2004, the issuance quantity of bank cards had amounted to 178.16 million. The business revenue of bank cards increased greatly, reaching RMB 3.8 billion with an increase rate of 369 percent (ACFB, 2006).

ABC is widely seen as the most inefficient bank among the SOCBs. It pitches the business to normal customer in both rural and urban area, using the huge amount of branch throughout the country. Given the disadvantage in its infrastructure in the rural areas and the generally backward state of the rural economy, this bank still has a long way to go to catch up with the other banks that are largely located in the cities

and towns and are associated with the rapidly growing sectors of the Chinese economy.

3.2.3 Bank of China (BOA)

The Bank has the most extensive overseas branches among the SOCBs. By the end of 2003, it has 549 overseas branches (BOC Annual report 2003, p. 17). It was separated from the People's Bank and made an economic entity directly subordinating to the State Council in March 1979. At the same time, the State Council vastly expanded the bank's authorised business scope, primarily to support China's economic opening to the outside world. Before 1985, the bank had the sole monopoly to carry out all types of foreign exchange business (Almanac of China's Finance and Banking 2003, Statistics section, p. III-9). The State Administration of Exchange Control allowed more and more branches of the specialised banks, as well as nonblank financial institutions, to enter the foreign exchange business gradually during 1980s and 1990s. Its assets reached 2.9 trillion Yuan (Almanac of China's Finance and Banking 2003, Statistics section, p. II-7). In 1994 and 1995, the bank became the third note issuing bank in Hong Kong and the second one in Macau respectively. On October 1st 2001, Bank of China (Hong Kong) Ltd. was incorporated as a result of the merging of 10 member banks of the former Bank of China Group. In July 2002, Bank of China (Hong Kong) Limited was successfully listed on the Hong Kong Stock Exchange. It became the first State-owned Commercial Bank that was listed on the international capital market. BOC

completed the financial restructuring in 2004, and the introduction of strategic investors in 2005. On 1st June and 5th July 2006, the bank was successfully listed on the Stock Exchange of Hong Kong and the Shanghai Stock Exchange respectively. Thus the bank became the first Chinese bank to be listed in both international and domestic capital markets.

The Bank is mainly engaged in commercial banking, including corporate and retail banking, treasury business and financial institutions banking. Corporate banking is built upon credit products, to provide customers with personalized financial services as well as financing and financial solutions. Retail banking focuses on providing customer with such services as savings deposit, consumer credit bankcard and wealth management business. Treasury business includes domestic and foreign-currency trading and investment, fund management, wealth management, value-secured debt business, domestic and overseas financing and other fund operation and management services. Financial institution banking refers to services offered to banks, securities brokerages, fund companies and insurance companies worldwide ranging from clearing, inter-bank lending to agent and custodian services.

BOC has built up a modern management system and started to expand its overseas developments through issuance of shares and introduction of strategic investors. The bank claims in the Annual Report 2007 that, "the Bank develops in a comprehensive,

coordinated and sustainable manner, thereby creates greater value for shareholders".

Following the other commercial banks strategy in domestic business, BOC has been reducing the number of the branch in the last decade. This strategy has affected its performance in domestic banking market. This will be examined in detail in chapter six.

3.2.4 China Construction Bank (CCB)

The Bank was removed from the administrative control of the Ministry of Finance in October 1979, and elevated to an organisation subordinating directly to the State Council, placing it on the same administrative level as China's other banks (ACFB, 1986, pII-13). In 1980, for the first time, it also began to accept deposits and to engage in lending to support investment projects, rather than simply acting as a pass-through for government budgetary funds. By the end of 2004, its assets reached US$ 686.5 trillion with a network of approximately 14 thousand branches and 255 thousand employers (ACFB, 2005). In addition, the bank has two joint-venture subsidiaries in China and maintain overseas branches in Hong Kong, Singapore, Frankfurt, Johannesburg and Seoul; representative offices in New York and London; and a subsidiary bank, Jian Sing Bank Limited (The company has been renamed as China Construction Bank (Asia) Limited with effect from Nov 2, 2005), in Hong Kong. The bank was listed on Hong Kong stock market in 2005. According to The Banker magazine (2006), the Bank based ranked 11th among the world's top 1,000 banks.

CCB intend to strengthen historically relationships with its large corporate customers by focusing on industry leaders in strategic industries such as power, telecommunications, oil and gas, and infrastructure, as well as major financial institutions and government agencies, and by selectively developing relationships with small- and medium-enterprise customers. In the personal banking segment, the bank intends to increase revenue from high-income retail customers. On wholesale and retail products, the bank intends to develop fee-based businesses, including payment and settlement services, personal wealth management and corporate treasury management and grow proactively personal banking business with a focus on residential mortgages and diverse savings products, and to build an industry-leading credit card business. The bank prioritizes the efforts in the major cities of the more developed geographical markets of the Yangtze River Delta, Pearl River Delta and Bohai Rim regions and accelerates development in the capital cities of inland provinces in China.

3.2.5 The competitive advantage of the State-owned commercial banks

A significant competitive disadvantage of Chinese banks relative to their international peers is the reliance on corporate lending and on interest income. Corporate loans accounted for 88 percent of the loan portfolio of ICBC, China's largest bank, with retail loans at only about 12 percent. And nearly 90 percent of earnings at ICBC are derived from interest income, though net interest margin has shown modest improvement for ICBC and other Chinese banks in recent years.

Despite a fast growth and the large current size of China's banking industry, banking products and services remain substantially under-penetrated by international standards. The favourable macroeconomic trends not only provide exceptionally attractive growth opportunities for China's banking industry, but also offer opportunities for them to revamp the existing business model and diversify businesses and income. Two under-developed but high potential areas of business growth are retail banking and fee income.

At the same time, China continues to improve the institutional framework to build a modern and vibrant banking industry. Key areas of focus include legal and judiciary reforms to allow for effective bankruptcy mechanism and gradual interest rate liberalisation to allow banks to more efficiently price credit risks, establishment of a nationwide credit rating service and a consumer credit reporting bureau, harmonisation of PRC accounting and auditing standards with the International Financial Reporting Standards (IFRS), a more reasonable tax regime that avoids over taxation and encourages banks for prudent provisioning, and a relaxation of outdated regulations preventing banks from growing their fee-based business (ACFB, 2008). Needless to say, all these limitations cast a shadow over the prospect of the Chinese banking industry and likely hobble its tremendous potential to become a world-class banking system.

3.3 Performance of the banking sector

Comparing to the international banks, the efficiency of Chinese commercial banks is rather low. As shown in the table below, the numbers of staff and branched in SOCBs are ten and twenty-six times as great of that of international banks. Consequently, in terms of some qualitative indicators of bank performance, such as deposit per worker and per branch, international banks are usually far more productive than the Chinese SOCBs by up to one hundred seventy-three times!

Table 10. Comparison of banking operations in 2004

	Number of Staff	Number of Branches	Total deposit (Billion US$)	Deposit per worker (Thousand US$)	Deposit per branch (Million US$)
ICBC	375781	21223	581.8	1548.2	27.4
ABC	489425	31004	413.7	845.28	13.3
BOC	164193	11307	258.1	1571.9	22.8
CCB	254689	14458	387.3	1520.7	26.7
Average	321022	19498	410.2	1371.5	22.6
Top 10*	30716	753	148.3	12930.0	3902.5

* Top 10 banks in the world in average in 2003

Source: ACFB, 2005

3.3.1 The income structure of SOCBs

The growth in banking assets, deposits and loans has been spectacular in recent years across all the SOCBs, but the growth in the more market-oriented and riskier businesses has been rather limited. Although the business scope of the SOCBs is expanding, the traditional banking businesses still remain the dominant source of commercial income for the SOCBs (see Table 11). Non-interest income accounted for only around 10 percent of total income for the Chinese SOCBs (with the only exception of ABC that recorded a 26 percent share of non-interest income in 2005), compared with roughly 48 percent for the global banking market. Therefore, the traditional market for deposits and loans still remain the main battleground for the SOCBs.

Table 11. Share of interest earnings in total operating revenue (percent)

	CCB	ICBC	ABC	BOC
1998	98.3	76.8	94.8	72.5
1999	95.8	75.5	94.8	73.9
2000	75.7	77.4	91.8	92.6
2001	90.0	69.8	88.8	90.0
2002	94.6	95.4	87.9	79.9
2003	92.7	93.7	85.8	79.9
2004	92.2	83.0	80.8	83.9
2005	93.5	81.8	73.7	87.6

Source: Authors' calculation from various issues of the ACFB

SOCBs reported a net income of $19 billion in 2006, $5 billion higher than the net income for 2005 (ACFB, 2007). The net incomes of ABC are $1.4 billion in 2006 and $0.13 billion in 2005 (ACFB, 2007), indicating an astonishing year-on-year rate of increase of 980%! The increased amount of net interest income, fee-based income and public subsidy are $586 million, $55 million and 354 million (ACFB, 2007). This shows the current competition situation of the SOCBs. Their business scope is still restricted to traditional business- deposits and loans. Unlike other SOCBs, ABC increased share of non-interest income steadily from 1998 to 2005. This is based on its huge network around both rural and urban area. This is one example of how the Chinese banks exploit their location advantage.

3.3.2 The financial performance of the state-owned commercial banks

To measure the performance of a firm, two of the most preferred ratios are Return on Equity (ROE) and Return on Assets (ROA) (Hollis, 2005). Each ratio provides insight into a financial institution that allows management to make strategic decisions that can dramatically affect its structure and profitability. In the case of credit unions, ROA has been the predominant analytical tool to measure profitability; however, ROE is just as comprehensive and could be the better indicator (Hollis, 2005). Return on assets equals Net Income divided by Total Assets. It shows how

efficient asset is used. Return on equity is calculated by dividing Net Income by average Equity. This tells us how efficient the invested capital is used.

Further evidence to show that the SOCBs are unlikely to behave as profit maximisers comes from the usual measures of financial performance for business firms. As Table 12 reveals, the usual measures of financial performance such as ROA and ROE for the SOCBs are simply unreliable and subject to huge swings from time to time. This is simply because the business operations of the SOCs were subject to frequent government interference such as asset-stripping and capital injections. Thus, all the data on costs, income and profits are substantially distorted market outcomes (see Table 12).

Table 12. Return on assets and return on equity for the Chinese SOCBs (percent)

	CCB	ICBC	ABC	BOC
ROA:				
1998	0.06	0.11	-0.05	0.10
1999	0.23	0.12	-0.02	0.11
2000	0.07	0.13	0.01	0.07
2001	0.10	0.14	0.05	0.10
2002	0.14	0.13	0.10	0.33
2003	0.01	0.04	0.06	0.15
2004	1.25	0.60	0.05	0.60
2005	1.03	0.53	0.02	0.70

ROE:				
1998	1.08	1.88	-0.68	1.69
1999	4.64	2.27	-0.26	1.98
2000	1.63	2.72	0.22	1.17
2001	2.20	3.09	0.87	1.21
2002	4.01	3.47	2.13	4.33
2003	0.22	1.24	1.39	2.46
2004	25.08	-5.60	2.57	10.22
2005	16.37	13.30	1.31	11.76

Source: Authors' calculations from various issues of the ACFB.

One particular example is the ROE of ICBC for 2004 which reported to be -5.60 percent. This substantial deterioration in the ROE was because the bank used the income to write off the huge amount of bad assets in 2004 (ACFB, 2005). The figure jumped to 13.30 percent next year. This shows the bank management of ICBC intended to make the bank's balance sheets look more profitable after the new reform measures had been introduced from 2004. The banks are not as good as they looked in their financial reports. The other hidden issue is that the amount of non-performing loans is usually transferred into new loans to make the quality of the loans appear normal.

As a summary, given the market conditions under which the SOCBs operated (and are

still operating, though to a lesser extent), there was little incentive or obligation for individual banking groups within the SOCB sector to pursue maximum profit as an operating objective. In fact, how successful the individual banks perform in the traditional markets for deposits and loans fundamentally determine their overall competitiveness and financial performance, particularly during the time period under investigation. It is questionable to make direct comparisons of the financial or efficiency performance between SOCBs and other domestic banks or foreign banks (as in Li, et. al, 2001; and Lin and Zhang, 2008), since these banks operated under distinctly different market models. A model of banking efficiency and competitiveness of the SOCBs must take these aspects into consideration. This is the conceptual basis for the empirical models that are used for assessing the efficiency level of the SOCBs in chapters five and six.

3.4 The formation and normalisation of NPLs

This section single out the NPL problem as it seems that it is no longer the major concern of the SOCBs as most of the NPLs have been transferred to the AMCs. The SOCBs all claimed they have a low ratio of bad loans (ACFB, 2008). However, the huge burden of low quality assets had been broadly discussed from the mid of 1990s to mid of 2000s. Studies by Xu (1998) and Lardy (1998) claimed that China's four major state banks were technically insolvent by the late 1990s. They were estimated that by 1997, 35 percent of state owned enterprises had debts greater than assets. Despite the fact that the Chinese government had set up asset management companies

to take over about RMB 1.4 trillion (US\$ 169 billion) of bad debts off the state banks'

accounts, China's Central Bank Governor, Dai Xianglong (2001) disclosed that the

Chinese banks' non-performing loans (NPL) ratio was alarmingly high – a quarter of

the state banks' loans were still overdue. In 2003, the nonperforming loans (NPLs) of

these 'big four' banks were officially estimated to be RMB 2.4 trillion (US\$290

billion), or 23 percent of total loans, but the unofficial estimate from the credit-rating

agencies suggested the figure to be close to 3.5 trillion Yuan or 34 percent of total

loans (ACFB, 2004). The figure was dramatically dropped to less than 3% by end of

2008 (CBRC, 2008).

3.4.1 Formation of NPLs

a) Emergence of NPLs

In the 1980s, by using banks as the primary intermediary to allocate funds instead of

relying on direct fiscal grants, the government attempted to reduce the role of central

planning and impose more financial discipline on state-owned enterprises (SOE). In

order to maintain control over aggregate credit, the PBC established an annual credit

plan for the nation as a whole and for each of the specialized banks. However, both

PBC and the state banks were subject to extensive government influence and actual

credit growth consistently exceeded the targets as set by the credit plan.

SOEs seemed to have insatiable appetite for borrowing as they regarded loans from

state-owned banks as "essentially free". A substantial amount of bank loans were

directed by government to finance priority projects and support commercially unviable SOEs. The political support for even chronic loss-makers was such that there was no credit culture of honouring debt obligations. As the banks' loan portfolio grew, so did the non-performing assets. By the early 1990s, the problems of swollen bad assets in the banking system had become so severe that the government was forced to reconsider the wisdom of pervasive political interference with banks' credit decisions. Therefore, the logistical next step was to separate the so-called policy lending from commercial lending. Policy lending not only includes subsidized credit (i.e., lower interest rates than for other similar activities) to particular uses, but also includes the channelling for funds to specific activities and priority sectors designated to spearhead national development, notwithstanding the underlying commercial risks. Typically policy lending is mandatory as banks are required, irrespective of its commercial merit, to extend such credit to meet the objectives of government economic and industrial policies. The outstanding stock of policy loans was estimated at RMB 699.6 billion in 1991. PBC accounted for 4 percent, and the rest were all extended by the Big 4 banks. Policy lending accounted for a staggering share of the Big-four's loan portfolio- 58 percent for CCB, 51 percent for ABC, 67 percent for BOC, and 18percent for ICBC (see table 13).

Table 13. Policy Lending by the State-Owned Commercial Banks in 1980s (percent share of total loan portfolio)

	ICBC	ABC	BOC	CCB	Overall
1985	11	42	88	48	32
1986	11	38	82	50	31
1987	12	38	77	51	31
1988	12	38	78	51	31
1989	14	42	77	51	34
1990	14	48	73	53	36
1991	17	51	67	58	38

Source: ACFB, 1992

The massive scale of policy lending not only caused colossal misallocation of credit and undermined the banking system's financial health, but also hindered PBC's conduct of monetary policy. Even in the face of strong inflationary pressures, PBC found it extremely difficult to rein in credit expansion because of the political pressure to maintain policy lending. But the risk of runaway inflation in early 1990s also led to greater resolve on the part of the central leadership to enable PBC to exercise more effective monetary control. To free specialized banks from the burden of policy lending and transform them into true commercial banks, China in 1993 set up three policy banks-China Development Bank (CDB), China Export-Import Bank, and China Agricultural Development Bank, to take over policy lending functions from state-owned specialized banks. The main function of CDB, which started operations

in the spring 1994, is to finance large-scale infrastructure projects and strategic industries of national priority. It is a not-for-profit institution but is expected to break even. It can extend the so-called soft loans at subsidized interest rates. Since their establishment, CDB and Export-Import Bank have been functioning in line with or exceeding initial expectations. CDB in particular has proven to be more commercial than it was set up to be. Starting from a clean slate, it has picked the most viable state projects and corporate clients, hence its loan portfolios exhibit surprisingly good asset quality. As an unexpected consequence, CDB is in effect in competition with non-policy banks as a commercial long-term credit institution.

b) The magnitude of NPLs

Since the middle of the 1990's, the Chinese government has paid increasing attention to the problem of NPLs of banks. In 1995, the annual meeting of the National Banking Operation and Management explicitly pointed out the NPL problems of SOCBs. At the annual meeting of the National Financial Work Conference of 1997, the problems were again referred to. In January 1998, the Governor of the PBC, for the first time, disclosed data regarding NPLs at a press conference. According to the report (PBC, 1998), the NPL ratio reached 25 to 26 percent at end-1997, of which past-due loans constituted 15 percent, past-due beyond 2 years 8 percent, and bad loans 2 percent. The 1997-2003 data of NPLs, reported by the Governor of the PBC, are shown in Table below.

Table 14. Formally Released Ratios of NPLs in SOCBs

	NPLs/Total Loans (percent)	Amount of NPLs (Billion US$)	NPLs/GDP (percent)
1997	25	22.6	17.2
1998	10	75.6	7.9
1999	25	199.2	20
2000	25	197.4	18.2
2001	25.3	213.6	18.4
2002	25.3	245.1	19.8
2003	22.2	242.1	17.1

Source: ACFB, 1998-2004

The data released on NPLs are likely to be underestimated for several reasons. First, the 1998's figure of 10 percent appears puzzling given that the NPL ratio of SOCBs reached more than 25 percent in other years. Some have pointed out that 10percent was meant to refer to the ratio of bad loans, thus it is likely that the NPL ratio reached about 25 percent in 1998 as well. Second, the NPL data of 1999 is also somewhat doubtful. After the SOCBs transferred RMB 1.4 trillion of NPLs to the four AMCs, the PBC unambiguously stated that this enabled the NPL ratio of the SOCBs to be reduced to 10 percent. However, this adjustment appears not to be reflected in the official data. Shi (2003) estimated that the NPL ratio of SOCBs reached 39 percent in 1999 and 29.2 percent in 2000.

Based on data released by the government, foreign research institutions and credit rating agencies also carried out several estimates. For example, Moody's Investors Service estimated that the NPL ratio of SOCBs was in the range of 35 percent to 70 percent in 1996, while Morgan Stanley Dean Witter estimated that the ratio was 36 percent in 1998 (Li, 2002). Regardless of which data or estimates are correct, the fact is that the sheer amount of China's banking sector NPLs is immense, and the problems it presents are serious. For example, at the end of July 2001, in ChaoYang City, the balance of loans issued by all financial institution was RMB 6.76 billion, of which NPLs were RMB 4.9 billion. This means that the NPL ratio was 72.4 percent (Wu Liang 2002). Given that the accounting and auditing systems were opaque before 2002, collecting reliable data is an extremely difficult task. Furthermore, as pointed out earlier, the four-category classification basis allows some banks to falsify reports by adopting the practice of making new loans to pay back old loans so that on the balance sheet some NPLs can be concealed.

According to figures provided by the CBRC, the amount of NPLs totalled RMB 2.54 trillion at end-June 2003 (CBRC, 2003). The amount includes NPLs of major financial institutions (such as the four SOCBs, three policy banks and 11 joint-stock commercial banks), whose aggregate loans accounted for 82 percent of the total loans. The amount of NPLs of SOCBs reached about RMB 2 trillion. At the end of September 2003, NPL ratios of various financial institutions under the 5-category

classification were 21.4 percent for SOCBs, 18.1 percent for policy banks, and 8.4 percent for joint-stock commercial banks (ACFB, 2004). NPL problems of UCCs and RCCs appear more serious than those of SOCBs and other banks. Based on the four-category classification, the NPL ratio of UCCs is estimated to have reached more than 30 percent--much greater than the national average (Economic Daily, 2002). The ratios of RCCs are likely to be even greater than those of the UCCs, although relevant data are not available.

c) Soft budget constraints and moral hazard

Soft budget constraint of state banks is widely cited as a major cause of China's non-performing loan problem (Yuan, 2000; Zhang, 1999; Li, 1999; Xu, 1998). Lack of hard budget constraint in banks themselves leads to the failure of the banks to impose hard financial constraint on the borrowers, causing the development and accumulation of non-performing loans.

It is, therefore, more comprehensible that the banks' more generous lending to high-risk SOEs was driven by moral-hazard behaviour, especially in the backdrop of the 1.7-trillion-yuan bailout for the four big banks in the period 1998 to 1999. Meanwhile, on finding that bank lending bias towards SOEs became more severe in this period contradicts the *ex ante* bailout hypothesis, but lends support to the hypothesis of reckless lending induced by possible future *ex post* bailout plans. Such *ex post* bailout did happen again. In January 2004, the PBC injected US$ 45 billion of

China's foreign reserves to boost the capital-adequacy ratios of CCB and BOC, two of the four big state-owned commercial banks. A major purpose of this 'indirect bailout' was to refresh the banks' balance sheet with the injected funds so that they could soon list their shares on the stock market and be able to make new, supposedly more profitable, lending. In an efficient market, assistance to financially troubled firms can only be arranged through a mutually beneficial agreement between the bank and the borrowing firm in the event of default. The pre-condition for such arrangement is adequate legal protection for creditors, which China still lacks. Without such protection, the banks should have resorted to credit-cutoff as deterrence to the worst-risk firms' irresponsible borrowing. Stiglitz and Weis (1983) argue that an effective threat of denying credit might have important incentive effects on borrowers' behaviour, causing borrowers to take less risky projects. Such a sub-optimal scenario, unfortunately, did not emerge in China during the late 1990s, plausibly due to expectation for ex post government bailout. Reckless lending was aggravated during 1998 to 1999 when the Chinese government took over a huge number of bad loans from the major state banks through its four state-sponsored asset management companies.

With the NPL ratio in China's banking sector standing at nearly a quarter of banks' assets, just removing the bad debt from bank account is not enough. Although, in time of transition, there could be good reasons for the government to take over bad loans to give banking business a fresh start, such interventions must follow carefully specified

legal procedures and must not cultivate expectations by lenders and borrowers for implicit government guarantees for future loans. Firm government commitments to enforce hard budget constraints on both SOEs and state banks are badly needed to prevent the formation of a new vicious cycle of non-performing loan accumulation.

3.4.2 Asset management companies (AMCs)

By the middle of 1998, the State Council had decided to set up AMCs to absorb NPLs at face value and to recover as many NPLs as possible. The four AMCs, Cinda, Changcheng, Huarong and Dongfang, which took over NPLs from China Construction Bank, the Agricultural Bank of China, Industrial and Commercial Bank of China, and the Bank of China respectively, each received 10 billion RMB in initial capital from the MOF. On that basis, the four AMCs issued 1.4 trillion RMB in financial bonds to the state banks and used the funds to purchase 1.4 trillion in NPLs from the Big Four state banks at face value (ACFB, 2002). AMCs each had a charter of ten years and were suppose to recover as many of the NPLs as possible through debt-to-equity swap, bankruptcy and restructuring debt. At the end of the ten-year charter, the MOF will issue bonds or inject government surplus to write-off the remaining amount. In this manner, state banks replaced 1.4 trillion RMB in NPLs with 1.4 trillion RMB in MOF-backed AMC bonds, thereby getting rid of some two-fifths of the estimated 3.3 trillion in NPLs. Meanwhile, the MOF did not have to list the 1.4 trillion in special bonds on the official budget, since it merely guaranteed bonds issued by the AMCs. The AMCs, on the other hand, were saddled with 1.4

trillion RMB in NPLs. Although AMC officials initially resisted purchasing NPLs at face value, the opposition soon dissolved as they realized that the MOF was ultimately responsible for the pool of NPLs.

Table 15. Details of AMCs (Billion US$)

	Cinda	Huarong	Changcheng	Dongfang	Total
Time of establishment	1999.4	1999.10	1999.10	1999.10	
Related SOCB	China Construction Bank	Industrial and Commercial Bank of China	Agricultural Bank of China	Bank of China	
NPLs removed (Billion US$)	45.2	49.4	41.9	32.4	168.8
Capital (Billion US$)	1.2	1.2	1.2	1.2	4.8
Central Bank Lending (Billion US$)	0	11.5	41.8	13.0	66.3
Financial Bonds (Billion US$)	45.2	37.9	0	19.4	102.4

Source: ACFB, 2002; Cinda, 2007; Huarong, 2007; Changcheng, 2007; Dongfang, 2007.

AMCs took over SOCBs' NPLs, which had been contracted before 1996. In principal, the past-due and bad loans classified under the four-category loan classification were purchased at their book value. This indicates that the government took over the NPLs produced in the era of planning economy. The total NPLs received by the four AMCs were RMB 1.4 trillion, which accounted for 15.6 percent of the total assets of the four SOCBs. The four AMCs financed this transfer by issuing bonds of RMB 850 billion and borrowing RMB 55 billion from the PBC. This operation, however, did not increase reserves, since the SOCBs' total borrowings of RMB 55 billion from the PBC were deducted from their liability (and the total amount of RMB 85 billion in bonds issued by AMCs appeared on the asset side of SOCBs in exchange for a reduction of transferred NPLs of RMB 1.4 trillion.) The interest rate for the PBC lending was 2.25 percent. The purchase of RMB 1.4 trillion NPLS was completed by end-2000. In fact, the quality of the transferred NPLs was extremely poor. More than 70 percent of the debt assets are credit loans, which are largely loans made by the state-owned enterprises for investing in equipment and production capacity. Quite a few of the loans include those guaranteed by the government. It has been pointed out that 40 percent of SOCBs' assets are NPLs and should be written off (Economic Daily, 2001). As for measures to cope with the RMB 1.4 trillion worth of NPLs transferred, the AMCs have used two approaches. One is to conduct a debt-equity swap for firms (largely, state-owned enterprises) that are relatively better performing and thus can be regarded as candidates for becoming public companies. The other is to directly deal with transferred NPLs to firms that are unlikely to survive.

a) Debt-equity Swaps and Problems

The debt-equity swaps scheme involves the following measure. Initially, the State Economic and Trade Commission investigate insolvent enterprises and makes recommendations to the relevant AMCs. The conditions for such a recommendation are stringent for several reasons. First, the enterprise debtor must have the necessary management skills, employ competent managers, maintain good accounting standards, have an element of competitiveness, etc. The enterprises whose debts were transferred to the AMCs were mostly state-owned, and only a few were foreign trading enterprises. The companies had been established without any equity and their liabilities consisted totally of loans. Second, based on the enterprises book value, the AMCs are supposed to pay principal and interest to the SOCBs that own the debt of the particular enterprise. Third, the AMCs are in charge of arranging debt-equity swaps and signing contracts with enterprises after their own investigation. Such contracts become effective after being examined and confirmed by the State Economic and Trade Commission, the Ministry of Finance and the PBC, and are then followed by the issuance of the certification of the State Council. Fourth, the AMCs as shareholders are supposed to encourage the enterprises to improve their management in order to realize a public listing, and thereby recover the costs of their acquisition by selling stocks on the stock market, or by facilitating the enterprises ability to buy back their stocks.

By the end of 2000, the AMCs had performed debt-equity swaps of RMB 341 billion

in respect of 587 enterprises (ACFB, 2002). But the impact of the debt-equity swaps was not as successful as expected. This was because those enterprises made little progress in terms of reforming their management. The debt-equity swaps enabled firms to lower the ratio of their liabilities, on average, from 73 percent to 50 percent. In 2000, the balances of 80 percent of firms performing debt-equity swaps shifted from deficit to surplus. The main reason for such an improvement came from a reduction in the cost of funding. According to the available statistics, from April 2000 when firms were allowed to escape paying any interest for up to April 2003, enterprises could lower their interest payment burden to a significant degree. For example, in the case of 5-year loans with an interest rate of 5.76 percent, enterprises could save RMB 69 billion worth interest, which accounted for one third of their total profit (ACFB, 2004).

On the other hand, the debt-equity swaps also had problems: First, the operation of the debt-equity swaps was de facto equivalent to debt relief for both the insolvent firms and banks. The original scheme of debt-equity swaps didn't work out, so that the swaps gave rise to moral hazards for both banks and enterprises alike.

Second, the State Economic and Trade Commission limited the authority of the AMCs in respect to the supervision of enterprises; so that the AMCs could not fully monitor those enterprises. One of the reasons for limiting the authority was because the AMCs' involvement in firms met with strong resistance from local governments

and individuals with vested interests in the effected enterprises. Furthermore, in the early days of the debt-equity swaps operation, the programs also included a stock repurchasing plan, such that firms conducting debt-equity swaps would be able to repurchase those stocks held by the AMCs within the specified period without them being publicly listed. This plan was supposed to guarantee asset recovery for the AMCs and thus protect them. However, the government cancelled the plan because firms, being unsatisfied with the purchase prices and the costs needed, were not willing to do so.

b) Asset Disposition Methods

The direct measures to cope with the NPLs include bidding, auctions, restructuring of debt, liquidation and bankruptcy, contracting agreements, Asset Backed Securities (ABS) and so on. The most widely used methods have been bidding and auction. The AMCs held various auction fairs and exhibitions of the assets they had for sale (including land, buildings and tangible assets such as vehicles). They also used package selling for disposing debts by category. The assets were packaged on the basis of the characteristic of the areas or industries. Generally used practices are (1) packaging debts and establishing an AMC with foreign investors; (2) directly selling the package to domestic or foreign investors, and entrusting the asset package to foreign investors; (3) setting up a securitization fund for each package. In November 2001, Huarong established a first Joint AMC with Morgan Stanley and Rongsheng with Goldman Sachs (Pei and Shirai, 2004). As of June 2003, the data on the amount

of NPLs recovered by the AMCs is shown in the table below. The AMCs have made some progress in cash recovery; not only in terms of the cash recovery but also the recovery rate.

Table 16. Balance of AMCs' Retrieving NPLs (March 2006)

	Cinda	Orient	Changcheng	Huarong	Total
Purchased Sum	45.2	32.4	41.9	49.4	168.9
Rate of asset settled (percent)	64.7	56.1	80.1	70.1	68.6
Settled Asset Sum (Billion US$)	25.8	17.7	33.8	30.8	108.1
Rate of Recovery (percent)	34.5	27.2	12.7	26.5	24.2
Recovery of Cash Sum (Billion US$)	8.1	4.1	3.5	6.8	22.5
Recovery Rate of Cash (percent)	31.6	23.1	10.3	22.2	20.8

Source：CBRC, 2006

After purchasing NPLs, the main strategy by which AMCs converted bad asset into

performing asset was debt-for-equity swap, or transforming the debt owed by SOEs to share ownership for AMCs. Instead of deciding which SOEs qualified for the swap themselves, AMCs received State Economic and Trade Commission (SETC) "recommendations." Because a debt-for-equity swap drastically reduced a company's debt level, eager SOE managers and local officials waited in a "long line of Red Flag sedans" in front of the SETC for the privilege. In choosing beneficiaries, the SETC focused on large SOEs and state corporations, especially those with personal connections and factional ties.

Despite the short-term success of the AMC programme to reduce NPLs, rescue SOEs and reduce fiscal pressure, a main outcome was to transfer fiscal pressure to the future. While official announcements optimistically claimed that AMCs would recover 30 to 50 percent of the NPLs (ACFB, 2004), analysts and officials involved in setting up AMCs agreed that the actual ratio is likely to be 10 to 20 percent (Hu and Liu, 2009). Recovering transferred asset in real estate proved to be extremely difficult because of collapsing real-estate prices in some localities. Moreover, while debt-to-equity swap gave AMCs sufficient preferred shares to pay interest on their bonds; they ultimately needed to find buyers for their shares of SOEs to repay the principal of the bonds. As of March of 2006, AMCs have thus far dealt with 866.3 billion RMB ($108.1 Billion) in NPLs, cash recovery was 180.6 billion RMB ($22.5 Billion), or 21 percent of the total. Among the four AMCs, the asset recovery rate of Changcheng Asset Management Corporation was only 12.70 percent as over 80 percent of the transferred

NPLs have been written off. The NPLs are taken from ABC. Attempts to sell NPLs to foreign institutional investors yielded a return of 6 percent, and offering of NPLs by an AMC failed to attract sufficient bidders even after the assets were greatly discounted. Despite these troubling indicators, State Council officials were not perturbed because they knew that the main objective of the NPL policies was to minimize short-term burden for the Central Government.

Studies by Klingebiel (1999) claimed that as the initial conditions for AMCs were significantly weaker in the developing economies while at the same time AMCs in these countries had to deal with a notably larger problem as assets transferred to these agencies accounted for a large amount of banking system assets. For example, the legal framework was considerably weaker in developing countries and capital markets were less developed, as indicated by the low bond market capitalization. Governments tried to compensate for the weak legal framework by granting superpowers to their respective AMCs. In both cases this strategy proved ineffective as despite strengthened creditor rights the courts remained either debtor friendly or the overall efficiency of the court system did not improve.

Chapter IV Research Methods

Before 1994, the state-owned commercial banks were strictly limited to operating in their designated business segments. The market structure was highly fragmented and concentrated. Competition only existed in the overlapping areas of businesses. With the set-up of joint-stock commercial banks and the commercialisation of the state-owned banks in 1994, the level of competition in banking sector has increased significantly. Following China's accession to the WTO in 2000, foreign banks were allowed to conduct Renminbi business in 2004 and three out of the four state-owned banks were floated on the stock market to attract foreign investors in order to improve their competitiveness.

As banking reform and banking development in China sped up in the 1990s, empirical research on the Chinese banking sector also took off. The initial focus of the research was mainly on qualitative issues concerning the introduction of market-based incentive schemes into the state-owned banks and competition from other types of banks in the whole banking sector. The focus of research gradually shifted to quantitative analysis of banking performance and measurement and evaluation of efficiency. However, a general weakness of the quantitative work is a lack of systematic examination of the market condition and the competitive environment for the banks. The empirical work was largely based on simple aggregate banking statistics without a consistent underlying conceptual framework. A detailed literature

review on the empirical research on Chinese banking sector will be developed in section 3 in this chapter.

In the economics literature, there is no clear definition of competitiveness of business firms or banks. Instead, analysts have proposed a wide range of indicators of the competitiveness of a bank (firm) that are broadly related to either its competitive capabilities or business and financial performance. The former approach focuses on the amount and quality of firm-specific productive factors and assets as well as mechanisms to effectively deploy such factors and assets. In the area of commercial banking, a bank's competitive capabilities are reflected in a number of dimensions including source and cost of financing management, asset allocation management, liquidity management, risk management and innovation management. Since banks may differ substantially across such a wide range of capabilities, different measures may give different indications of a bank's competitiveness. Therefore, an alternative and also the most common approach to the examination of a bank's competitiveness is to focus on the bank's underlying business and financial performance as measured by productivity (efficiency) performance or financial performance (e.g., ROA, ROE) – the implicit assumption being that productive efficiency or superior financial performance is the ultimate indicator of competitiveness. Therefore, the measurement of banking profitability and efficiency forms a significant part of the literature on banking competitiveness. Moreover, following the industrial organisation literature, research on banking has also adopted a consistent conceptual framework for

explaining and determining competition and performance.

The research on banking competition and performance has evolved mainly in two directions: the structural and non-structural approaches. Traditional industrial organisation theory focuses on the Structure-Conduct-Performance (SCP) paradigm. The non-structural approach posits that factors other than market structure and concentration, such as entry/exit barriers and the general contestability of the market, may also affect competitive behaviour and performance. The literature has covered two broad issues concerning measurement and economic modelling. The measurement issue concerns the construction and estimation of indicators for banking market structure, conduct, and performance. Economic modelling is then employed to determine the significant factors underlying banking performance. The following sections provide a critical review of the general theoretical framework and empirical literature before the specific literature on Chinese banking is reviewed.

4.1. Theoretical framework for the determination of banking competitiveness

The methods to examine the banking competitiveness include structural and non-structural tests. We will focus on the structural test in this research. There are generally four distinct theoretical hypotheses in the structural tests: structure-conduct-performance (SCP), relative-market power (RMP), x-efficiency and scale efficiency hypotheses. The non-structural tests will also be reviewed in this section.

4.1.1. The S-C-P Paradigm

a) Early stage of research on the S-C-P Paradigm

The SCP paradigm is introduced to measure the performance of an industry in the late 1930s and 1940s. It was developed by Bain (1959, 1968), Clodius and Mueller (1961), Slater (1968), and Bateman (1976).The traditional SCP approach assumed that certain elements of market structure increase the likelihood of collusive behaviour and the collusive behaviour results in higher price and profits (Bain, 1956).

The approach assumes that there is a well-defined link between structure, conduct and performance: the market structure (the environment) determines market conduct (the behaviour of economic agents within the environment) and thereby sets the level of market performance. It is an attempt to compromise between formal structures of economic theory and empirical observations of organisational experience in imperfect markets. It is a standard tool for market analysis. The definition of structure, conduct and performance differs from one author to the other, depending on the sector and region being studied and the perception of the researcher. The key words used here are based on Clodius & Mueller (1961), Van Tilburg (1988) and Lutz and Van Tilburg (1992).

Market structure is defined as "the characteristics of the organization of a market which seem to influence strategically the nature of the competition and pricing within the market" (Bain, 1959). The research on banking market structure includes

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concentration ratio, the Herfindahl-Hirschman Index (HHI), entry and exit barriers, etc. The factors affecting market structure include internal and external. The internal factors are decided by the character of product and technology level, for example, the speed and security of the service. The external factors include government policy and central bank's supervisory policy and etc.

There are several measures of market concentration ratio. The traditional oligopoly theory uses aggregate concentration for some particular measure. The problem is the concentration ratio does not reflect the distribution of market shares among the top firms. Albert Hirschman and Orris Herfindahl (1964) proposed the HHI to measure the number of firms and the inequality of market shares. The HHI is defined as the sum of the squares of individual firms' market shares, expressed mathematically as:

$$\text{HHI} = S_1^2 + S_2^2 + S_3^2 + \ldots + S_k^2 = \sum_{i=1}^{K} S_i^2$$ (where K is the number of firms in the industry, Si is the market share of firm i). The HHI approximates 0 for a perfect competitive industry and equals 10,000 for a monopoly. In general, the more firms there are in an industry, the lower is the value of the HHI.

Market conduct refers to the set of competitive strategies that firms use to achieve more profit or higher market share. Complete monopoly and perfect competition are two extreme market structures. In the real economy, the market structure is often a transitional form between the two. One of the important goals of industrial organisation research is to analyse the relationship between market structure and

market behaviour to determine whether there is unfair competition in the market. On the one hand, the market structure decides market behaviour. On the other hand, the market structure itself is changing. The market structure is often the result of interaction between market performance and market behaviour. For example, large banks take over small banks; efficient banks buy bankrupt banks. Such practices would enhance market concentration.

Market performance according to Stern et al. (1996) is a multi-dimensional concept, which can be assessed by considering a number of dimensions including effectiveness, equity, productivity, and profitability. Market performance refers to economic results: product suitability in relation to consumer preferences (effectiveness); rate of profits in relation to marketing costs and margins; price seasonality and price integration between markets (efficiency). In sum, market performance refers to the impact of structure and conduct as measured in terms of variables such as prices, costs, and volume of output (Bressler and King, 1979). By analysing the level of marketing margins and their cost components, it is possible to evaluate the impact of the structure and conduct characteristics on market performance (Bain, 1968). To measure the performance of a firm, two of the most preferred ratios are Return on Equity (ROE) and Return on Assets (ROA). Each ratio provides insight into a financial institution that allows management to make strategic decisions that can dramatically affect its structure and profitability. In the case of credit unions, ROA has been the predominant analytical tool to measure

profitability; however, ROE is just as comprehensive and could be the better indicator. Return on assets equals Net Income divided by Total Assets. It shows how efficient asset is used. Return on equity is calculated by dividing Net Income by average Equity, which tells us how efficient the invested capital is used.

Applying SCP to the banking sector, the researchers seek to establish that the more concentrated the market, the more market power banks have, and thus the stronger they are in a position to afford to be inefficient without being forced out of the market. Traditionally, the SCP hypothesis stipulates a causal relationship running from market structure to firm conduct and performance: a concentrated market structure leads to anti-competitive behaviour, a loss in efficiency, and/or the capture of monopolistic profits (Stigler, 1964). Structure of the market is determined by the interaction of cost (supply) and demand. Conduct is a function of the numbers of sellers and buyers, barriers to entry and the cost structure- a firm's conduct is reflected chiefly on its pricing decisions. Performance is often measured by profitability. To carry out empirical work on banking industry with industrial economics theory, we need to measure some quantitative indicators. According to traditional industrial economics theory, these indicators include concentration ratios, the HHI, profitability, and barriers to entry.

b) Application of the S-C-P hypothesis on the banking sector

Since the early 1990s, spurred by an accelerated pace in economic and financial globalisation, there has been a rapid growth in empirical research on the measurement and explanation of bank performance in both the developed and developing countries (see, for example, the survey article by Berger, et al. 2004). The early empirical research in the banking sector was almost exclusively based on the SCP hypothesis. Insofar as measurement is concerned, alternative empirical measures of market structure, conduct and bank performance have been adopted and tested. The measure of market concentration is usually captured by the n-bank market share in deposits or loans or the combination of the two, or more comprehensively, the Herfindahl-Hirschman Index. The anti-competitive behaviour is normally measured by banks' pricing behaviour as reflected by, e.g., the lending-deposit (or domestic-foreign) interest spread (as in Berger and Hannan, 1989; and Peria and Mody, 2004) or the bank revenue elasticity to input prices (as in Claessens and Laeven, 2004). In measuring banking performance, the most widely adopted measures are the traditional short-run accounting measures of return-on-assets (ROA) and return-on-equity (ROE), although recently researchers have also used alternative measures that reflect banks' long-run performance (e.g. the stock market-based franchise values of banks as adopted by De Jonghe and Vander-Vennet, 2008) on the basis that changes in banking market conditions may take time to have an impact on bank performance. Moreover, a considerable amount of literature has been devoted to the measurement of banking efficiency as an indicator of performance. As is shown in

a survey article by Berger and Humphrey (1997), numerous concepts of efficiency such as technical efficiency, scale efficiency, cost-based or profit-based x-efficiency have been defined and alternative estimation methods have been proposed.

Therefore, under the general umbrella of the SCP framework, two sub-strands of empirical literature have emerged with one focusing on the structure-conduct relationship and the other on the structure-performance relationship. Both strands of literature associate a concentrated market with anti-competitive behaviour and existence of monopolistic profits, and thus justify the use of regulatory measures to prevent the over-concentration of markets or to curtail the monopoly power of large firms. However, the early empirical application of the SCP hypothesis in the banking sector generated inconclusive evidence and also questioned the interpretation as well as the validity of the SCP hypothesis (see e.g. the studies on the U.S banking sector by Rhoades, 1982 and Gilbert, 1984; see also Goldberg and Rai, 1996). For example, Berger (1995) found little evidence to support the SCP hypothesis in US banking; whereas in Europe, structural factors appeared to be important and the SCP hypothesis seemed to hold (Goddard et al., 2001). Therefore, subsequent developments in banking research have extended the original lines of inquiry or sought to provide alternative hypotheses about the relationship among market structure and more general market conditions, conduct and performance.

4.1.2. The R-M-P hypothesis

The RMP hypothesis is a variant of the SCP hypothesis. Unlike the traditional SCP that focuses on the market as a whole, RMP focuses on the market power of individual firms/banks. A firm possesses market power when it has "the ability profitably to maintain prices above competitive levels for a significant period of time" (Lerner, 1934, p. 171). In empirical research, an individual firm's market power is usually proxied by its share of the market. Firms with a higher market share can exert more market power and earn higher profits, independent of how concentrated the market is. The firms can gain more market power through higher concentration ratio. The traditional SCP hypothesis asserts that the setting of prices that are less favourable to consumers (lower deposit rates, higher loan rates) in more concentrated markets as a result of competitive imperfections in these markets. The RMP hypothesis asserts that only firms with large market shares and well-differentiated products are able to exercise market power in pricing these products and earn supernormal profits (Shepherd 1982).

4.1.3. The efficient structure hypotheses

The interpretation of the firms' market shares as measures of their relative market power has been questioned by other analysts. An alternative interpretation treats a larger market share of a firm to be an indication of a higher level of its efficiency. This is known as the 'Efficient Structure' (ES) hypothesis, which states that due to economies of scale and scope in the collection and use of information, adoption of

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new technology and business models, as well as provision of banking products and services, large banks may be inherently more efficient and thus more profitable than smaller ones. Consequentially, large efficient banks will be able to expand at the expense of small ones, leading to market concentration. Due to the differences in how firm/bank efficiency is measured, the ES hypotheses include sub-strands of approaches: the x-efficiency and scale-efficiency hypotheses. In stark contrast to the traditional SCP analysis that treats market concentration as an exogenous indicator of non-competitiveness in the marketplace, ES depicts market concentration as arising endogenously from the efficiency of large firms. The policy implications of the ES hypotheses are also in stark contrast to those of the SCP hypothesis. Opposite to the SCP that justifies the use of regulatory measures to prevent the over-concentration of markets or to curtail the monopoly power of large firms, the ES hypotheses regard such policy interventions totally unjustified and unnecessary.

Past empirical research has normally included market share of individual banks as an independent variable alongside the usual measures of market concentration in the regression analysis of bank conduct or performance, with a positive coefficient for market share being taken to support the ES hypothesis, that is, the higher an individual bank's market share, the more efficient it is, and the more profitable it becomes (Smirlock, et al., 1984). However, this interpretation was challenged by Shepherd (1986), who argued that the interpretation of individual market shares is ambiguous: it can be a proxy for either the efficiency level or market power of banks.

If the latter interpretation is valid, a positive coefficient would support a variant of the SCP hypothesis – the RMP hypothesis, rather than the ES hypothesis. Further, only firms with large market shares and well-differentiated products are able to exercise market power in pricing these products and earn supernormal profits (Shepherd 1982).Thus, having both individual market shares and market concentration as explanatory variables was insufficient to differentiate the RMP and ES hypotheses.

A procedure for clarifying the ambiguity was provided in Berger (1995) which incorporated measures of banking efficiency directly into the model, alongside variables of market shares and market concentration, so that the hypotheses of SCP, ES and RMP can be jointly tested.

4.1.4. Non-structural hypotheses

Subsequent developments in banking research have typically attempted to encompass alternative hypotheses by incorporating indicators of the efficiency, service quality, and risk of the banks as additional measures of bank conduct and performance (Berger, et al. 2004). Moreover, apart from market structural variables, non-structural factors may also affect competitive behaviour, such as entry/exit barriers (Bain, 1956), the general contestability of the market (Baumol et al. 1982; Bresnahan, 1989; Panzar and Rosse, 1987) and the institutional approach (Berger et al. 2004). Non-structural approaches do not observe the competitive environment but they attempt to

measure/infer it. Casu and Girardone (2005) argued that the most important advantage of non-structural approaches probably is that "it cannot be assumed a priori that concentrated markets are not competitive because contestability may depend on the extent of potential competition and not necessarily on market structure" (Casu and Girardone, 2005, P4). They also indicated that another advantage of non-structural models is that there is no need to specify a geographic market, since the behaviour of individual banks gives an indication of their market power. Non-structural measures of competition are mainly based on the Lerner (1934) measure of monopoly power. Specifically, they include measures of competition between oligopolists (Iwata, 1974) and those that test for the competitive conditions in contestable markets (Bresnahan, 1989; Panzar and Rosse, 1987). These latter approaches have been developed in the context of the New Empirical Industrial Organisation (NEIO) literature.

a)   Market entry/exit barriers

The existence of barriers to entry helps the firms in an industry to maintain their price above the competitive level over time. The commonly used measures of barriers to entry include economies of scale, capital requirement and product differentiation. Bain (1956) examined the entry conditions of 20 US manufacturing sectors. He defined three types of barrier: a) low cost of existing firms, b) product differentiation and c) the existence of scale economies. A careful study of these aspects for each industry enabled Bain to give a qualitative classification of industries according to

whether barriers were 'very high', 'substantial', or 'moderate-to-low'. He examined the eight-firm concentration ratio for each sector for 1936 to 40 and 1947 to 51. Bain's result suggested that barriers to entry were the main determinant of profitability: higher barriers to entry lead to higher profit rates. Market barriers and the major bank's price behaviour will affect the entry of new banks, leading to changes in market structure.

b) Market contestability

The market is contestable when "market is one into which entry is absolutely free, and exit is absolutely costless." (Baumol, 1982, P3). A market is perfectly contestable when entry into and exit out of the market is costless. The reality is that no market is perfectly contestable. There are always some "barriers to contestability". Virtually every market is contestable to some degree even when it appears that the monopoly position of a dominant seller is unassailable.

Bresnahan (1989) developed a method of testing competitive behaviour in industries, where demand equations are jointly estimated with marginal cost equations. The method was applied to the banking industry in some studies. Most studies have found little evidence of anticompetitive market behaviour at the overall bank level. For example, Suominen (1994) estimated the competitive behaviour for two separate markets, aggregated loan and deposit markets. His study found mixed results on the market behaviour of Finnish banks. The result of their researches are coherent with

the argument raised by Shepherd (1986).

c) Institutional approach

It is worth noting that the main-stream literature on banking competition has largely ignored a substantial and growing literature on spatial agglomeration and institutional complementarity approaches to firm conduct, competition, and performance. According to the relevant literature, firm conduct and performance are moulded by the historical, location and institutional settings within which firms operate and there are complementary institutional mechanisms that generate synergy and cumulative causation effects in specific locales and the wider economy. This literature has a long economic lineage that dates back to Myrdal (1957), Hirschman (1958), Kaldor (1966), Richardson (1972) and has been recently revived by Porter (1998) and formalised by Krugman (1980, 1991, 1996). Insofar as banking is concerned, banking development is an important factor influencing firms' resources acquisition, hence their economic performance. Improved economic performance in turn generates favourable demand and supply conditions for banks. Indeed, it has been argued that a more developed banking sector is more effective in screening and monitoring investors, thus increasing the efficiency of resource allocation (see, e.g. Goldsmith 1969; Greenwood and Jovanovic 1990). This greater ability to collect and process information might result in lower costs of bank financing (Rajan and Zingales 1998) and greater availability of funds (Bencivenga and Smith 1991; Levine 1992). Furthermore, these positive effects may be particularly beneficial for

firms that are more dependent upon financial intermediaries for their external financing (Benfratello et al. 2006). The institutional complementarity mechanisms have given rise to rather complex relationships between banks of different sizes and their clients, as is shown in the survey article by Berger et al. (2004). Therefore, a comprehensive explanation of bank conduct and performance must also consider such institutional factors, particularly in the context of the Chinese economy where non-market-based mechanisms as well as market incentives are all necessary ingredients to business and economic processes.

Having examined the conceptual frameworks for evaluating the relationship among market structure, market conditions, conduct and performance, the following sections discuss the measurement of banking inputs, outputs and productivity in banking sector.

4.2. Measurement issues concerning banking performance

As is mentioned above, in examining banking competition and performance, a crucial aspect of the research is to measure the business or financial performance of banks. The early literature tended to focus on the traditional financial measures of ROA and ROE, but the recent banking literature is dominated by the measurement of the banks' underlying performance in banking efficiency or productivity. This section discusses a number of the major issues concerning the concepts, definitions and techniques for measuring banking efficiency as an indicator of performance.

4.2.1. Measuring banking inputs and outputs

Productivity (or productive efficiency) is widely considered to be at the heart of the competitiveness of firms and industries. As the measurement of productivity necessitates the measurement of inputs into and outputs from a production process, the application of the concept in banking requires the appropriate definition of the mode of production for banking and financial services in the national economy and the measurement of banking inputs and outputs. However, serious controversies surround the treatment of banking and financial services as well as the measures of banking and financial output in national accounts and the economics literature (see Triplett, 1990; Fixler and Zieschang, 1991; and Berger and Humphrey, 1992; Triplett and Bosworth, 2004). The controversy stems from the ways in which banking and financial services derive their main sources of income: by applying differential interest rate to borrowers and lenders to obtain net interest income and by explicitly charging fees for the provision of certain services. Because banks do not charge fees for many services they offer to their customers, the service charges are usually insufficient to cover non-interest costs of operation (e.g., wages, rents and materials). Thus banks and financial institutions typically rely on interest income to cover all the operating costs. However, opinions differ on how interest income should be treated in the measurement of banking output and value added.

Traditionally interest is viewed by national accounts statisticians as a transfer payment from borrowers to lenders for the foregone consumption. On this view,

interest payments are not considered to be payments for a "real" service rendered, but a form of property income, and so are recorded in the generation of primary income account, but not the production account. This treatment inevitably means that the operating surplus of banks would show as a negative item. As this would give a false impression of the size of the operating surplus of banks compared with other firms, the original system of national accounts (SNA) adopted a somewhat peculiar solution. On the one hand, net interest income, alongside other banking services that are explicitly charged for, was counted as part of banking net output. On the other hand, total net interest income was deducted from the total operating surplus for all the other industries so that the calculation of national GDP remained unaffected (the net interest income was not allocated to particular industries or final users though).

Alternatively, in the economics literature on the bank production function approach to banking output and productivity (see the discussion in Baltensperger, 1980; Santomero, 1984; and Berger and Humphrey, 1997), interest is viewed as a payment for services that banks and financial institutions provide to the economy (payments services, money creation, management of liquidity and risk), to depositors (record-keeping, safe-keeping, and interest payments on deposits) or to borrowers (funding and credit rating). In this view, apart from the explicitly priced banking services, banking output also includes gross interest earnings from bank loans as well as imputed charges for depositor services that banks offer to their customers

free of charge. Although there is little difference in the measured net banking output or value added between the above two approaches, the difference in the measured total banking output is substantial with the economists' measure being significantly higher than the national statisticians' measure.

More recently, an eclectic approach has been adopted by economists and national accountants to incorporate the contribution by banking and finance to the national product through a statistical term called Financial Intermediation Services Indirectly Measured (FISIM). In essence, the method assumes that FISIM is purchased implicitly by borrowers paying higher interest than would be necessary if FISIM were charged for explicitly and by lenders receiving lower interest than would be necessary if FISIM were charged for explicitly. FISIM is then allocated to sectors and industries so as to identify the purchase of these services explicitly and to classify them as intermediate consumption, final consumption expenditure or exports according to which sector incurs the expenditure. The implication of the implementation of FISIM is far-reaching – not only banking output, in both net and gross terms, but also the output and value added for both the aggregate economy and the other industrial sectors will all be altered. A simple example here can help to illustrate the issues more clearly. Let L, D, RL, RD and I denote the volume of loan, deposit, the bank lending rate, the deposit rate and the net interest income. In the conventional national accounts treatment, the net interest income is defined to be I = RL L – RD D. In the FISIM framework, there will be a reference interest rate that

represents the pure charge for the financial intermediary services that the banks provide to both depositors and borrowers. Let RF denote this reference rate (which lies between the deposit and lending rates), then the new level of net interest income is IF = (RF − RD) D + (RL − RF) L = I + RF (D − L). Since under normal conditions D > L, the new measure of bank net output is larger than the old measure by the amount RF (D − L), which represents the amount of additional charges for financial services offered by the banks. It is worth noting that such charges are shared by both depositors and borrowers, hence their income, expenditure and net output have to be adjusted accordingly. However, how the reference rate is determined is still highly controversial (see further discussion in Triplett and Bosworth, 2004).

Corresponding to such controversies, it is little wonder that despite the substantial number of studies on banking output and productivity, there is still no coherent definition of either banking inputs or outputs. In the empirical literature, the selection and classification of banking inputs and outputs have been guided by three general models of banking and are also constrained by data availability in practice. The three general models are "financial intermediation", "production function" and the "hybrid" model. The financial intermediation model is consistent with the traditional national accounts view that any interest-related banking activity is non-productive and the primary role of banks is to offer financial intermediation between depositors and borrowers. In this model, banks use the traditional factors of production (e.g. labour and capital) together with deposits as inputs to produce

outputs of loans and other fee-based services (e.g. Sealey and Lindley, 1977). In the production function approach, banks are treated essentially the same as any other non-financial firm – they employ the traditional factors of production, viz. labour and capital, to produce a range of (flows of) banking and financial outputs as measured by the deposit and loan accounts as well as other services (see, e.g., Benston and Smith, 1976; Berg, et. al., 1991; Berg, et. al., 1993; Berger and Humphrey, 1991). More recently, a number of researchers have proposed hybrid models that focus on the efficiency of banks in reducing costs or generating revenue/profit (e.g., Hancook, 1985; Berger, et. al., 1993; Berger and Mester, 1997, 2003). In contrast to the earlier two approaches that focus on banking assets and liabilities in measuring technical and scale efficiencies, this third approach focuses on costs and earnings in measuring X-efficiency (see detailed discussion below). Moreover, the classification of inputs and outputs in the hybrid model is also flexible – a financial product can be classified either as an input or an output, depending on whether or not the product makes a negative or positive net contribution to bank revenue.

Insofar as the financial intermediation and the production function approaches are concerned, the fundamental difference between the two is whether or not bank liabilities should be treated as inputs or outputs. It is nonetheless increasingly recognised that banks, like many other non-financial firms, use scarce economic resources to produce a range of banking outputs, including outputs that are offered

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free-of-charge mainly to depositors. Such outputs include free cheques cashed, automatic teller machine (ATM) transactions, and other transactions services. Although there is no explicit charge for using such services, depositors do pay for these services in the form of interest that depositors forego. Banks accordingly earn implicit revenue from these depositor services. At the same time, banks incur costs for producing the services, in the form of the resources employed in cheque clearing, ATM operations and other transactions services provided to deposit holders. In the spirit of Benston and Smith (1976), what a bank produces facilitates both inter-temporal and intra-temporal transfers of consumption, which corresponds to demands for both deposits and loans. Therefore, in principle a model of bank production and output needs to incorporate both deposit-related and lending-related services as well as other explicitly charged services. In the context of the Chinese SOCBs, there is an additional incentive for the banking groups to compete for deposits in order to support the burden of NPLs that arise largely from lending to the state-owned enterprises. It is no wonder that the amount of deposits that a branch attracts features prominently in the criteria against which the performance of the branch is judged by the management. Although a rigorous approach must take the measurement of every element of banking outputs seriously, such an approach is still eluding analysts.

4.2.2. Measuring banking efficiency

In the literature, alternative concepts and definitions of efficiency have also been proposed. Conceptually the overall bank efficiency can be decomposed into scale efficiency, scope efficiency and X-efficiency. "Scale efficiency measures whether banks are operating with an efficient level of outputs; scope efficiency measures whether banks are operating with an efficient mix of outputs; and X-efficiency focuses on whether banks are operating with an efficient mix of inputs" (Liu and Tripe, 2002, p. 63). The bank has scale efficiency when it operates in the range of constant returns to scale. Scope efficiency occurs when the bank operates in different diversified locations. X-efficiency includes technical efficiency and allocative efficiency. When the bank maximises output from the given level of inputs, pure technical efficiency occurs. Technical efficiency is the major method that this study employs to measure bank efficiency due to the constraint of data availability. Allocative efficiency happens when the bank chooses the revenue maximizing the mix of outputs. Theoretically, a bank is fully efficient if it produces the output level and mix that maximize profits and minimize possible costs.

X-efficiency can be measured in terms of cost or profit but the emphasis of much of the banking literature is on cost X-efficiency. Since managers have the ability to control costs (cost X-efficiency) or revenues (profit X-efficiency), greater X-efficiency can be achieved by superior management. Cost X-efficiency gets far more attention than profit X-efficiency as the former represents managements'

ability to control costs and employ resources to generate outputs. X-efficiencies

have been shown to be more important in determining overall firm and market

performance than scale or scope inefficiencies (Berger & Humphrey, 1997).

However, estimation of x-efficiency entails the separation of price and quantity data,

which is not straightforward or even meaningful, particularly in the banking sector

due to the complexity in measuring banking outputs (see more detailed discussion

below).

There is so far no consensus view on the best way to measure efficiency in the

banking sector, although the majority of studies employ some form of frontier

analysis. Berger and Humphrey (1997) suggest that the essence of frontier analysis

is its sophisticated method of benchmarking the relative performance of decision

making units (DMUs). At least five different frontier approaches to evaluating

efficiency have been employed in the literature, three of which are parametric and

two are non-parametric. The three parametric frontier approaches are the stochastic

frontier approach (SFA), the distribution-free approach (DFA), and the thick frontier

approach (TFA). DEA and free disposal hull (FDH) are non-parametric approaches.

There are both advantages and disadvantages of each approach. In general, the

parametric approaches allow for random errors in measuring inputs and outputs as

well as in specifying the functional relationship between inputs and outputs.

However, these approaches have to assume particular statistical distributions for the

error term and also adopt specific functional forms for the input-output relationship.

In contrast, the non-parametric approaches do not impose any restrictive assumptions on the input-output relationship (e.g. a particular production function or returns-to-scale characteristics). Nevertheless, no allowance is made for any measurement error in inputs or outputs.

4.3. Empirical literature on Chinese banking competition and performance

4.3.1. Review of current empirical study on measurement of banking performance in China

Despite the substantial difficulty in obtaining adequate and reliable data on Chinese banking[2], a growing body of empirical research has shed light on various aspects of the effectiveness of this reform programme in recent years (e.g., Li, et al., 2001; Chen, et. al., 2005; Fu and Heffernan, 2007, 2009; Lin and Zhang, 2008). The literature to date has focused on the financial performance of the banking groups as a whole (Li, et al., 2001) and how the performance relates to the asset structure and ownership of individual banking groups as well as the structure of the Chinese banking market (Chen, et. al., 2005; Fu and Heffernan, 2007, 2009; Lin and Zhang, 2008). What has generally emerged from these studies is that, compared with banks of other ownership types, such as domestic joint-stock, foreign-domestic joint stock, domestic private and foreign ownership, the SOCBs are heavily burdened with problems of bad loans, low efficiency and poor financial performance. Despite the huge effort put into the reform

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2 Such difficulties include very limited disclosure of financial information due to lack of regulatory requirement, inconsistent accounting standards across banking groups and misreporting of information even in official data sources (see a detailed discussion in Li, et al., 2001).

programme for nearly three decades, there is so far limited improvement in the relative inefficiency or underperformance of the SOCBs. It might be argued that if the Chinese SOCBs operated in a genuinely competitive market environment, they would perhaps have gone out of business a few years ago. It then becomes even more puzzling that the recent floatation of three of the four Chinese SOCBs received unprecedented levels of enthusiasm from both Chinese domestic and international investors. Various explanations might be offered that are based on the irrationality or rationality hypothesis of investors' behaviour, but it is also likely that the true nature and state of the competitiveness of the SOCBs are still not properly measured and understood. A sound assessment of the competitiveness and performance of the Chinese SOCBs in the broad context of the special characteristics and structure of the Chinese economy compounded by the forces of globalisation remains a challenge for analysts and policymakers. A comprehensive assessment of such issues is beyond the remit of the current study.

Insofar as specific research on the Chinese banking market is concerned, the empirical literature to date is rather limited and dominated by measurement of banking efficiency (see e.g. Huang, 1998; Chen, et. al., 2005; Fu and Heffernan, 2007), although systematic studies of bank conduct and performance have also been conducted recently (e.g. Fu and Heffernan, 2008; Lin and Zhang, 2008). In measuring banking efficiency in China, researchers have employed both non-parametric DEA (e.g. Chen, et al., 2005) and parametric SFA (e.g. Fu and Heffernan, 2007) to estimate

the efficiencies of individual banks, including SOCBs and the joint-stock banks, relative to their most efficient peers. In these studies, different concepts of efficiency such as cost efficiency, allocative efficiency, technical efficiency and cost-based x-efficiency have been adopted. The extant studies also differ in their selection of banks and the time periods for investigation. It is little wonder that the empirical results for banking efficiency in the Chinese banks also differ. For example, in their study of the big four SOCBS and ten joint-stock banks over the period 1985-2002, Fu and Heffernan (2007) estimated the cost-based x-efficiencies using the SFA. For the fourteen banks as a whole, the average x-efficiency for the whole period was between 0.41 and 0.52. The joint-stock banks were found to be significantly more x-efficient than the SOCBs. Chen et al. (2004) studied banking efficiency for forty-three Chinese banks (including the four SOCBs) during the period 1993-2000 using DEA. For the whole sample, the cost efficiency varied between 0.42 and 0.58; the allocative efficiency between 0.53 and 0.69; and the technical efficiency between 0.69 and 0.85 over the study period. Although their cost efficiency estimates were broadly in line with those of Fu and Heffernan, their findings concerning the technical efficiency were rather surprising: the SOCBs were significantly more efficient than the joint-stock banks – a result that is the opposite to the previous findings on the technical efficiency of Chinese banks by Wei and Wang (2000).

4.3.2. Review of research on relationship between market structure and performance in China

The study by Fu and Heffernan (2009) provided the first attempt to empirically test the alternative hypotheses of structure, conduct and performance in the Chinese banking market. Adopting the same framework as in Berger (1995) and Goldberg and Rai (1996), and using data for the fourteen banks as mentioned above, Fu and Heffernan (2009) examined the Chinese banking market from 1985-2002. Their empirical results showed a declining trend in efficiency in the Chinese banking sector as measured by the cost-based x-efficiency index. They provided support to the RMP hypothesis during the first stage of the study period (1985-1992), but rather weak support to the ES hypothesis for the second stage (1993-2002). Moreover, they found no relationship between market concentration and bank efficiency. They also found that "there were no dramatic change in market structure" (Fu and Heffernan, 2009, P50) though the JSCBs are relatively more X-efficient. They claimed the regulatory bodies should liberate interest rate and increase market entry to improve the competitive structure. Zou (2004) adopted the fixed effects models to examine the scale efficiency of China banking industry during period 1993-2003. He found that the efficiency of most banks had experienced a period of increase at first then a decrease afterwards during the study period from 1993 to 2003. He also noticed that there were distinct differences in the efficiency among the joint-stock commercial

banks. He concluded that total commercialisation does not always improve performance in efficiency.

4.4. Research methods for the current study

There is so far very little empirical study of banking efficiency of Chinese banks at the sub-group (e.g., provincial or branch) level and there is very limited hard evidence on differences in banking efficiency across the provinces. Due to the sheer dominance of the SOCBs in the whole Chinese banking market, it is perhaps more important to examine issues of competition and efficiency among the SOCBs in different regions than to compare SOCBs with non-state-owned banks. Without enhancing the state of competition and performance across different administrative regions within the SOCB sector, further encouragement of competition between state-owned and non-state-owned banks is likely to yield rapidly diminishing returns. Yet the lack of hard evidence of banking efficiency and performance at the individual provincial branch level presents serious difficulties for evaluating the effectiveness of banking reform so far as well as for informing the design and implementation of further banking reform at the micro/branch level.

The purpose of this study is to fill in this empirical gap. There are two broad objectives in the empirical investigation. First, the study will obtain precise measures of inter-group and inter-provincial differences in banking efficiency in the Chinese SOCB sector using the DEA technique and decompositional analysis. Second, a panel

econometric model will be employed to investigate the significant factors and mechanisms that underlie the inter-group and inter-provincial differences in banking efficiency. The following sections discuss the research methods in detail.

4.4.1. Measuring within-group and between-group efficiencies

In the literature on banking efficiency measurement, there are still substantial controversies over the concept, definition and estimation technique. In the present study, given the complete absence of data on bank cost, price, income and profit at the provincial level in the published official sources, the only concepts of efficiency that can be empirically measured are technical and scale efficiencies. In light of the theoretical controversies and data limitations, this study adopts an eclectic production function approach to banking efficiency measurement in the spirit of Baltensperger (1980), Santomero (1984) and Berger and Humphrey (1997). Applying DEA and decomposition analysis, this paper conducts a thorough investigation into the technical input efficiencies, scale efficiencies and returns-to-scale characteristic of the Chinese SOCBs at the provincial level. Moreover, the total input efficiency of each provincial branch is decomposed into the product of within-group (or local provincial level) and between-group (or banking group level) efficiencies.

In contrast to the existing studies that treat the four state-owned banking groups as four DMUs alongside other banking groups of different ownership structures, this study focuses exclusively on the big four SOCBs and treats their provincial branches

as individual DMUs[3]. There are several reasons for doing this. First of all, the SOCBs differ substantially from other types of banks in terms of scale of operation, governance, market conditions and business conduct. Whilst the SOCBs have branch networks across the entire country and their business operations are subject to severe policy interventions and protection, many other types of banks (e.g. joint-stock or private) only operate within very specific locations and under highly competitive market conditions. Since the efficiency measures of individual banks are relative to the most efficient peers (or the "outliers") that form the efficient frontier for the whole sample, the measures are very sensitive towards the selection of samples. It is little wonder that due to different samples being selected, as well as differences in the variables and estimation methods adopted, the empirical measures of efficiency of Chinese banks differ substantially. For example, in a study on the cost x-efficiencies of the SOCBs and other types of banks in the 1990s by Chen, et al. (2005), the SOCBs were found to be more x-efficient than the joint-stock banks, contradicting the results in Fu and Heffernan (2007, 2008). By restricting the samples to the SOCBs in the current study, the results may be more comparable and convincing. Second, by treating the provincial branches of the SOCBs as DMUs, the present study has overcome a statistical problem common among all the existing studies that arises from the small number of DMUs selected and hence a lack of degree of freedom.

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[3] Each of the four banking group has hundreds or thousands of branches in each of the thirty-one provinces, autonomous regions and directly administered municipalities on Mainland China. As detailed data are only available at the provincial/municipal level, each province or municipality under a banking group is treated as a DMU and the term "provincial branch" here refers to all the branches of a particular group within a particular province. Therefore, there should be 124 DMUs. But due to data omissions in official publications, the actual number of DMUs in this study is 122.

In light of the theoretical controversy surrounding the definition and measurement of banking output, market conditions and data limitations, this research adopts a bank production function approach in the spirit of Baltensperger (1980), Santomero (1984) and Berger and Humphrey (1997) to examine the efficiency of the Chinese SOCBs over the period 1998-2003[4]. Applying DEA and decomposition analysis, this resaerch conducts a thorough investigation into the technical input efficiencies of the Chinese SOCBs at the provincial level. Although the DEA technique has been employed in various existing studies of banking efficiency in China, the present study extends the empirical work in a number of ways. First, for the first time this study examines banking efficiency of the SOCBs at the provincial level and almost all the provincial branches for the big four banking groups. Using the DEA technique, the present study will obtain values for *total input efficiency, pure technical efficiency, scale efficiency* and *returns-to-scale characteristic* for all provincial branches of the SOCBs. As data on banking costs, revenues and net incomes is generally unavailable at the provincial level due to confidentiality reasons[5], such analysis provides an informed judgement on the efficiency and competitiveness of the SOCBs using data that is more accurate and more readily available. The empirical findings also reveal valuable information for judging the scale economy, unit cost of production and thus potential profitability of the banking groups. Second, the total input efficiency of each provincial branch is

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[4] 2003 is the latest year for which there is a full set of data for conducting the present DEA analysis.

[5] Although such data exist for the whole banking groups, there is a significant extent of distortion to the data arising from government interference, as is discussed in more detail in a later section.

decomposed into the product of within-banking-group and between-banking-group efficiencies to separate the efficiency arising from within the provinces from the efficiency arising from the banking group as a whole. The rationale for such a decompositional analysis is that due to historical and political reasons, individual banking groups may be particularly advantaged or disadvantaged relative to the other groups. It is useful to empirically find out whether or not and to what extent this hypothesis is true. Moreover, the within-group versus between-group decomposition analysis can reveal the effectiveness of the banking reform programmes at the micro (province/branch) level as compared with the efforts at the mezzo (group/market) level. In short, the empirical results can enable policymakers and the management of SOCBs to target specific operational areas for further efficiency improvement.

Following the literature, the current study uses the number of employees and the number of bank branches as inputs and the total amount of deposits and loans (in RMB Yuan) as outputs. Moreover, the present study also uses the number of cash cards as an input and the amount of card transactions as an output. Since the issuance and maintenance of cards incur additional capital and technology related costs and the average amount of card transactions per card can reflect the cardholders' average spending power, this practice can capture the efficiency of the branches in attracting wealthy individuals who also have demands for other fee-based banking products and services such as personal asset management. It should be pointed out that ideally all the outputs should be flow measures but the

outputs adopted here are stock measures. This practice is imposed by the lack of flow data on deposit and loan accounts (which was also noted by other studies on Chinese banking, e.g., Fu and Heffernan, 2007). Moreover, the outputs here correspond to total, not net, banking outputs.

Having clarified the selection of inputs and outputs, the next step is to specify the method for measuring the efficiency of bank branches in transforming inputs into a variety of outputs. Since there are multiple inputs and outputs in the present case, the natural tool of analysis is the non-parametric Data Envelopment Analysis that was originally developed by Charnes et al. (1978). DEA is ideally suited for benchmarking the relative operational efficiency of business units (termed decision making units, or DMUs) against their most efficient peers under similar market conditions and business models when multiple inputs and outputs are involved in the production process. The analysis indicates the necessary changes in individual inputs and outputs of a particular DMU so that the performance of the unit becomes as efficient as its most efficient peers. This method, now routinely adopted in a broad range of application areas, has been applied extensively in the banking and financial service sector. Conditional upon the appropriate choice of inputs and outputs as well as the sample of DMUs, the kind of mathematical programming procedure used by DEA for efficient frontier estimation is found to be comparatively robust (Seiford and Thrall, 1990). Further evidence of the robustness of DEA as compared with other similar estimation methods is presented in Bauer et al. (1998).

Due to the constraint of data availability at the provincial level, the present study focuses on the technical input efficiency of the provincial branches of the SOCBs, that is, the maximum proportional contraction in any observed input that can be achieved if all inputs by a branch contract *radially* as far as possible without detriment to its output levels (Thanassoulis, 2001, p.24). The focus on input efficiency is consistent with real world developments in the Chinese banking sector that was characterised by limited scope for further growth in deposits and loans for the SOCBs due to severe competition from other banks that were expanding rapidly. Therefore, the present study will adopt the production function approach but employ proxy measures for deposit-related, lending-related and other outputs. Such proxy measures are also widely used in the literature (e.g. see Berger, et al. 1993; Humphrey, 1993; Mester 1997).

The estimation of the technical input efficiency is performed under alternative assumptions about the returns to scale characteristic in the production process. Following the original model of Charnes, et al. (1978), which has become widely known as the CCR model, the overall *technical input efficiency* (termed θ^{CCR}) of each branch is estimated under the assumption of constant returns to scale. The CCR model is also extended to obtain the slacks in inputs and outputs by a two-stage estimation procedure (see, Cooper, et. al., 2002). Let j denote the jth DMU (or bank branch, j = 1, …, N), x_i the ith input (i = 1, …, M), and y_k the kth output (k = 1, …, S), SX_i the

slack in the ith input, and SY_k the slack in the kth output. In the first stage, for any particular DMU (denoted by j0) the following linear programming problem is solved to obtain its efficiency score (i.e. θ_{j0}^{CCR}):

Minimise: $\quad \theta_{j0}$

Subject to:

$$\theta_{j0} x_{i,j0} \geq \sum_{j=1}^{N} \lambda_j x_{i,j}, \qquad i = 1,..., M$$

$$y_{k,j0} \leq \sum_{j=1}^{N} \lambda_j y_{k,j}, \qquad k = 1,...S$$

$$\lambda_j \geq 0, \qquad\qquad j = 1,..., N$$

$\theta_{j0}^{CCR} = \theta_{j0}^{*}$ where θ_{j0}^{*} is the optimal value of θ_{j0}.

In the second stage, the optimal value θ_{j0}^{*} is used in the following linear programming problem:

Minimise: $\quad -\sum_{i=1}^{M} SX_i - \sum_{k=1}^{S} SY_k$

Subject to:

$$\theta_{j0}^{*} x_{i,j0} = \sum_{j=1}^{N} \lambda_j x_{i,j} + SX_i, \qquad i = 1,..., M$$

$$y_{k,j0} = \sum_{j=1}^{N} \lambda_j y_{k,j} - SY_k, \qquad k = 1,...S$$

$$\lambda_j \geq 0, \qquad\qquad j = 1,..., N$$

If $\theta_{j0}^{*} = 1$ and $SX_i = 0$ (i = 1,…,M), $SY_k = 0$ (k = 1,…,S), the operation of DMU j0 is defined to be Pareto-efficient, otherwise it is Pareto-inefficient and the extent of technical inefficiency is measured by $1 - \theta_{j0}^{*}$. One limitation of the above model,

however, is that all the DMUs, regardless of their size, are assumed to be operating

under constant returns to scale, which is a very restrictive assumption. Banker et al.

(1984) modified the CCR model to allow for the DMUs to operate under variable

returns to scale (and the modified model is termed the BCC model). The modification

is rather straightforward: the following *convexity constraint* is introduced into the

CCR model: $\sum \lambda_j = 1$. The resultant efficiency score for DMU j0 is now termed the

pure technical input efficiency (denoted by θ_{j0}^{BCC}). On the basis of the two efficiency

scores, the *scale-efficiency* score for DMU j0 (denoted by θ_{j0}^{S}) can be obtained as:

$\theta_{j0}^{S} = \theta_{j0}^{CCR} / \theta_{j0}^{BCC}$. Moreover, using the optimal values for λ (denoted by λ^{*}), the

returns-to-scale characteristic of DMU j0 can also be determined as follows: 1) If

$\sum \lambda_j^{*} > 1$ for all the optimal solutions to the CCR model, then decreasing returns to

scale (DRS) hold locally for DMU j0; 2) If $\sum \lambda_j^{*} = 1$ for at least one optimal solution

to the CCR model, then constant returns to scale (CRS) hold locally for DMU j0; 3) If

$\sum \lambda_j^{*} < 1$ for all the optimal solutions to the CCR model, then increasing returns to

scale (IRS) hold locally for DMU j0. The optimal scale size is at where CRS holds.

Given the absence of any data on bank profit at the provincial level, such information

is valuable in identifying the potential unit cost of production and thus profitability of

the branches.

In the above procedures, all the branches of all the banking groups are pooled

together to estimate a *global* efficient frontier against which every branch is

compared. However, it is probable that for historical as well as political /

administrative reasons, branches within a particular banking group may face a separate *group* efficient frontier from that for another banking group. In other words, irrespective of the efficiencies at the provincial level, a banking group may be intrinsically more effective than the other groups in improving the operational efficiencies of all its branches across the provinces. This is particularly pertinent in the Chinese SOCBs as historically these banking groups were severely restricted in the economic sectors within which they could operate. As a result, the level of efficiency of individual banking groups may be related to the conditions and performance of those economic sectors. Moreover, over different time periods different banking groups received policy priority treatments by the Chinese government, which again may have led to differences in efficiency performance at the group level. Therefore, similar to the procedure developed by Charnes et al. (1981), this study decomposes the technical efficiency score for a provincial branch into the product of *within-banking-group efficiency* and *between-banking-group efficiency*. For convenience such efficiencies are termed *local efficiency* and *group efficiency* respectively in subsequent discussions. *Local efficiency* is obtained by estimating the technical input efficiency of all the provincial branches within the *same* banking group in the first-step estimations. In the second step, the observed input-output levels of all the branches for all the banking groups are replaced by their targeted optimal levels that are calculated from the first-step estimations. All the branches with the new optimal input-output levels are then pooled together to estimate the efficiency score for the branches again. Since in the second step, the

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inefficiencies at the local level have already been removed by the use of optimal inputs and outputs, any new inefficiency must be due to the group effect.

Having examined the efficiency level of all the provincial branches, several questions may be raised. Specifically, the central questions need to be investigated are: How efficient were the SOCBs in deploying resources to provide banking services in recent years? How did banking efficiency differ across different groups as well as different provinces? How did banking efficiency across groups and provinces change over the study time period? These questions are answered by measuring and decomposing the technical efficiency of the four SOCBs across the thirty-one provincial units on mainland China over the period 1998-2003. By so doing, the current study overcomes or alleviates a number of the problems associated with the existing studies. First of all, given the distorted profits and costs for the SOCBs due to routine policy interventions, it is more useful to reveal their underlying efficiency in utilising resources to produce banking outputs. Secondly, by focusing on the SOCBs, the measured efficiency levels are economically more meaningful, as is explained in detail later. Finally, by treating the provincial branches as the units of analysis, the number of data points increases significantly.

4.4.2. Panel econometric modelling of within-group and between-group efficiencies

Once the efficiency levels of the provincial bank branches have been estimated, the study will go on to explain the inter-provincial differences in banking efficiency using a panel econometric modelling approach. The econometric model is constructed on the basis of an extended conceptual framework that encompasses the alternative hypotheses as discussed above. In the present study, since no data on banks' cost, income or profit is available at the provincial level, any measure of bank performance on the basis of profit or cost is ruled out. Therefore, banking efficiency is used instead as a measure of bank performance. A considerable amount of literature has been devoted to the measurement and explanation of banking efficiency, as is shown in a survey article by Berger and Humphrey (1997).

As the literature review in the previous sections suggest, the level of efficiency of individual bank branches in the provinces depend on a wide range of factors, both structural and non-structural. Therefore, the estimated technical efficiencies of individual provincial branches are used as the dependent variable in the following panel regression model:

$$TE_{it} = x'_{it} \beta + v'_{jt} \gamma + z'_{i} \alpha + \varepsilon_{it}$$

(1)

In the above model, TE is technical efficiency; i: the number of provinces; j: the number of provincial-level bank branches; t: time; x': a vector of variables that refelct the economic, banking and institutional conditions of the provinces; v': a vector of

variables that capture branch-specific conditions; $z'_i\alpha$: a term for the 'individual effect'

(Greene, 2003, p.285) which contains a constant term and a set of unobserved branch

specific variables; ε: the usual random error term. Contingent on the data, model (1)

can turn out to be either of three variants: i) if $z'_i\alpha$ contains only a constant term,

model (1) becomes the standard pooled regression model; ii) if $z'_i\alpha$ contain

unobserved variables that are correlated with x', model (1) can be transformed into a

'fixed-effect' model; iii) if $z'_i\alpha$ contain unobserved variables that are uncorrelated

with x', model (1) can be transformed into a 'random-effect' model (Greene, 2003,

p.285).

The econometric estimation strategy is as follows. The initial model started with all

the explanatory variables listed above and the number of explanatory variables was

reduced round by round. In every round, the Breusch-Pagan Lagrange Multiplier test

was conducted and the pooled regression model was rejected on each occasion in

favour of the individual effects models. Therefore, model selection was restricted to

the 'fixed-effects' and 'random-effects' models. The Hausman procedure was

followed for this purpose. Indeed, the Hausman procedure, together with the condition

number for testing the significance of the multi-collinearity problem as well as the

p-values for the estimated coefficients, were used as the criteria for dropping

explanatory variables from each round of estimation. For example, if the presence of a

variable caused the value of the condition number to rise and rendered Hausman's χ^2

test statistic negative as well as the p-value showed statistical insignificance, then it

was dropped from the next round of estimation. For the final set of explanatory variables, the 'random-effects' model was chosen as best suited for explaining the inter-provincial differences in the technical efficiencies of the 122 provincial-level bank branches. Details of the final estimated 'random-effects' model using Stata are presented in Table 26 in chapter 6. In the final model, as the condition number of the matrix formed by all the explanatory variables is substantially below 20 (Table 26), multi-collinearity is not a serious concern here. The Hausman's test statistic strongly suggests the acceptance of the null hypothesis that the individual effects are uncorrelated with the other explanatory variables. Thus the random-effects model is justified.

4.5. Summary of conceptual issues and framework for empirical investigation

This chapter has reviewed the conceptual and empirical issues concerning the examination of banking competition and competitiveness. Due to the lack of a clear definition of competitiveness, alternative measures have been adopted as indicators of competitiveness. Insofar as the banking industry is concerned, the most commonly adopted measure is bank performance, measured either by financial performance (i.e. profitability) or efficiency. There are also numerous concepts of efficiency as well as alternative methods for estimating efficiency. This chapter has also reviewed the literature on the determination of bank efficiency. The literature is represented by alternative hypotheses about the relationship among market structure, market condition, bank conduct and performance.

On the basis of literature review, and given the business models of the Chinese SOCBs in the study period as well as the constraint of data availability, this study proposes to adopt the DEA method to estimate technical input efficiency for individual provincial bank branches and then employ a panel econometric model to investigate the significant factors in explaining the inter-provincial differences in banking efficiency. The next two chapters present details of the data, specification of the empirical estimation procedures and models, selection of explanatory variables, and the empirical findings.

Chapter V. Measurement of Banking Efficiency at Provincial Level

5.1 Current market conditions and business model of the Chinese SOCBs

Existing empirical studies of banking efficiency in China have largely followed the literature on estimating the cost x-efficiency of banking and financial institutions (mainly in the U.S.) with little consideration for the market conditions and business conduct in the Chinese banking market (Heffernan, 2005). An implicit assumption underlying the estimated cost function is that the banks in question operate in an imperfectly competitive (e.g. monopolistically competitive) market as profit maximisers. In a standard monopolistically competitive model, the firms have complete discretion over the design and launch of their products, the prices to charge, the markets to compete in, and the price and non-price aspects to compete against or collude with their rivals. However, in the Chinese SOCB sector during the study period, such conditions were far from reality. Although the Chinese SOCBs had come a long way to be commercially viable, they were still severely restricted to function independently as profit maximisers, largely due to historical reasons and policy interventions. The SOCBs were, and are still, closely monitored and regulated in their corporate governance, deposit-taking and lending decisions and the deposit-lending interest spread. Their flow of funds was largely allocated on a geographical and sectorial formula basis and they had little control over their cost bases. As a legacy of the historical administrative division of business scopes coupled with the very nature of banking that is based on information, reputation, trust and network between the

bank and the clients, the SOCBs and the colossal state-owned industrial sectors are inextricably linked to maintain stability in national output and particularly employment. In a sense, the SOCBs were still playing the role of the "treasurer" for the state-owned corporations. Therefore, the Chinese government always stands ready to rescue any failing SOCBs through capital injections and taking-over of bad assets[6].

The business model of the SOCBs was also shaped by the stage of China's economic development in general and banking development in particular. Compared with established foreign banks, the Chinese domestic banks, particularly the SOCBs, have many disadvantages. Although the basic structure of a modern banking system is in place, the management of specific business areas such as credit and risk remains primitive. Despite a significant rise in the capital adequacy ratio achieved by capital injection by the government, stripping off bad assets, and stock market floatation, the formation and accumulation of bad assets still haunt the SOCBs disproportionally as a result of the ties with the state-owned enterprises. The rapid development of the stock markets and venture capital markets in China pose an increasing challenge to the banking sector's traditional sources of commercial income and thus the profit model.

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[6] The SOCBs' defence against market risk is not always or exclusively policy intervention. One further buffer for the SOCBs to withstand the problem of significant proportion of NPLs is the very high liquidity level in the economy that arises from impressive economic growth at an annual rate of 8-10 percent for nearly two decades and also a culture of high savings ratio by Chinese households. In the past decade, the annual average growth rate in total banking assets, deposits and lending is almost twice the growth rate in real GDP. The ratio of banking assets to GDP in China increased from 151.8 percent in 2000 to 245.2 percent in 2005, suggesting a very high level of liquidity in the Chinese economy that is very similar to the level in the Euro area (see also Fu and Heffernan, 2007). This high level of liquidity has enabled the SOCBs to spread the burden of NPLs over a rapidly expanding asset base and over a longer time horizon.

The new fee-based or capital-gains-based businesses also face tough challenges as China has little history or culture of paying for banking and financial services. If the SOCBs were to move rapidly to a pure profit-based market model, it would entail significant levels of unemployment in the SOCB sector itself and probably a credit crunch for the state-owned enterprises – an economic as well as political risk too high for the Chinese government to bear.

Therefore, it can be argued that the most appropriate conceptual framework for describing the conduct of SOCBs is the principal-agent theory (Shi, 2006). A full development of the principal-agent model of the conduct of the Chinese SOCBs is beyond the scope of the current study. Nevertheless, it can be argued that significant moral hazard problems can arise from the peculiar ownership and governance structure of SOCBs. Whilst the objective of the principal (the government) is to sustain rapid economic growth and social stability by maintaining a constant flow of credit to the economy in general and the state enterprises in particular, that of the agents (managers of the SOCBs) is to maximise their market power that is manifested through their market share of deposits, loans and the size and quality of the client base. In other words, the competition among the SOCBs mainly took the form of non-price competition. In the meantime, the principal maintains control through a number of mechanisms including direct involvement in the corporate governance and control of the cost base to influence productivity, efficiency and profitability of the SOCBs.

This characterisation of the behaviour of the SOCBs is consistent with empirical observation. As is already mentioned in a previous chapter, the growth in banking assets, deposits and loans has been spectacular in recent years across all the SOCBs, but the growth in the more market-oriented and riskier businesses has been rather limited. Although the business scope of the SOCBs is expanding, the traditional banking businesses still remain the dominant source of commercial income for the SOCBs (see Table 16 in chapter 3). Non-interest income accounted for only around 10percent of total income for the Chinese SOCBs (with the only exception of ABC that recorded a 26 percent share of non-interest income in 2005), compared with roughly 48 percent for the global banking market. Therefore, the traditional market for deposits and loans still remain the main battleground for the SOCBs.

As revealed in the "performance" section in chapter 3, the SOCBs are unlikely to behave as profit maximisers comes from the usual measures of financial performance for business firms. The usual measures of financial performance such as ROA and ROE for the SOCBs are simply unreliable and subject to huge swings over time. This is simply because the business operations of the SOCBs were subject to frequent government interference such as asset-stripping and capital injections. Therefore, having examined the market conditions, the business model of the SOCBs, and the availability and quality of existing data sources, the present study will focus on the underlying efficiencies of the provincial branches of the SOCBs in utilising resources to produce a range of banking services.   The remaining sections of this chapter will

discuss how the DEA and decomposition analyses as discussed before are implemented and present the empirical findings.

5.2 Implementation of the empirical DEA and decomposition analyses

All the data for the present study are obtained from the Almanac of China's Finance and Banking (1998-2003 issues). The full dataset contains all the defined inputs and outputs from 1998 to 2003 for the branches of the four banking groups in 31 provinces, autonomous regions and provincial-level municipalities on mainland China (with the exception of Tibet which has partial data), giving rise to a sample size of 122 provincial level DMUs for each year. The following table presents the relative share of the inputs and outputs by each banking group as a whole.

Table 17 Share of inputs and outputs by banking groups in 2003 (percent)

	Branch	Employee	Card[7]	Deposit	Loan	Card Transaction
CCB	18.8	24.2	33.5	23.7	22.7	30.6
ICBC	27.3	27.5	21.5	37.6	37.4	15.7
ABC	40.8	36.1	31.3	23.9	25.0	50.7

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[7] It should be pointed out that the term "bank cards" refers to different measures for the four banking groups at the provincial level in the Almanac of China's Finance and Banking: for ABC, CCB and ICBC, the term contains both cash cards and credit cards, whilst for BOC only credit cards are counted. Therefore, the card-related inputs and outputs for BOC had to be adjusted to be consistent with the figures for the other three groups using a variety of sources including statistical year books for individual provinces.

| BOC | 13.1 | 12.1 | 13.8 | 14.8 | 14.9 | 2.9 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: ACFB, 2004

Clearly, ABC has the most extensive banking infrastructure among the four SOCBs, with the largest share in the number of branches and employees and second largest share in the number of cards issued. It also has a significant share of all the outputs, with more than half of the market in card transactions. Compared with ICBC, ABC's relatively smaller shares in deposits and loans were mainly due to the historical and administrative reasons that the operations of ABC were largely restricted to the agricultural sectors and the rural areas whilst ICBC was traditionally the dominant player in the state-owned industrial and commercial sectors. However, over the recent years, ABC was very aggressive in venturing into new business areas such as bank card related businesses. BOC has the smallest market share in either inputs or outputs. This is largely due to the fact that it was primarily dealing with banking businesses involving foreign currencies and thus accessible to a small proportion of domestic individuals and firms. Of course, there are significant variations in market shares of inputs and outputs across all the provinces. By estimating the CCR and BCC models the technical input efficiency scores as well as the decomposed pure technical and scale efficiency scores for all the provincial branches are obtained. Table 5 shows the average efficiency scores for the banking groups from 1998 to 2003[8].

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[8] All the DEA models were implemented in the GAMS modelling system developed by GAMS Development Corporation.

Table 18. Group average input efficiencies of the Chinese SOCBs (1998 – 2003)

	1998	1999	2000	2001	2002	2003
Technical:						
All	0.53	0.49	0.51	0.59	0.53	0.61
CCB	0.48	0.40	0.47	0.54	0.62	0.54
ICBC	0.42	0.44	0.46	0.64	0.62	0.74
ABC	0.58	0.50	0.52	0.62	0.40	0.56
BOC	0.62	0.60	0.58	0.56	0.46	0.63
Pure:						
All	0.59	0.55	0.56	0.62	0.57	0.64
CCB	0.52	0.43	0.50	0.55	0.65	0.55
ICBC	0.51	0.54	0.54	0.67	0.66	0.75
ABC	0.69	0.61	0.59	0.64	0.44	0.59
BOC	0.68	0.66	0.62	0.62	0.52	0.66
Scale:						
All	0.90	0.89	0.91	0.96	0.93	0.96
CCB	0.94	0.94	0.94	0.98	0.95	0.97
ICBC	0.88	0.85	0.88	0.96	0.95	0.98
ABC	0.87	0.84	0.89	0.97	0.92	0.95
BOC	0.92	0.92	0.93	0.91	0.90	0.95

Note: due to rounding errors, figures for technical efficiencies do not exactly equal the

products of pure technical and scale efficiencies in the table.

For the Chinese SOCBs as a whole, there was clear evidence of significant levels of operational inefficiency as compared with the most efficient provincial branches – the average score was 53 percent in 1998 and then fluctuated between 49 percent and 59 percent until it improved to 61 percent in 2003. The generally low level of efficiency was primarily due to the low pure technical efficiency, which was 59 percent in 1998 and 64 percent in 2003. The low pure technical efficiencies were reflected in the loss of efficiency for all the inputs. At the start of the study period, compared with the efficient targets, around 57 percent of branches, 49 percent of employees and 49 percent of cards for the whole sector could have been cut to achieve the same or even higher level of outputs. In 2003, despite the significant reductions in the number of branches and employees over the years of further reform, the percentage of wastage was still 42 percent for branches, 45 percent for employees and 39percent for cards. Therefore, the cost-cutting measures by the banking groups did have the desired effects, but the effects were only partial and the process of reform was very slow. These results are consistent with the gradualist approach to economic and banking reform adopted by the Chinese government to avoid potentially large scale unemployment and credit crunch problems that could arise from a "shock-therapeutic" approach. Some other benefits of the reform started to be evident at the end of the period. For example, the pure technical efficiency started to improve for the whole sector in 2003, and the average scale efficiency increased steadily from 0.9 in 1998 to 0.96 in 2003.

Having briefly examined the overall efficiency performance of the whole SOCB sector, the focus now turns to the performance of individual banking groups. As Table 18 shows, BOC was the clear leader in operational efficiency in the first half of the period but its leading position was taken over by ICBC in the second half. The performance of ICBC in the second period was particularly noticeable as this group was the worst performer in the first three years. The other groups showed a mixed fortune over the period. CCB had the lowest score for 3 out of the 6 years and was at the bottom of the league table in 2003. ABC came second in the table in the first four years but its position dropped to the bottom in 2002 and second from the bottom in 2003. More detailed results regarding various aspects of the operational efficiencies are reported in Table 19.

Table 19. Operational efficiencies of individual groups of the SOCBs (1998-2003)

	1998	1999	2000	2001	2002	2003
No. of Pareto-efficient provinces:						
CCB	3	2	3	4	4	4
ICBC	2	1	1	2	5	5
ABC	3	2	2	3	1	2
BOC	6	6	5	4	2	4
No. of branches operating at CRS:						
CCB	3	2	3	4	4	4

ICBC	2	1	1	2	5	5
ABC	4	2	2	3	1	2
BOC	7	6	5	4	2	4
No. of branches operating at IRS:						
CCB	10	18	21	16	1	4
ICBC	11	10	11	5	2	16
ABC	6	8	8	3	5	7
BOC	15	18	17	19	12	22
No. of branches operating at DRS:						
CCB	18	11	7	11	26	23
ICBC	17	19	18	23	23	9
ABC	20	20	20	24	24	21
BOC	9	7	9	8	17	5
percent of target level - by no. of branches						
CCB	46.9	38.3	45.9	53.4	56.7	52.9
ICBC	36.7	34.3	35.3	57.4	42.0	67.9
ABC	38.2	36.0	34.0	50.5	38.1	55.0
BOC	50.7	48.9	47.0	48.8	28.7	56.0
percent of target level - by no. of employees						
CCB	41.9	36.3	42.7	43.7	59.4	47.0
ICBC	42.0	43.7	46.3	63.1	62.4	73.6

ABC	57.5	50.4	51.4	61.1	19.6	35.3
BOC	61.9	59.8	58.0	55.1	46.4	62.7
percent of target level - by no. of cards						
CCB	44.5	35.9	45.5	53.5	61.9	53.0
ICBC	39.2	40.9	43.3	64.3	59.6	73.6
ABC	57.2	50.5	51.7	61.9	40.3	55.5
BOC	62.1	59.9	58.0	56.4	45.9	62.7

Note: percent of target level is expressed as the ratio between the level of an input that a DMU would require were it operating as efficiently as its most efficient peer and the actual level of that input. Thus, 1 minus this figure can be regarded as the percentage of wastage in that input.

A number of significant results have emerged. First, among the 122 provincial branches, just over 10 percent operated at an efficient scale (13 percent in 1998 and 12 percent in 2003). Around half of branches operated at decreasing-returns-to-scale (52 percent in 1998 and 48 percent in 2003), suggesting that these branches were operating at a scale that is above the most productive level. Given the dominance of interest income in banks' total revenue and the very limited autonomy by the banks to change their interest rates, it can be deduced that these branches were not operating at the profit-maximising scales and thus could benefit from a reduction in their scales of operation. The problem was particularly acute for CCB and ABC throughout the period. ICBC also experienced a significant problem of DRS in every year apart from

2003. In contrast, the most significant problem for BOC over the entire period was IRS, thus there was scope for many branches in this group to increase the scale of operation. Second, related to the problem of above-optimal operational scales, there was also a significant problem of surplus inputs of branches, employees and bank cards. Relatively speaking, ICBC had the least surpluses whilst CCB and ABC had the most surpluses in all the inputs. The problem of surplus labour was particularly severe for ABC. To shed further light on the areas where improvement is required, the decompositional analysis of local versus group efficiencies is conducted and the results are presented in Table 20.

Table 20. Local and group efficiencies of the SOCBs (1998 – 2003)

	1998	1999	2000	2001	2002	2003
SOCBs: Local	0.70	0.73	0.70	0.68	0.68	0.68
Group	0.77	0.71	0.76	0.90	0.85	0.94
CCB: Local	0.64	0.66	0.72	0.61	0.68	0.54
Group	0.80	0.68	0.66	0.90	0.96	0.99

ICBC: Local	0.79	0.80	0.77	0.76	0.69	0.76
Group	0.53	0.56	0.61	0.86	0.92	1.00
ABC: Local	0.75	0.84	0.73	0.73	0.71	0.74
Group	0.74	0.60	0.77	0.85	0.66	0.78
BOC: Local	0.63	0.62	0.61	0.60	0.64	0.66
Group	1.00	0.99	0.99	0.99	0.87	0.98

It is clear that for the whole sector of SOCBs, efficiency at the local provincial level declined but efficiency at the group level generally improved over the entire period. Moreover, efficiency at the group level dominated efficiency at the local level and the gap was rising in recent years, suggesting that in general the source of inefficiency was from the local level. Therefore, further efficiency gain can be obtained more effectively by targeting reform efforts at the micro/branch level than at the group level.

Insofar as the individual banking groups are concerned, BOC was the most efficient at the group level. This is not really surprising given this group's significant exposure to international markets and foreign competition. Nevertheless, compared with the most efficient peers within the BOC group, the level of local efficiency was the lowest among the four banking groups. Again, this result was not really surprising as it is expected that those provinces in the interior parts of China were not as exposed to foreign-currency related businesses as their counterparts located in the east coastal provinces. In the remaining three groups, some interesting contrasts have emerged. Although ABC was not the worst performer in the first few years, it fared worst in the efficiency score by 2003. For CCB and ICBC, although these two groups compared unfavourably with the BOC in the first few years, they had become almost as efficient as BOC in 2002 and 2003. Therefore, ABC seemed to be particularly disadvantaged in its operational efficiency over the study period. At the local level, the level of inefficiency was very significant across all the banking groups, especially within the CCB group.

Finally, this chapter presents the six-year average technical and scale efficiency scores for all the provincial branches of the Chinese SOCBs over the examination period. Not surprisingly, provinces on the eastern coast and the major cities were associated with much higher technical input efficiency scores than those provinces in the interior parts of China, although the difference in scale efficiency was rather limited. Therefore, the cross-province differences in technical input efficiency mainly arose

from the differences in pure technical efficiency. The charts in the Appendix show the

distribution of efficiency scores among all the provincial branches. Apparently, with

the exception of 2001 and 2003, the peak of the distribution occurred at an efficiency

level of less than 50 percent (shown in figure 2). By 2003, the provincial branches

were more uniformly distributed across the efficiency range of 0.4 to 1, suggesting an

across-the-board, albeit limited, efficiency improvement.

Table 21: Average technical input efficiency of SOCBs across Chinese provinces and major cities (1998 – 2003)

| Provinces	CCB	ICBC	ABC	BOC
Beijing	1.00	1.00	0.69	1.00
Tianjin	0.66	0.53	0.51	0.73
Hebei	0.36	0.50	0.57	0.51
Shanxi	0.59	0.64	0.49	0.48
Inner Mongolia	0.37	0.48	0.44	0.43
Liaoning	0.54	0.64	0.47	0.72
Jilin	0.41	0.72	0.37	0.79
Heilongjiang	0.49	0.70	0.57	0.78
Shanghai	0.95	0.89	0.87	1.00
Jiangsu	0.39	0.65	0.48	0.50
Zhejiang	0.63	0.48	0.51	0.42
Anhui	0.30	0.42	0.43	0.43

Fujian	0.78	0.70	0.85	0.45
Jiangxi	0.51	0.61	0.42	0.39
Shandong	0.44	0.63	0.44	0.44
Henan	0.49	0.71	0.60	0.43
Hubei	0.27	0.44	0.33	0.64
Hunan	0.29	0.33	0.35	0.55
Guangdong	0.44	0.64	0.39	0.71
Guangxi	0.45	0.39	0.55	0.43
Hainan	0.42	0.50	0.46	0.65
Chongqing	0.54	0.34	0.39	0.47
Sichuan	0.54	0.44	0.41	0.57
Guizhou	0.32	0.29	0.54	0.47
Yunnan	0.29	0.38	0.55	0.63
Tibet	0.96	-	-	0.89
Shaanxi	0.42	0.57	0.55	0.43
Gansu	0.55	0.54	0.67	0.69
Qinghai	0.53	0.59	0.82	0.39
Ningxia	0.43	0.41	0.75	0.47
Xinjiang	0.38	0.48	0.46	0.38

Table 22. Average scale efficiency of SOCBs across Chinese provinces and major cities (1998 – 2003)

Provinces	CCB	ICBC	ABC	BOC
Beijing	1.00	1.00	0.99	1.00
Tianjin	0.94	0.98	0.97	0.94
Hebei	0.97	0.81	0.82	0.98
Shanxi	0.97	0.94	0.94	0.97
Inner Mongolia	0.98	0.97	0.97	0.97
Liaoning	0.95	0.76	0.86	0.96
Jilin	0.94	0.91	0.94	1.00
Heilongjiang	0.96	0.83	0.83	1.00
Shanghai	0.99	0.91	0.97	1.00
Jiangsu	0.97	0.82	0.71	0.92
Zhejiang	0.92	0.94	0.83	0.96
Anhui	0.98	0.98	0.91	0.99
Fujian	0.97	0.99	1.00	0.98
Jiangxi	0.98	0.85	0.95	0.98
Shandong	0.93	0.80	0.79	0.96
Henan	0.83	0.84	0.76	0.99
Hubei	0.97	0.87	0.83	0.91
Hunan	0.95	0.97	0.97	0.98

Guangdong	0.77	0.69	0.73	0.75
Guangxi	0.99	0.99	0.99	0.98
Hainan	0.98	0.97	0.99	0.99
Chongqing	0.90	0.96	0.99	0.80
Sichuan	0.98	0.94	0.86	1.00
Guizhou	0.92	0.99	0.90	0.90
Yunnan	0.94	0.99	0.96	0.95
Tibet	0.98	-	-	0.89
Shaanxi	0.98	0.94	0.95	0.92
Gansu	0.99	0.98	0.92	0.94
Qinghai	0.99	0.96	0.94	0.56
Ningxia	0.99	0.95	0.94	0.72
Xinjiang	0.97	0.98	0.97	0.81

Figure 2. Distribution of efficiency scores among provincial branches
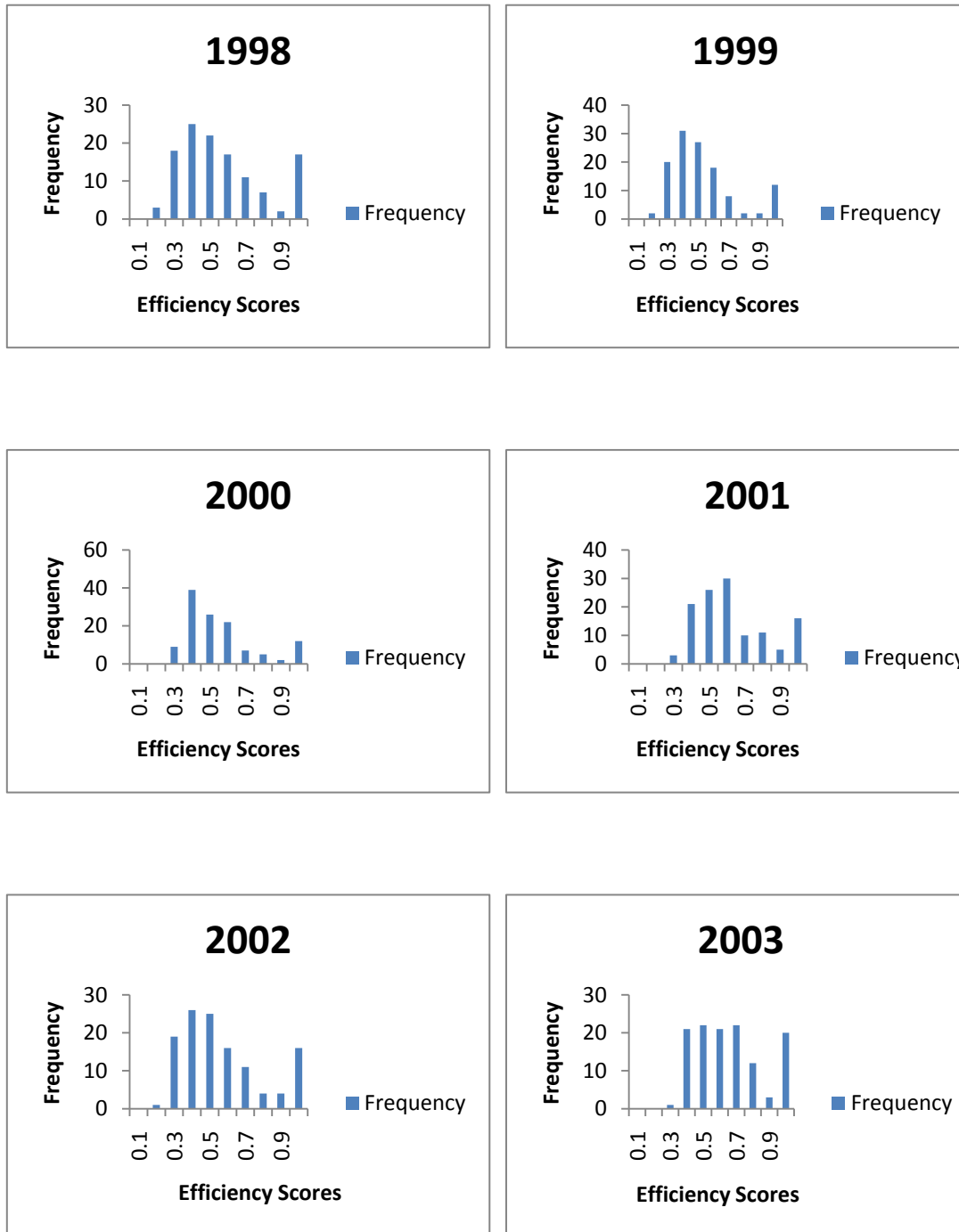
5.3 Conclusions

Given the significance of banking and finance in the modern economy and the still dominant position of the SOCBs in the Chinese banking sector, substantial resources

and efforts have been deployed by the Chinese government to improve the level of efficiency and competitiveness of the SOCBs in recent years. How successful the efforts have turned out to be remains an open question. A combination of conceptual problems with a proper definition of the banking production process and the lack of consistent and reliable data for the Chinese SOCBs has made the empirical assessment difficult to carry out. By adopting a banking production function approach, and using data on banking inputs and outputs that are relatively reliable, the present study focuses on the measurement of technical input efficiency and scale efficiency of the SOCBs at the provincial branch level. On the whole, the empirical results represent rather uncomfortable readings for the Chinese policymakers and management of the SOCBs. For the whole sector of SOCBs, the level of technical input efficiency remained very low throughout the study period, even though there was a small improvement in 2003. The technical input inefficiency was mainly due to pure technical inefficiency, but also to scale inefficiency. Despite the substantial reduction in the number of branches and employees over recent years, the problem of surplus branches and employees was still significant in 2003. A related problem was that around half of the provincial branches were operating at an above-optimal scale (larger than the most productive scale size), particularly among CCB, ICBC and ABC. In contrast, the most significant scale problem for the BOC group was increasing returns to scale (i.e. operating below the most productive scale size). Therefore, for the first three groups, further efforts should be directed at consolidating existing banking inputs (e.g. branches) further, whilst for BOC the main focus should be on

further expanding banking outputs and new business opportunities.

Looking at the sources of inefficiency from an administrative point of view, different patterns have emerged among the banking groups. For BOC, the inefficiency is almost entirely due to local inefficiency in the provinces whilst the group as a whole remained efficient throughout the study period. ICBC and CCB made significant improvements over the years and by 2003 were almost as efficient as BOC. Therefore, by the end of the study period, there was little difference in operational efficiency at the group level among CCB, ICBC and BOC. In contrast, the group level efficiency for ABC stayed low until the end of the study period. It seemed that the Chinese government's efforts to prepare CCB, BOC and ICBC for stock market floatation in recent years had put ABC in a considerably disadvantaged position in terms of operational efficiency. It remains to be seen whether or not the on-going effort by the Chinese government to float ABC will bring its efficiency performance in line with the other three groups. Moreover, compared with the efficient provincial branches, the majority of the provincial branches were operating at a too low level of technical efficiency. A casual inspection of the empirical results reveals that the inefficient branches were mostly but not always located in the interior parts of China, suggesting a potential link to the state of economic and banking development in different provinces. The detailed explanation of the inter-provincial differences in banking efficiency is discussed in next chapter.

Chapter VI. Explanation of inter-provincial differences in banking efficiency

6.1 Introduction

Having examined the efficiency of Chinese banking industry, this chapter further examines the relationship between market structure, market conditions in general, bank conduct and performance at the Chinese provincial level. Mainland China consists of thirty-one provincial-level administrative units which exhibit a significant degree of heterogeneity in natural endowments, economic structure, history of economic growth and development, and the current level of living standard. Insofar as commercial banking is concerned, there are also important differences in the history and current level of banking and financial development as well as banking market conditions. Therefore, it should come as no surprise that the financial performance of banking institutions also differs across the provincial units. Nevertheless, to the best of the authors' knowledge, there is so far little hard evidence on the inter-provincial differences in banking performance or what significant factors are underlying such, if any, differences. The present study aims to fill in this empirical gap in the research concerning the Chinese banking sector.

Having measured the efficiency levels of individual provincial branches over the period from 1998 to 2003, a panel econometric model is now introduced to examine the statistical significance of the factors that explain banking efficiency on the basis of the economic literature on institutional complementarity, relative market power,

market structure, conduct and bank performance. The empirical results lend support to the institutional complementarity and the market concentration hypotheses whilst rejecting the relative market power hypothesis of performance in the Chinese state-owned commercial banking sector. The results also revealed deterioration in banking efficiency in the SOCBs over time despite the banking deregulation and consolidation efforts during the study period.

This chapter is structured as follows. Section two highlights the heterogeneous and fragmented nature of the Chinese provincial economies and the banking markets. Section three discusses the datasets, models, estimation procedures and presents empirical findings. The final section concludes.

6.2 Fragmentation of the Chinese provincial markets

Although China has been a unified country since the first emperor of the Qin Dynasty conquered the whole country in 221BC, the Chinese history is beleaguered by constant wars and rebellions to seize power by different warlords and peasant leaders from different parts of China. Even during the intermittent periods of peace and prosperity, the local Chinese governments and officials always enjoyed a high level of autonomy in the administration and management of the political, social and economic affairs of their regions. The fiscal structure in particular has always been effectively a system of highly autonomous federal states under the rule of a central government. More recently, despite three decades of market-oriented economic reform that started

in 1979, this fragmented administrative structure remains largely intact even to the present day and constitutes perhaps the single most important barrier to the integration of the whole Chinese economy.

Due to heterogeneity in administrative efficiency, economic geography and the history of economic development, and also as a legacy of central planning during the period from 1949 to 1979, noticeably different patterns of economic growth and economic structures have emerged in the thirty-one provincial units. Such differences in provincial administration, economic development and sectoral composition have important implications for the demand and supply conditions in the provincial banking markets. As a matter of fact, the big four SOCBs were initially set up in the early 1980s to serve the specific needs that arose from the implementation of the Chinese central government's economic plans in designated economic sectors. It was relatively recently that the big four SOCBs were commercialised and the central government-imposed sectoral restriction on banking operations was started to be removed in 1994. Therefore, as a legacy of the historical division of business scopes coupled with the very nature of banking that is based on information, reputation, trust and network between the bank and the clients, the SOCBs and their traditional business sectors are inextricably related. It is expected that the banking businesses and performance of CCB, ICBC, ABC and BOC will be related to the significance of construction, industrial, agricultural and external trade activities in each provincial unit. Moreover, the fragmented administrative system and the rampant practice of

protecting local interests through the enactment of local legislations and imposition of local fiscal schemes imply that there is very limited inter-provincial competition in banking businesses. Therefore, it is also expected that the supply of and demand for credit will depend on the level of economic development and standard of living within each province. Table 23 presents some key economic indicators that may play a significant role in shaping banking businesses and performance in the provincial units.

Table 23. Key economic indicators for Chinese provinces (2003)

	GDP/pc	GGR*	CON/ GDP	IND/ GDP	AGR/ GDP	DO**
	(Yuan)	(percent)	(percent)	(percent)	(percent)	(percent)
Beijing	25151.74	12.77	34.67	104.02	2.42	154.84
Tianjin	24203.10	12.92	21.28	165.45	3.60	99.26
Hebei	10486.18	10.81	10.99	80.42	13.50	10.47
Shanxi	7412.12	9.32	21.99	99.30	10.15	10.42
Inner Mongolia	9036.84	12.67	11.98	63.04	15.62	10.89
Liaoning	14257.81	9.12	16.94	101.84	8.29	36.57
Jilin	9330.25	10.14	13.75	105.54	17.38	20.18
Heilongjiang	11612.06	9.43	9.94	65.69	11.35	9.96
Shanghai	36533.08	11.16	19.13	165.46	1.57	148.81
Jiangsu	16825.73	11.64	22.43	144.75	7.87	75.50
Zhejiang	20076.72	13.58	33.29	136.93	5.64	54.12

Anhui	6197.16	7.24	15.68	65.70	15.56	12.40
Fujian	15000.49	9.47	10.50	94.68	8.92	55.90
Jiangxi	6653.28	8.98	12.70	52.02	13.56	7.40
Shandong	13628.42	11.72	11.91	123.67	12.86	29.72
Henan	7291.39	10.15	9.00	76.12	16.14	5.54
Hubei	9000.30	7.86	16.16	74.61	13.58	7.83
Hunan	6962.13	7.66	17.65	56.30	14.48	6.66
Guangdong	17130.36	11.51	11.13	157.89	6.25	172.29
Guangxi	5631.32	7.57	10.30	52.52	18.31	9.65
Hainan	8277.77	8.88	5.87	49.70	22.76	28.07
Chongqing	7190.29	9.57	26.05	70.56	12.00	9.55
Sichuan	6271.34	8.83	22.46	62.08	14.75	8.55
Guizhou	3504.47	10.03	15.65	72.09	20.31	6.01
Yunnan	5634.18	6.59	16.10	63.16	17.60	8.96
Tibet	6829.03	15.16	15.90	11.59	13.70	7.17
Shaanxi	6501.10	11.71	18.36	78.35	13.94	9.61
Gansu	5011.25	8.47	17.15	87.96	21.14	8.42
Qinghai	7310.04	12.15	19.15	63.53	7.62	7.20
Ningxia	6640.36	11.18	28.04	91.56	14.05	14.04
Xinjiang	9708.68	11.07	17.03	59.28	25.71	21.03

*GDP growth rate 1998-2003

** Degree of openness

Note: the figures are derived from the Chinese Statistical Yearbook (Chinese State Bureau of Statistics, 2004). Unless stated otherwise in the table, all the figures are for the year 2003. CON/GDP, IND/GDP and AGR/GDP are the ratios of construction output, industrial output and agricultural output to provincial GDP respectively. The degree of openness is measured by the ratio of total imports and exports to GDP.

As is clear from Table 23, apart from some slight inter-provincial variations, the average growth rate in GDP for the period of 1998-2003 was generally very fast across all the provinces. However, in terms of GDP *per capita*, the differences across the provinces were substantial, with the highest GDP *per capita* (in Shanghai) being over ten times the lowest figure (in Guizhou which lies in the south-west of China) in 2003. In general, those provinces in the eastern coast and the big cities enjoyed a substantially higher living standard than the interior parts of China. Table 1 shows further evidence of significant differences in the extent of industrialisation, construction and agricultural activities across the provinces, again highlighting the contrast between the eastern coast and the interior parts with the former achieving a higher level of industrialisation than the later. It is no surprise that the more affluent provincial units, due to their strategic trading positions by the sea and rivers, were also considerably more open to international trade, as is shown by the indicator of openness in the last column. Therefore, banking businesses conducted in foreign currencies are also expected to be located primarily in those big cities and coastal provinces.

Insofar as the banking sector is concerned, individual provincial banking markets as well as the whole Chinese banking sector have been fundamentally shaped by economic history and the process of economic reform that started in 1979[9]. Compared with the economic reform programmes in the former Soviet Bloc countries in the 1990s, a strikingly distinctive feature of the Chinese economic reform over the past three decades is its gradualist approach. Although banks of alternative ownership structure, such as private or joint-stock ownership between local governments and corporations, have emerged and indeed grown faster than the state-owned sector, these tend to be located almost exclusive in a few big cities and have very limited geographic coverage. Currently, apart from the SOCBs, there are twelve national shareholding banks, more than one hundred city commercial banks, and tens of thousands of urban and rural credit unions in the Chinese banking sector. These latter types of banks compete aggressively with the SOCBs in the household retail banking market as well as the business banking market for the non-state-owned and local collectively-owned industries and businesses, particularly the fast growing small- to medium-sized enterprises (SMEs). Nevertheless, these banks still lack the infrastructure and the banking network to compete with the SOCBs on a level playing field.

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[9] The process of bank reform in China has been covered extensively in the literature (see e.g., Li, et al., 2001; Chen, et. al., 2005; Fu and Heffernan, 2007; Lin and Zhang, 2008). A detailed discussion concerning specifically the reform process of the Chinese SOCBs is given in Chapter 2.

More recently, although the Chinese domestic banking market was also open to international competition from foreign banking institutions, the dominant mode of entry into the Chinese market by foreign banks was strategic alliance or joint venture with the SOCBs. It is little wonder that despite the long process of economic reform which encompasses reform in banking and financial services, the big four state-owned commercial banking groups still dominated the banking market in every provincial unit. For example, despite the continuous fall due to rising competition from other banks in recent years, the share of total provincial deposits and loans by the big four groups still ranged from 45 percent to 94 percent, with an average of 60 percent in 2003 (the figures are derived from various issues of the ACFB 1998-2004). Table 24 presents a number of measures that capture the central features of the individual provincial banking markets.

Table 24. Banking market characteristics for Chinese provinces (2003)

	Deposit/ GDP (percent)	Loan/ GDP (percent)	L/D* (percent)	CR4 (percent)	Branch density			
					CCB	ICBC	ABC	BOC
Beijing	558.98	329.17	0.59	0.56	0.07	0.69	0.22	0.13
Tianjin	165.98	154.89	0.93	0.61	0.08	0.58	0.40	0.20
Hebei	114.47	81.32	0.71	0.59	0.05	0.29	0.29	0.09
Shanxi	193.42	147.80	0.76	0.58	0.06	0.31	0.35	0.11

Inner Mongolia	98.97	91.67	0.93	0.68	0.09	0.55	0.42	0.11
Liaoning	158.40	126.91	0.80	0.45	0.06	0.45	0.28	0.14
Jilin	136.64	135.67	0.99	0.59	0.05	0.51	0.39	0.11
Heilongjiang	112.34	92.40	0.82	0.64	0.07	0.27	0.32	0.09
Shanghai	277.06	210.66	0.76	0.51	0.13	0.47	0.19	0.08
Jiangsu	129.87	96.64	0.74	0.56	0.10	0.27	0.26	0.13
Zhejiang	164.08	132.18	0.81	0.50	0.10	0.34	0.23	0.14
Anhui	107.62	88.09	0.82	0.59	0.06	0.18	0.20	0.06
Fujian	107.19	78.75	0.73	0.57	0.07	0.35	0.31	0.12
Jiangxi	116.88	91.71	0.78	0.64	0.05	0.29	0.32	0.09
Shandong	103.23	88.21	0.85	0.47	0.05	0.24	0.22	0.09
Henan	110.36	93.86	0.85	0.53	0.07	0.17	0.29	0.07
Hubei	114.04	97.70	0.86	0.57	0.09	0.25	0.27	0.10
Hunan	102.93	84.09	0.82	0.60	0.05	0.22	0.20	0.07
Guangdong	217.53	147.71	0.68	0.51	0.13	0.34	0.28	0.14
Guangxi	122.43	86.61	0.71	0.69	0.06	0.22	0.26	0.06
Hainan	156.54	130.30	0.83	0.71	0.10	0.26	0.35	0.11
Chongqing	156.09	132.26	0.85	0.51	0.04	0.56	0.20	0.07
Sichuan	135.84	111.74	0.82	0.63	0.03	0.07	0.24	0.06
Guizhou	141.39	127.35	0.90	0.68	0.04	0.16	0.17	0.03
Yunnan	155.70	122.70	0.79	0.64	0.05	0.19	0.25	0.03

Tibet	174.65	78.61	0.45	0.94	0.07	NA	NA	0.07
Shaanxi	197.20	151.52	0.77	0.58	0.05	0.27	0.27	0.06
Gansu	166.61	134.40	0.81	0.66	0.08	0.40	0.33	0.05
Qinghai	139.50	145.30	1.04	0.75	0.12	0.39	0.41	0.07
Ningxia	197.59	179.44	0.91	0.61	0.14	0.47	0.37	0.11
Xinjiang	144.34	114.55	0.79	0.62	0.14	0.38	0.39	0.09

* Loan/Deposit ratio

Note: the figures are derived from Almanac of China's Finance and Banking (China Finance Society, 1998-2004). CR4 is the big four's share of total provincial loans and deposits. The density of bank branches is measured as the number of branches per 10000 people.

The significant differences in industrialisation, economic development and living standards across the provinces are also reflected in the extent of banking development in the provinces which is measured by the deposits/GDP and loans/GDP ratios. As is expected, the big cities and coastal provinces enjoyed significantly greater extents of banking development than the interior parts. Especially in big cities like Beijing and Shanghai, the concentration of banking assets and liabilities not only reflected the uneven regional distribution of income and wealth, but also significant externality effects arising from spatial agglomeration in the banking sector as well as the complementarity effects between banking and non-banking firms, as we discuss in more detail in the next section.

The loans/deposits ratio reflects the source and cost of financing for banking operations. During the study period, the traditional businesses of deposit-taking and lending still constituted the bulk of the SOCBs' banking operations and contributed to around 90 percent of their total commercial income. Due to the still primitive nature of China's capital markets, deposits were the dominant source, and the cheapest form, of bank finance. Column (4) in Table 24 shows that for the majority of the provinces the loans/deposits ratio varied between 70 to 80 percent, although the more affluent cities and provinces had noticeably lower ratios, reflecting their access to wider sources of funding.

With only a few exceptions, the big four SOCBs dominated the bank deposits and loans markets, as revealed by the big-four banks' market concentration ratios in the total deposit and loan market in each province in Column (5). In terms of the banking infrastructure as measured by the bank branch density, two groups, i.e. the ICBC and the ABC enjoyed unrivalled dominance in every provincial unit. There were also variations across the provincial units with the big cities and coastal provinces being served with a much higher branch density than the interior parts.

Having depicted a general picture of the inter-provincial differences in the economic and banking market conditions, the next section presents details of the empirical investigation process concerning selection of variables, data, estimation and the

findings.

6.3 Variables, data, estimation and results

In selecting the explanatory variables, this study started with an as large as possible set of variables that are informed by the literature and also allowed by data availability. At the provincial level, the variables include living standard as measured by GDP *per capita* (variable name 'gdppc'), extent of banking development as measured by the ratio of total deposits and loans to GDP ('ldgdp'), economic structure as measured by industrial, agricultural, construction outputs and foreign trade to GDP ratios ('indgdp', 'aggdp', 'congdp' and 'iegdp'). Market concentration is measured by the Herfindahl-Hirschman Index ('hi'). The branch-specific variables include each branch's share of total provincial deposits and loans ('dlshare'), scale of operations ('small', 'medium', and 'large', with 'small' referring to branches that have less than or equal to 80percent of the mean size of deposits and loans, 'medium' being greater than 80percent and less than 120percent of the mean size, and 'large' being greater than or equal to 120percent of the mean size), branch density ('dense'), and innovation in other banking business as proxied by the number of cash cards issued ('card'). The institutional complementarity mechanisms are captured by the interaction terms between banking groups and their traditional business sectors ('icbcind', 'abcag', 'ccbcon' and 'bocie'). Moreover, dummy variables have also been introduced to categorise individual branches into corresponding banking groups ('ccb', 'icbc', 'abc' and 'boc') as well as for individual time periods (from 't98' to 't03').

Before details of the econometric study are discussed, Table 25 presents some summary statistics for the dependent variable and the key explanatory variables.

Table 25 Summary statistics of the key variables (1998-2003)

Variables	Mean	Std. Dev.	Min	Max
efficiency	0.541653	0.2229957	0.15	1
gdppc	8823.326	5909.868	2301.476	36533.08
ldgdp	2.514629	1.048501	1.350519	8.881549
indgdp	78.3793	31.3375	11.5935	165.4637
aggdp	16.18576	7.102852	1.570427	34.68885
congdp	14.53428	6.073331	4.826208	34.66605
iegdp	28.09707	39.16553	3.164371	172.2889
card	479.4641	944.0653	0.4230807	10636.23
dlshare	0.1621911	0.0700471	0.0274543	0.7896509
hi	0.1724555	0.0523217	0.1435884	0.6969885
dense	0.2212188	0.153633	0.0185579	0.7940298

Clearly, there were significant variations in every aspect of the economic, market and branch conditions across the provinces. A typical potential econometric problem in panel models is that of multi-collinearity. In this case, a number of explanatory variables such as 'gdppc', 'indgdp', and 'iegdp', are clearly correlated, as revealed by the pair-wise correlation coefficients. However, whether or not such correlations

cause a significant multi-collinearity problem depends on the condition number of all the explanatory variables, as is discussed in Greene (2003, p.57-58). Thus, the test for multi-collinearity is a major issue in the empirical work. Another empirical issue concerns the selection of the final model out of three choices: 'pooled', 'fixed-effects' and 'random-effects' models.

The econometric estimation strategy is as follows. The initial model started with all the explanatory variables listed above and the number of explanatory variables was reduced round by round. In every round, the Breusch-Pagan Lagrange Multiplier test was conducted and the pooled regression model was rejected on each occasion in favour of the individual effects models. Therefore, model selection was restricted to the 'fixed-effects' and 'random-effects' models. The Hausman procedure was followed for this purpose. Indeed, the Hausman procedure, together with the condition number for testing the significance of the multi-collinearity problem as well as the p-values for the estimated coefficients, were used as the criteria for dropping explanatory variables from each round of estimation. For example, if the presence of a variable caused the value of the condition number to rise and rendered Hausman's χ^2 test statistic negative as well as the p-value showed statistical insignificance, then it was dropped from the next round of estimation. For the final set of explanatory variables, the 'random-effects' model was chosen as best suited for explaining the inter-provincial differences in the technical efficiencies of the 122 provincial-level bank branches. Details of the final estimated 'random-effects' model using Stata are

presented in Table 5 below. In the final model, as the condition number of the matrix formed by all the explanatory variables is substantially below 20, multi-collinearity is not a serious concern here. The Hausman's test statistic strongly suggests the acceptance of the null hypothesis that the individual effects are uncorrelated with the other explanatory variables. Thus the random-effects model is justified.

Table 26 GLS 'random-effects' model of inter-provincial banking efficiency (1998-2003)

Random-effects	GLS regression	No. of observations:	732
Group variable	(i): branch	Number of groups:	122
R^2: within	= 0.2174	Obs per group: min:	6
Between	= 0.4033	mean:	6.0
Overall	= 0.3218	max:	6
Random effects	u_i ~ Gaussian	Wald chi2(20) =	243.56
Corr(u_i, X)	= 0 (assumed)	Prob > chi2 =	0.0000
efficiency:	Coef. (std. error)	t	P>|t|
Gdppc	0.0000152 3 (0.16e-06)	4.83	0.000
Indgdp	-0.0022042 (.000593)	-3.72	0.000
Aggdp	-0.0093521	-3.89	0.000

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	(0.0024015)		
Ccb	-0.1735126 (.0605697)	-2.86	0.004
Icbc	-0.1403767 (0.0831014)	-1.69	0.091
Abc	-0.1381651 (0.0744821)	-1.86	0.064
Card	0.0000298 (8.28e-06)	3.59	0.000
Icbcind	0.0031699 (0.0008819)	3.59	0.000
Abcag	0.0138489 (0.0035822)	3.87	0.000
Ccbcon	0.0094854 (0.0034834)	2.72	0.006
Bocie	0.0014172 (0.0006612)	2.14	0.032
t99	-0.0523852 (0.016143)	-3.25	0.001
t00	-0.0569385 (0.0162115)	-3.51	0.000
t02	-0.0910774	-5.12	0.000

	(0.0177963)		
t03	-0.0805477 (0.0219386)	-3.67	0.000
Medium	-0.0647546 (0.0204688)	-3.16	0.002
Large	-0.0900923 (0.0233075)	-3.87	0.000
Hi	0.430518 (0.1401125)	3.07	0.002
Dense	-0.3392643 (0.1068837)	-3.17	0.002
Dlshare	0.0855283 (0.1890835)	0.45	0.651
_cons	0.7372969 (0.077269)	9.54	0.000
sigma_u	0.10710337		
sigma_e	0.13468624		
Rho	0.38738755	(fraction of variance due to u_i)	
Hausman test, chi-2(15) :	5.78		
Condition number	4.289522		

Clearly, the standard of living ('gdppc') has a significant and positive impact on banking efficiency, whereas the extent of industrialisation and the share of agriculture in the economy have significant and negative impacts. The extent of banking development and the shares of construction and external trade activities do not have statistically significant impacts and cause the collinearity problem to worsen; hence these variables are dropped from the final model. The negative impacts of industrialisation and share of agriculture deserve closer examination, since these variables also enter the model through the interaction terms with two banking groups, ICBC and ABC. When such interaction terms are also considered, the marginal impact of industrialisation on banking efficiency differs between banking groups: it is positive (0.00097) for ICBC but negative (-0.0022) for the other groups. Likewise, the marginal impact of the share of agriculture on banking efficiency is positive (0.0045) for ABC but negative (-0.00935) for the other groups. Therefore, industrialisation only benefits ICBC but adversely affects the efficiency of the other banking groups, whilst a larger share of agriculture benefits ABC but reduces the efficiency of the other groups. Combined with the significant and positive coefficients before the other interaction terms ('ccbcon' and 'bocie'), it is strikingly clear that, even after years of reform and banking deregulation, there still exist strong complementarities between the banking groups and their traditional business sectors which they were initially set up to serve.

The results also lend support to the traditional SCP hypothesis whilst rejecting the RMP hypothesis. The extent of market concentration is positively and statistically significantly related to banking efficiency, but individual branches' market shares have a positive but statistically insignificant impact on banking efficiency. Moreover, the interaction term between individual market shares and market concentration is also insignificant (and had to be dropped from the final model due to multi-collinearity offence). Taking the results together, it is clear that, *ceteris paribus,* the more concentrated the market, the higher the big four's technical efficiency, and *vice versa*. However, individual provincial branches are not necessarily more efficient in more concentrated markets or have higher market shares. A possible explanation of this finding is that in a more concentrated provincial banking market, it is easier for the four groups to collude in non-price competition and focus on the areas and sectors of businesses in which each group has traditionally established a comparative advantage through the long-established networks with clients and the accumulated 'soft' information about their credit demand and supply conditions.

Concerning the scale of banking operations, there is significant evidence of scale inefficiency. Compared with the 'small' branches that are used as the reference group, both the 'medium' and 'large' branches have a negative impact on banking efficiency. Therefore, on average the provincial SOCB branches were operating at a beyond-optimal level of scale. Not surprisingly, innovation to develop new businesses by branches improves efficiency whilst a rise in branch density reduces efficiency.

Insofar as the banking groups are concerned, compared with BOC that is used as the reference group, the other three groups and CCB in particular were less efficient. A somewhat disturbing finding is that compared with 1998, banking efficiency was significantly lower in all the subsequent years apart from 2001, suggesting a general deteriorating efficiency performance of the SOCBs over the years of further banking reform.

6.4 Conclusions

The present study represents a first attempt to empirically measure and explain the inter-provincial differences in banking efficiency of the Chinese state-owned commercial banking groups across the provincial units in recent years. Not surprisingly, substantial differences in technical efficiency have emerged across the provincial branches, although the general level of efficiency was very low in the whole state-owned banking sector during the study period. Empirical tests of alternative explanations of bank performance lend strong support to the institutional complementarity and the traditional structure-conduct-performance hypotheses and in the mean time reject the relative market power hypothesis. It appears that the SOCBs benefit from a concentrated market structure and the strong relationship with the traditionally established areas of businesses. Such relationships confer a significant advantage on a particular banking group at the expense of the other groups. Some other disturbing findings have emerged concerning the deterioration in banking efficiency over time and the existence of a significant problem of scale inefficiency.

Therefore, further banking reform efforts should particularly encourage competition in all dimensions, including inter-bank, inter-province and inter-business sector. Moreover, further consolidation of bank branches is generally required to improve scale efficiency.

Chapter VII. Conclusions

7.1 Summary

The thesis adopted both qualitative and quantity methods to examine the efficiency and competitiveness of Chinese state-owned commercial banks. The qualitative study was carried out under the framework that represents a synthesis of the traditional Structure-Conduct-Performance paradigm about market conditions, firm conduct and performance. The quantity study adopted Data Envelopment Analysis (DEA) to measure the efficiency levels of the State-owned commercial banks at provincial level during the period 1998-2003. Then the thesis carried out an econometric investigation into the sources of efficiency for these provincial branches.

The qualitative research adopted the SCP paradigm to examine the structure and performance of the Chinese commercial banks. After thirty years' painful reform on banking system, the state-owned commercial banks have gained limited autonomy in their business scope. Over the past decade, capital injections, transfer of bad debts and the introduction of foreign investors have mended the pace of the reform of the Chinese banking system. The major Chinese commercial banks have improved their capital and asset structures remarkably up to 2007. Three of the four SOCBs, ICBC, CCB and BOC, have changed their ownership structure and have successfully floated on Hong Kong and Shanghai stock exchanges. They are now the world's largest three banking group by market value. Their performance is regarded as successful,

particularly in the current context of global financial crisis since 2007, although the seemingly impressive performance was heavily dependent on the support from both the central and local governments. The main thrust of banking reform has been directed at the competitive capabilities and efficiency within individual banking groups of the SOCBs. Significant amounts of resources and efforts have been deployed to increase their business scope, improve banking and financial services, strengthen the internal management and risk control systems, and increase operational autonomy. It is high time that the consequences and efficacy of such reform programmes were objectively assessed, so that further policy measures can be effectively implemented to enhance the efficiency and competitiveness of the Chinese banking sector.

The qualitative research also revealed that monetary policy is under control of the government. Academic studies showed that the adoption of monetary tool have minimal impact on the financial market. The key to understanding China's monetary policy is not to place the conduct of monetary policy in the general framework of regulating market incentives to prevent market failure in achieving economic efficiency, but to understand the government's orientation to prevent social and political instability that might be caused by a significant slowdown in the economy and the associated mass unemployment problem. Moreover, the banking supervision regime in China has improved significantly over the examining period. Nevertheless, there are still many problems in banking supervision sector: the existing law system

still lags behind the development of banking industry; the data base is not accurate and systematic; the on-site supervision lacks continuity and pertinence.

The qualitative research also showed the degree of competition was increased during the examination period. However, the Chinese banks were still operating in a highly concentrated market. The improvement of financial performance in state-owned commercial banks was not driven by competition. The requirement of regulatory authority played a main role in this process, including transferring the bad debts to the asset management companies and injection of funds to improve the capital ratio. As the main competitors to the state-owned banks, the joint-stock commercial banks only took a small portion of the market share. The extent of competition in the Chinese banking market is fundamentally determined by the structure of the banking market, policy intervention and the historical and institutional factors underlying banking operations in China.

The distribution of branch network and asset structure of the SOCBs make the SOCBs compete in the major central cities except Agriculture Bank. The bad debts, so-called "non-performing loans", in the SOCBs have been a long debate in Chinese banking sector. With the support of financial supervisory authorise, the bad debts were transferred to the asset management companies in 1998 and mid of 2000. Moreover, the China SAFE Investments (Huijin) injected US$ 79 billion foreign exchange reserves to recapitalise the SOCBs. Having been restructured, BOC, CCB and ICBC

floated in stock market and demonstrated an astonishing financial performance in recent years. After examined the market condition and financial performance, the study found out there was little intention or obligation for individual banking groups within the SOCB sector to pursue maximum profit as an operating objective. In fact, how successful the individual banks perform in the traditional markets for deposits and loans fundamentally determine their overall competitiveness and financial performance, particularly during the time period under investigation.

As data on banking costs, revenues and net incomes is generally unavailable at the provincial level, the present study obtained values for total input efficiency, pure technical efficiency, scale efficiency and returns-to-scale characteristic for the SOCBs. By Applying Data Envelopment Analysis, the research found that there is a significant level of operational inefficiency for the SOCBs as a whole. The generally low level of efficiency was primarily due to the low pure technical efficiency. The benefits of reform started to be evident at the end of the period. For example, the pure technical efficiency started to improve for the whole sector in 2003, and the average scale efficiency remained steady from 0.9 in 1998 to 0.96 in 2003.

For performance of the individual banking groups, BOC was found to be the leader in operational efficiency in the first half of the period but its leading position was taken over by ICBC in the second half. The performance of ICBC in the second period was particularly noticeable as this group was the worst performer in the first three years.

The other groups showed a mixed fortune over the period. CCB had the lowest score for 3 out of the 6 years and was at the bottom of the league table in 2003. ABC came second in the table in the first four years but its position dropped to the bottom in 2002 and second from the bottom in 2003.

Among the 122 examined provincial branches, just over 10 percent operated at an efficient scale. Around half of branches operated at decreasing-returns-to-scale, suggesting that these branches were operating at a scale that is above the most productive level. Given the dominance of interest income in banks' total revenue and the very limited autonomy by the banks to change their interest rates, it can be deduced that these branches were not operating at the profit-maximising scales and thus could benefit from a reduction in their scales of operation. The problem was particularly acute for CCB and ABC throughout the period. ICBC also experienced a significant problem of DRS in every year apart from 2003. In contrast, the most significant problem for BOC over the entire period was IRS, thus there was scope for many branches in this group to increase the scale of operation. Second, related to the problem of above-optimal operational scales, there was also a significant problem of surplus inputs of branches, employees and bank cards. Relatively speaking, ICBC had the least surpluses whilst CCB and ABC had the most surpluses in all the inputs. The problem of surplus labour was particularly severe for ABC.

It is clear that for the whole sector of SOCBs, efficiency at the local provincial level

declined but efficiency at the group level generally improved over the entire period. Moreover, efficiency at the group level dominated efficiency at the local level and the gap was rising in recent years, suggesting that in general the source of inefficiency was from the local level. Therefore, further efficiency gain can be obtained more effectively by targeting reform efforts at the micro/branch level than at the group level. Insofar as the individual banking groups are concerned, BOC was the most efficient at the group level. This is not really surprising given this group's significant exposure to international markets and foreign competition. Nevertheless, compared with the most efficient peers within the BOC group, the level of local efficiency was the lowest among the four banking groups. Again, this result was not really surprising as it is expected that those provinces in the interior parts of China were not as exposed to foreign-currency related businesses as their counterparts located in the east coastal provinces. In the remaining three groups, some interesting contrasts have emerged. Although ABC was not the worst performer in the first few years, it fared worst in the efficiency score by 2003. For CCB and ICBC, although these two groups compared unfavourably with the BOC in the first few years, they had become almost as efficient as BOC in 2002 and 2003. Therefore, ABC seemed to be particularly disadvantaged in its operational efficiency over the study period. At the local level, the level of inefficiency was very significant across all the banking groups, especially within the CCB group.

The panel econometric model examined the statistical significance of the factors that

explain banking efficiency on the basis of qualitative research. The significant differences in industrialisation, economic development and living standards across the provinces are also reflected in the extent of banking development in the provinces which is measured by the deposits/GDP and loans/GDP ratios. As is expected, the big cities and coastal provinces enjoyed significantly greater extents of banking development than the interior parts. Especially in big cities like Beijing and Shanghai, the concentration of banking assets and liabilities not only reflected the uneven regional distribution of income and wealth, but also significant externality effects arising from spatial agglomeration in the banking sector as well as the complementarity effects between banking and non-banking firms.

In the econometric estimation model, the 'random-effects' model was chosen as best suited for explaining the inter-provincial differences. The model showed that the standard of living (income per head) has a significant and positive impact on banking efficiency, whereas the extent of industrialisation and the share of agriculture in the economy had significant and negative impacts. The result shows the SOCBs have been heavily relying on their traditional business with the SOEs and the policy loans to agriculture. The extent of banking development and the shares of construction and external trade activities do not have statistically significant impacts. This shows the SOCBs needs to improve the business with the constructional and international companies. The marginal impact of industrialisation on banking efficiency differs between banking groups: it is positive for ICBC but negative for the other groups.

Likewise, the marginal impact of the share of agriculture on banking efficiency is positive for ABC but negative for the other groups. Therefore, industrialisation only benefits ICBC but adversely affects the efficiency of the other banking groups, whilst a larger share of agriculture benefits ABC but reduces the efficiency of the other groups. Combined with the significant and positive coefficients before the other interaction terms, it is strikingly clear that, even after years of reform and banking deregulation, there still exist strong complementarities between the banking groups and their traditional business sectors which they were initially set up to serve.

The results supported the traditional SCP hypothesis whilst rejecting the RMP hypothesis. The extent of market concentration was positively and statistically significantly related to banking efficiency, but individual branches' market shares had a positive but statistically insignificant impact on banking efficiency. It is clear that, *ceteris paribus*, the more concentrated the market, the higher the big four's technical efficiency, and vice versa. However, individual provincial branches are not necessarily more efficient in more concentrated markets or have higher market shares. A possible explanation of this finding is that in a more concentrated provincial banking market, it is easier for the four groups to collude in non-price competition and focus on the areas and sectors of businesses in which each group has traditionally established a comparative advantage through the long-established networks with clients and the accumulated 'soft' information about their credit demand and supply conditions.

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Concerning the scale of banking operations, there is significant evidence of scale inefficiency. Compared with the 'small' branches that are used as the reference group, both the 'medium' and 'large' branches have a negative impact on banking efficiency. Therefore, on average the provincial SOCB branches were operating at a beyond-optimal level of scale. Not surprisingly, innovation to develop new businesses by branches improves efficiency whilst a rise in branch density reduces efficiency. Insofar as the banking groups are concerned, compared with BOC that is used as the reference group, the other three groups and CCB in particular were less efficient. A somewhat disturbing finding is that compared with 1998, banking efficiency was significantly lower in all the subsequent years apart from 2001, suggesting a general deteriorating efficiency performance of the SOCBs over the years of further banking reform.

7.2 Implications of the study and suggestions for further research

This study represented a first attempt to empirically measure and explain the inter-provincial differences in banking efficiency of the Chinese state-owned commercial banking groups across the provincial units in recent years. A comprehensive theoretical framework has been built up to examine the competitiveness of Chinese banks from both between and within banking group perspectives.

The qualitative research combed out the evolution process of the Chinese banking industry. The question imposed in this chapter has been and will be a constant harassment for both researchers and the policymakers. The Chinese government has taken a slow and cautious progress to improve the market conditions.

For the management of the SOCBs, the low efficiency level may be rather uncomfortable reading. The decomposition analysis on the source of inefficiency from both within-group and between-group aspects for each state-owned commercial banking group has provided a clear and comprehensive investigation from both group and local level. This kind of information can enable policymakers and the management of SOCBs to target specific operational areas for further efficiency improvement. Clearly, further reform efforts should be primarily directed at the local provincial branch level through branch closures and consolidations to improve both technical and scale efficiencies. The traditional barriers that separate different banking groups from competing in each others' traditional business areas must be removed. The dominance of the big four SOCBs in each provincial banking market has to be addressed, so is the issue concerning inter-provincial (or spatial) competition among all the banks located in different geographical and administrative regions.

The research methods adopted in the thesis can be expanded in future research programmes. The policymakers and management of the commercial banks have started to seek for more academic support before making decision in 2005. Current

research methods provide a solid research basis for future research. The prospects for further research in this area are exciting. The rising of Chinese state-owned commercial banks has become a significant event. The financial crisis broke out in 2007 has made the western countries to re-evaluate their regulatory policies and banking system. A research on the full picture of the Chinese banking system will be interesting and necessary. The methods on evaluating the performance of banking institutions will be more comprehensive and localised. The Chinese researcher have realised that a modified theoretical framework incorporating banking risks is needed to evaluate the Chinese banking system on a more rigorous basis. Both bankers and researchers will put more emphasis on the regulation of financial institutions. Future research will be more practical.

The data adopted in this research only exist up to 2003. The structure of data has been changed from ACFB 2005. The detailed information on loans, deposits, number of workers, number of branches, number of cards and card transactions at provincial level are unavailable for most of the banking groups. The quantitative analysis has to stop up to 2003. These kinds of data must be available in the banking groups' database. Moreover, if data on bank cost, income and profit are made available, then alternative measures of banking efficiency such as x-efficiency in cost or profit can be implemented. Moreover, such measures of efficiency can again be subject to rigorous econometric analysis to reveal the significant factors that underlie the inter-group and inter-provincial efficiency differences.

In addition, based on the current research, more accurate measures on market risk will be significant for the management of the Chinese commercial banks. This will help the banks to reduce system risk and further improve their financial performance.

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