Credit risk management in the current competitive condition in the Chinese banking industry

by

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Declaration

‘Whilst registered as a candidate for the above degree, I have not been registered for any other research award. The results and conclusions embodied in this thesis are the work of the named candidate and have not been submitted for any other academic award.’
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Abstract

In recent years, it has been witnessed that a number of countries are trying to recover from a deep recession which spread widely around the world. Researchers have pointed out that the laxity of credit risk management is one of the causes of the growth in the number of non-performing loans. It is necessary, therefore, to work out a method to improve the efficiency of credit risk management. This thesis examined five large commercial banks in China and studied their credit risk management processes.

This study intends to develop an up-to-date understanding of Chinese banking industry, covering some aspects of credit risk management, banking profitability and competition level using Panzar and Rosse model. The results have shown that the current competition level in Chinese banking industry is monopolistic competition. Regarding credit risk management, a set of face to face questionnaires aimed at the senior credit risk managers helped the author to analyse some existing management process in some aspect of loan decision making. Results indicated that the larger the size of the branch, the higher rate of return it generates on their investments. The rate of return is considered as an indicating factor to examine the profitability of banks. Furthermore, a discussion on banking profitability has been carried out using Augmented Dickey-Fuller test, Johansen’s co-integration test and Granger causality test. The results have shown that there is no short term relationship between capital ratio and profitability. According to trade-off theory and pecking order theory, it
can be understood that the capital ratio of Chinese banks, during the examined period of time, was close to the optimum capital ratio. The author hopes that the findings of empirical analysis in this work could play some part during the process of bank lending and borrowing activities and therefore reduce non-performing loans and increase the profitability.
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Chapter I
Introduction

1.1 Introduction

Operations that Banks are dealing with include two aspects: issuing loans and receiving deposits from customers (Freixas and Rochet, 2008). According to this simple definition, it is clear that the key activities of a commercial bank are lending and borrowing. In the lending and borrowing processes, there is a great deal of uncertainties involved. In other words, risk is associated with the traditional lending activity of banks. Actually, risk is part of banking and can hardly be avoided, because it is not possible to predict the future repayment capacity of debtors with precision (Crouhy, 2001). Altman (1998), divides up the risk portfolio according to the type of risk; there are three broad risk types: credit risk, market risk and operational risk.

The first and foremost is credit risk, which represent the possibility of a decrease in the value of an asset caused by instability in influencing factors. For example, the negative effects that appears with a default and the dynamics of recovery rates (Grundke, 2010). In this research, I have analysed the credit risk management in Chinese banking system.

Risk management is a continual process of corporate risk reduction. In practice, it can be summarized as a group of steps which are related between each other in a continues manner including: exposure identification, risk assessment, risk control, and risk finance (Louberge and Schlesinger, 2005). Laere and Bart, (2010) informed that Solvency II, a new regulation to reform insurance companies, has been approved by the European Commission. One of the consequences is that focus will be shifted to internal based models which are used to calculate the regulatory capital of banks, as the amount of capital should be enough to cover for any unexpected losses (Mohan, 2012). This is an important change in the modern
methodology that banks adopt to deal with credit risk assessment, because in this way it is possible to calculate the probability and level of identified exposures (Hunseler, 2013).

The goal of risk management is to minimise the bank’s exposures if it is not possible to avoid them. Martin (2010) pointed out that the risk management function has been regarded as an advisory function for senior management rather than a control function within the business. This has rendered the risk managers impotent when they see things going wrong but are ignored by senior management.

Recently, financial crisis has become a serious topic among academic researchers and finance managers all over the world. Considering the global context of the recent crisis compared to the ‘Asian’ crisis of the late 1990s, a more efficient credit risk management pattern is believed to be the solution for the global economic crisis (Deventer, et al., 2005). It is widely accepted that the financial crisis arose in 2008 and was mainly caused by the lax of credit risk managers in monitoring and controlling the loans. This broadly recognised view motivated the researcher to study the provision and pricing of credit.

1.2 Aim and objectives

There are extensive studies about the European banking system in all aspects, including risk management, bank profitability and competition conditions. However, research on the Chinese banking sector is relatively small in number. Since the economic reform in 1978 China has become a powerful economy in the world. The GDP of China was as high as twelve trillion US dollars in 2015, which marked China the second largest economy following the United States. It is necessary to reveal the banking industry of such a powerful economy in my opinion. Hence my focus in this study is on the five large commercial banks
of China, which took more than half of the Chinese market share altogether. The purpose of this study was to analyse how the reforms in the Chinese banking system have been affected by credit risk management. In order to achieve this aim, there are several objectives to implement. The accomplishment of the objectives is outlined as follows:

- Develop a thorough understanding of credit risk management in the banking industry.
- Discuss the transitional system in assessing credit risk
- Develop an up-to-date understanding of Chinese banking industry development including the changes of competition level
- Discuss the non-performing-loans problems in Chinese banks and the resolution methods
- Critically analyse the significance levels of some dependent variables, in the process of credit risk management. (All the variables were collected through questionnaires which covered the demographic questions and questions about credit risk management.) Then investigate the variable(s) that are likely to influence the rate of return in the Chinese banking industry.
- Using an analysis tool to work out the current competition level because credit risk management is an art in the competition level rather than monopoly level of an economy environment.
- Critically test the robustness of the interrelationship between the capital size of banks and profitability.

1.3 Structure of the study

The second chapter provides insights into credit risk management from several aspects. This includes the purpose of credit risk management, a brief history of the development of credit risk management in the global financial environment, as well as how to assess credit risk using a transitional system. Expert systems, credit rating and credit score have been discussed in detail respectively since they are three conventional tools in credit risk management. The last section (section 2.5) explains the credit risk in an emerging market. It gives a brief idea of the characteristics of the banking industry in emerging countries. Since this thesis is about
credit risk management in Chinese large commercial banks, the following chapter introduces the Chinese banking industry.

In third chapter the Chinese banking industry is explained from several angles. A critical analysis of most important published papers in credit risk management has been made in this literature review, starting from a brief history on the evolution of the Chinese banking industry. The reform of the modern banking system, starting from the late 1970s, has been discussed from different angles. Banking profitability is one of the most important factors which indicate banks’ performance, as well as competition environment in China. Researchers have investigated the Panzar-and-Rosse H-statistic test to study the competition level. I adopted this method to find out whether during the 2004 – 2011 the Chinese banks succeeded in forming a fully competitive market. Credit risk assessment in China is introduced, together with the resolution methods of dealing with non-performing loans. Besides, the establishment of asset management companies in China are discussed.

Chapter four delves into the research methodology. Wise (2008) indicated that the basic approaches of the research methodology are in the form of qualitative research and quantitative research. In this research an innovative methodology has been adopted. It combines primary and secondary data to analyse credit risk management in large Chinese commercial banks. Questionnaires have been designed to study the behaviour of senior credit risk managers and the corresponding effect on rate of return of loans. SPSS has been used to run correlation test based on the primary data which are collected through face-to-face questionnaires.

Secondary data has been collected from annual report between 2004 and 2011. In order to examine the long run inter-relationship among variables, different models have been adopted and all corresponding statistical techniques have been explained in detail (refer to section
4.4.2). E-views has been used to run Panzar-and-Rosse H-statistic test in order to get the competition level of Chinese banks during 2004 and 2011. Besides, Augmented Dickey Fuller (ADF) test, Johansen’s co-integration test and Granger causality test have been made respectively using E-views, as well.

Chapter five is devoted to the primary data analysis based on a questionnaire designed for this research for studying the behaviours of credit risk managers in Chinese large commercial banks. A large number of charts have been developed in order to enhance the understanding through visual images. Followed by correlation test to find out what factor(s) affect the rate of return of loans.

Secondary data analysis is left for the ensuing chapter. Many economic models, as discussed in the previous chapter, have been adopted. The purpose is to investigate if one variable can be used to predict the other variable if there is evidence to show a long run relationship between them.

The last chapter summarizes the contributions of this study and its conclusions. It also includes, in the recommendation section, some considerations for the possibility of extending the research. This PhD thesis is based on applying primary and secondary data. Indeed, the combination of questionnaire and financial models, like Panzar-Rosse model, Augmented Dickey-Fuller tests, Johansen’s co-integration test and Granger causality test, is rather an unconventional approach to the study of Chinese commercial banks compared to other studies in the field. Therefore, this research gives a critical insight into the concept of credit risk management which is put into practice. It is innovative to analyse the credit risk managers’ attitude towards credit policy and the effect on the profitability of banks.
Chapter II

Literature review on credit risk management

2.1 Introduction

Risk involves the day-to-day uncertainties of attracting, lending and investing money. Crouhy\(^i\) (2001) indicated that as a basic element risk could influence financial behaviour. Without risk, the financial system necessary for efficient allocations of resources would be vastly simplified.‘ According to Hefferman (2005)\(^ii\), ‘risk is understood to be the volatility or standard deviation of net cash flows of the firm, or, if the company is very large, a unit within it.’ Rose (2002) and Kealhofer (2003) also confirmed that risk is part of banking, and can hardly be avoided, because it is not possible to predict the future repayment capacity of debtors with precision. Crouhy (2001)\(^iii\) added that no one has ever been successful in forecasting the stock market, interest rates, or exchange rates consistently. It is not possible to forecast any credit, operational, or systemic events with major financial implications, which includes credit rating analysis as discussed in section 2.5 (Crouhy, et al, 2006).

Since it is not possible to operate a bank without dealing with risk, methods to safeguard operating against risks have been developed. The high volume of defaults since 1999 has meant that credit risk management has become more important than ever before. Dedu and Nechif, (2010) pointed out that no agreement has been made among experts in the field to define the term ‘risk management’. Generally speaking, risk management involves the different measures that financial institutions have put into practice to minimise and maintain a control on their exposures.
The aim of this chapter is to introduce credit risk management, which is the focus of this PhD thesis. The essential points to be discussed in this chapter are: (i) What is credit risk management? (ii) Why is it important to the banking industry? (iii) What models have been developed to manage credit risk?

To investigate credit risk management, the first thing to do is to understand the essential background of credit risk, the relationship between credit risk and banks, as well as to how the models of credit risk management have been developed. To this end, the literature review will embark on a brief history of credit risk and the banking industry to pave the way towards the current issues.

In what follows in this chapter, section 2.2 provides a clear understanding of credit risk and outlines a wide range of credit risk exposures faced by banks and their resources. Section 2.3 touches on the development of credit risk assessments, followed by Section 2.4 which covers the transition system in assessing credit risk, including the expert system, credit rating, and credit score. The last section of this chapter focuses on credit risk management and its implementation in emerging economies.

### 2.2 Risk management

Altman et al. (1998) pointed out that risk management is a continual process of corporate risk reduction. In reality, it is about how firms actively select the type and level of risk that is appropriate for them to assume. Duffie and Singleton (2003) elaborated risk management as the process of adjusting both the risk of large losses and the firm’s vulnerability to them. This vulnerability depends on the portfolio of positions and on the amount of capital that is backing the firm’s investment activities. Vulnerability to risk also depends on the quality of
the institution’s risk-management team, its risk-measurement systems, the liquidity of its position, and many other attributes (Hunseler, 2013).

According to Bente (2009) reducing costs to minimum is not the only target of when dealing with daily operations in banks. In order to diminish the negative impact of risk facts, managing risks in banking has become a fundamental element of banking management. The perception of the bank to the general public is clearly affected by the way banks deal with risks. Generally speaking, a strong and safe bank is preferred by shareholders as well as by normal customers because the soundness of the bank attracts more deposits (Casu, et al., 2006).

The principal purpose for risk management is to clearly define the risks and returns of alternative strategies at both the portfolio and transaction level. Over the last 20 years, risk management has become a hot topic. It is now widely acknowledged as the most creative but at the same time most destructive force in the world’s financial market.

### 2.2.1 Types of risks

Nelson, (1997) compared default risk as a missed payment, a broken agreement or an economic default (when the assets of institution loses value to a level below of its liability). Martensl et al (2010) elaborated that default risk is ‘the chance that a debtor or issuer of a financial instrument will not repay principal and other investment related cash flows according to the terms specified in a credit agreement’. It means that payments may be delayed or not made at all. Rating agencies consider that default occurs when a contractual payment has been missed for at least three months, which is line with the definition available
in Basel II (Chorafas, 2004). It should be mentioned, however, that the various events of default do not necessarily mean that there are immediate losses.

Broadly speaking, risks faced by financial institutions can be divided into five categories according to Altman (1998). The first one is market risk which is the probability of unpredicted oscillations in prices or rates. The second one is credit risk which is the probability of oscillations in value which is related to unpredicted oscillations in credit quality. The third one is liquidity risk which is the probability the cost for the institution largely increasing when varying financial positions or otherwise that an institution has no access to financing. The fourth one is operational risk which is the probability of fraud, system failure or trading errors (Fragniere, 2010). The fifth risk type is systematic risk which is the probability of breakdown in market-wide liquidity or chain-reaction default. Some authors assign this risk to a different class assuming that systematic risk cannot be managed without changing the system (Hull, 2010).

Chart 2.1 Types of risks

Source: Angelopoulos and Mourdoukoutas (2001)
Categorically, risks can be classified into two groups, which are traditional risks and non-traditional risks respectively (Angelopoulos and Mourdoukoutas, 2001). Traditional risks are liquidity risk, credit risk, political and legal risk and operational risk (Evan et al., 2008). Whereas non-traditional risks are market risk, interest rate risk, foreign exchange risk, liquidation risk, commodity price risks, investment portfolio risks and financial derivative risks.

Chart 2.2 Traditional risks and non-traditional risks

Source: Angelopoulos and Mourdoukoutas (2001)

Understanding the various types of risk is important because each category demands a different set of risk management skills. According to Bessis (2002) banks are facing many financial risks, such as credit risk, liquidity risk, operational risk, interest risk, foreign exchange risk and other risks. The risk type focused on in this thesis is credit risk, which is primarily concerned with default.
Liang (1989) explained the impact of credit risk in the profit of the bank since the bank needs to consider the cost of higher risk operations. Fraser et al., (2001) indicated that credit risk is most clear risk that the management banks need to deal with since it is considered to be the cause for majority of bank failures.

2.2.2 Credit risk management

Many of these risks, however, are activities which are also highly profitable. Banks are not different from other types of business in the matter of chasing after high profitability. As a consequence, minimizing credit risk is the main purpose of banking activities because profitability is affected by credit risk management (Honohan, 1997).

Traditional bank lending is defined as the financial intermediation of capital between providers and consumers (Greenbaum and Thakor, 2007). Traditional credit risk management, mainly in the form of providing and managing credit limits, has grown with the growth of bank lending as banks in their classical form including: taking deposits, making loans, and making profits from the spread between the higher lending interest rates and the lower deposit rate (Wernz, 2014).

Muninarayanappa (2004) defined the principle of credit risk management in banks. They specified the guidelines which should be used when senior managers in banks are making policies over credit risk management. According to them, the key points which may lead to a successful credit risk management is a combination of credit strategy and policies but also of maintaining the appropriate scenario for credit risk. As a result, protecting and improving the loan quality become the ultimate aim.
Boguslauskas et al (2009) indicated that the success of the bank must have received some influences from efficient credit risk management, even if banks move into other areas. Good credit risk management could help boost profit while minimizing risk and avoiding bad loans. The financial market is globalised. As a consequence, the financial markets around the world will respond the changes occurring at any of the key financial markets (e.g. City of London). Therefore, to prevent the negative effects of credit risk, it very important to keep an efficient strategy for the credit risk managers.

Credit risk managers could work effectively to mitigate it with a clear understanding of what credit risk is. Nelson (1997) stated that the role of a risk manager is to uncover the sources of risk and make them visible to key decision makers and stakeholders in terms of the probability of occurrence. Since credit risk managers are playing an important role, a questionnaire is designed and analysed to study the influence of credit risk managers to the rate of return (Chapter 5). The generated empirical results are then tested using veritable statistics (chapter 6). Since those models are numerical based, it is necessary to have credit risk managers interpret the corresponding statistical results of each model.

In practice, a risk manager has at least two advantages over a model. First, a risk manager knows the model’s limitations. Second, a risk manager can persuade management to take action to mitigate risk (Powell, 2010). Brown (2004) spots the credit loss aspects of credit risk and uses the Basel II formula as the definition of credit risk. The components for the calculation of the credit loss are defined as the probability of default multiplied by the expected exposure at default multiplied by the expected loss given default (Genest and Brie, 2013).

Bagchi (2003) explored the credit risk management in banks from many different aspects including: risk identification, risk measurement, risk monitoring, risk control, and risk audit.
Bagchi achieved a conclusion that there factors affecting how efficient the credit management system is such as: policies of credit risk management, framework of credit risk management, credit rating system, monitoring and control. (Danielsson, et.al., 2001)

2.2.2.1 Definition of credit risk

Bohn and Stein (2009) pointed out that risk is the possibility of the asset’s value suffering oscillations over a specific period of time. However, this is not the only definition because some experts have defined risk in terms of how likely the default will be. This definition brings in a strain that a portfolio can store up ‘time bombs’. Therefore, credit risk managers need to pay special attention on the probability of default. This is to prevent many businesses in the same industry or geographical area to default within a very short period of time.

Duffie and Singleton (2003) defines credit risk as the probability of default or decrease of the value in the market caused by oscillations in the credit quality of loan issuers or counterparties. According to the European Central Bank, credit risk is “the risk that the counterparty will not settle the full value of an obligation – neither when it becomes due nor at any time thereafter.” Credit risk involves the following risk: replacement cost risk, principal risk and the risk of the settlement failing.

Altman and Sabato (2007) specified the overdue value as a loss due to the financial weakness of the bank’s customer. Basically credit risk is understood as the possibility of the customer not having enough capital to meet the agreed payments for any reason. Malcolm (2008) had the similar understanding as Altman over credit risk. He defines credit risk as an expression of the probability of financial loss after taking into consideration as many influencing factors
as possible. In other words, credit risk is widely accepted by academics as a loss in the event of default of the borrower or otherwise a decrease in the credit quality of the borrower.

Altman et al. (1998) stated that every customer and every transaction carries an element of credit risk. There is the risk that they may not pay at all. Or that payment will occur beyond your trading terms. Both of these have a direct impact on cash flow. In the case of traded instruments, credit risk is the potential decrease in value generated by a change in credit quality during the life of the instrument. In the case of a bank loan, credit risk is considered primarily as the risk that the person receiving the loan not meeting the pre-arranged payments. There is a conflict of risk and reward. In financial markets, and other commercial activities, if one wants to achieve a higher rate of return on average, he has to take more risk. But the transparency of the trade-off between risk and return is highly variable.

Karras (2008) indicated that in a world of innovation, following the development of interest risk management, equity and foreign exchange risk management, now it was the turn of credit risk management. The reason is that overdue payment and non-payment are financial burdens that can be overcome by good credit risk assessment. The global banking crisis has affected many banks in the last decade. Even a giant global financial services firm such as Lehman Brothers was terribly affected and announced bankruptcy in 2008. It is no wonder that the dynamics of credit risk have become an active area of research.

Credit risk has been considered as one of the oldest elements of risk to banks (Kaminsky and Reinhart, 1999). The earliest reference to credit is found in Hammurabi’s Code. It means that the legal thinking of credit risk started from 1750BC. It described the principles of the legal process pertaining to debt and that the failure to repay a debt was a crime. The Bible (Old Testament) refers to the punishment of being sold into slavery for failing to repay a debt (2 Kings 4:1-7).
Besides, according to research by Kuritzkes, Schuermann and Weiner (2003) credit risk is also one of the largest elements of risk in the banking industry. They suggested that failures of credit risk management could weaken not only an individual bank but also the entire banking system. Research on credit risk has focussed on defining and developing a credit risk measurement and management framework.

Through the centuries, the growth of lending has led to a growth in credit risk management associated with the decision making process using local knowledge and techniques. The fundamental characters of credit judgement and general business judgement are similar. The decision would be made based on the reputation of applicants and observation of the activities of other business competitors. (Froot and Jeremy, 1998)

2.2.2.2 Valuation of credit risk

Ammann (2001) reviews some of the most common approaches to valuing credit risk and focuses on the application of credit risk valuation to derivative contracts. Ammann’s application covers, in particular, four aspects of derivative credit risk.

The first risk is Counterparty default risk. Patel and Pereira (2008) explained that derivative instruments are contracts in which the parties agree on future cash flows according to predefined rules. The recipient party of these cash-flows will be exposed to credit risk if it is perceived that the counterparty will not or cannot satisfy its contractual obligations in the future. As a consequence, the fair price of a vulnerable derivative differs from the default-free price (Keenan, 2009).
The second risk is *Options on credit-risky bonds*. Peterson and Stapleton (2003) purported that credit risk would result in lower prices for credit-sensitive bonds. However, the price distribution does not simply move, it also changes shape because of the low-probability, high-loss property of default risk. It is likely that the authors are implying a wider dispersion with a fat tail typical of skewed credit risk distribution curves. Accordingly, options on credit-sensitive bonds cannot be priced with standard option pricing methods but require a credit risk model.

The third risk is *Credit derivatives*. According to Dai (2008) credit risk may be the underlying variable of derivative contracts. In this case credit risk is not a by-product of a derivative, but the purpose of the contract itself.

The last risk is *Credit derivatives with counterparty default risk*. Ammann (2001) stated as typical OTC derivative contracts, credit derivatives themselves are subject to counterparty risk. In this case, two distinct forms of credit risk affect the price of the credit derivative. On the one hand, the promised payoff of the contract is calculated based on a credit risk variable, such as a credit spread or a default loss caused by the default of the party specified in the contract. On the other hand, the counterparty risk of the derivative counterparty can affect the value of the contract (Frey, 2010).

### 2.2.2.3 Risk policy

The objectives of bank management are maximising the investments profits, minimizing risk exposure and meet with the requirements by regulators. To achieve the aim of risk management, it is essential to control all risks that the bank may take through credit policy, since the latter could formalize and articulate the credit risk management process. Besides,
credit policy also states the tolerance of the management group of the bank in the matter of credit exposure. In the research methodology chapter, the author designed a questionnaire to study the credit policy in Chinese major commercial banks. The credit policy involves techniques to prevent, minimize and keep under control the defaults. Conventionally speaking, the policy is revised once a year and modified based on the present economic environment.

According to Gnos and Rochon (2011) credit policy should clarify the following:

- **The credit risk management framework**: it would define (i) what aspects are considered as credit risk management for daily banking operations; (ii) the credit risk management organisation, which includes the role and responsibilities of each manager; (iii) the credit committee’s relevance in the bank as well as the promotion procedures.

- **The application process**: it would specify all information submitted by the applicant such as identification, compliance and fraud checks, etc.

- **The acquisition process**: it would specify the process for assigning credit and also the scores ranking and how the loans are generated.

- **The portfolio management process**: it would identify the credit line assignment process for future months as well as how to manage the credits.

- **Portfolio monitoring**: it would specify the documents required to manage credit risk. These documents include identification, measuring, monitoring and controlling.

- **Forecasting-Impairment**: it would show the calculation to obtain the loan loss reserve and the monitoring.

- **Overrides guidelines**: it would clearly state all the exceptions when a customer does not meet one of the conditions. Further, it would also specify the steps to approve the exceptions.
- **Fraud prevention and detection**: it would describe what measures are to be done for the fraud detection as well as how to deal with the suspicious accounts.

- **Collections**: The Collections policy normally explains the general collection procedure.

In 2000, the macroeconomic performance started to recover from the previous crisis. The financial operation was well balanced and the inflation rate was as low as zero. In order to enhance structural adjustment of the economy, the People's Bank of China continued to flexibly employ all kinds of monetary policy instruments to adjust money supply, actively leverage credit policies to guide the direction of lending, to properly increase credit lending. This credit policy drafted by the PBC in 2000 met the needs of economic and financial development, and played a positive role in maintaining the stable growth of effective demand and the sound performance of the economy. In other words, it is likely that the credit policy by the PBC did contribute to the relentless economic growth in China.

Credit policy and strategy in banks are approved by the main authority- the bank’s board (Boateng and Huang, 2013). In this questionnaire, questions to examine the frequency of reviewing the policy have been included. The Credit Committee is the committee in charge of evaluating and approving the credit policy. In the case of any factor affecting the credit risk management process, a request of change will be made correspondingly. In the ensuing chapter about the Chinese banking system (refer to chapter 3), the China Banking Regulatory Committee will be introduced.

2.2.2.4. **Credit risk in global financial environment**

Suresh et al, (2010) pointed out that credit is conventional practice in daily commerce. Throughout history, the definition of credit is the action of borrowing and lending money.
Credit transactions are not considered the same type of activity as other investments due to the differences in the contracts. The difference between credit instruments and equity instruments is the agreement of fixed payments for the duration of specific period of time. Yu and Zhou (2013) indicated that equity instruments are not the same as credit instruments, because the latter is defined for a specific period of time. Furthermore, equity instruments define a share of whatever profits an entity can generate in future. Mckinley and Barrickman (1994) contributed that even if some equity instruments pay dividends, they don’t give any guarantee of regular payment.

Roach (2009) pointed out that the global financial environment has been changing radically. The globalisation and integration of financial markets has broken down the boundaries between countries, and strengthened the linkages and interdependencies between markets and economies around the world. A policy change by the Deutsche Bank in Germany may affect investors in the US immediately. Lam (1995) pointed out that in the last decade, the globalization has enhanced the instability of the financial systems of countries due to the increasing influence of key financial markets around the world.

Tornell and Westerman (2001) and Martinaityte (2008) alerted that the liberalization of financial market in a country may cause a credit boom, which can lead to a series of financial collapses such as: short-term economic recession or long-term post-crisis credit rating.

Wang (2008) indicated that since the 1990’s, bank crises such as the Japanese bank crisis and the Asia Financial Crisis have soared all over the world promoting an interest in research the corporate governance in banking organizations among other things. In September 1999, a policy, enhancing corporate governance for banking organizations, was released by the Basel Committee, which draws on supervisory experience with corporate governance problems in banking organizations. The policy gave suggestions that could help avoid such a problem.
The long-run challenge is to learn from the crisis and take measures designed to limit risk-taking to acceptable levels in today’s global financial environment (Jones, 2000).

Martin (2010) indicated that since loans are originated in banks, this leads to banks facing constantly credit risks. If the majority of borrowers fail to pay principal as well as interest, it will cause a banking crisis. Kim and Bertrand (2009) analysed the latest financial crisis, which originated from the US property loan crisis where there was high credit growth but with interest rate of loans and sub-prime mortgages was low. When this scenario crossed borders it was the start of the global financial crisis. There is a wide agreement to consider this crisis as the worst since the Great Depression in the decade of 1930 (Kim and Bertrand, 2009). There were several financial institutions that had to close down the business including the giant Lehman Brothers. In order to help the financial system to recover from the recession, many governments, including the US government, have made policies as a remedy (Kim and Bertrand, 2009). While some signals of success have been achieved, there is still a big concern about the financial market. It is the common target among all commercial banks to further develop the credit risk management system (Juta and Ingrida, 2009).

2.3 The development of credit risk assessments & sound practices

Risk assessment can be understood as the capability of commercial banks to forecast any default of loans. Until the 1990s, credit analysis was based on one to one conversations with no usage of external data. During that period, credit managers had limited methods to examine default risk.

Rajagopal (1996) wrote an analysis of the bank risk management and also suggested a model to use the borrower’s credit risk assessment to classify the different products. Few years after,
the models of the credit risk management were studied and discussed by Ferguson (2001). In his analysis, he reached the conclusion that an appropriate risk assessment is to achieve a systematic and strict method to identify any variation in the riskiness of their portfolio. Senior managers could use this measurement as a tool and based on this good understanding of risk, they can efficiently workout a framework to manage variations in their risk.

Carling et.al (2007) points out that many different methods have been studied for analysing credit risk. Contribution to credit rating and credit scoring is not limited to this case. In 1997, Credit Suisse Financial Products (SCFP) informed of a technique named “Credit Risk+”, which is design to help in analysing defaults.

Mckinley and Barrickman (1994) indicated the high potential risk that any holder of a deposit account has. The main services related to deposits are classified as follows: funds availability, return items and irrevocable payments. Funds’ availability indicates that customers are able to withdraw, either by cheque or electronic deposits, even if the bank does not have sufficient funds in its clearing account. Due to the strong competition between banks this is not a rear practice in the banking industry. Return Items indicates that cheques will be always accepted even though there are not enough funds in the customer’s account. This has a higher risk to cause default. Irrevocable Payment makes effective an irrevocable payment on behalf of a customer when there is an expectation of funding in the future. All these exposures can range from several minute (i.e. short time overdraft) to various days.

2.4 Transitional system in assessing credit risk

Gatfaoui (2003) pointed out the importance of credit risk in the vast majority of financial transactions. Similar to other risks, there needs to be some level of compensation to the client.
As an example, in bond markets, in order to attract the interest from potential investors the bond issuers offer higher yield. However, how much higher the yield should be set? It is possible to set the value of credit risk by using methods from contingent claims analysis.

Ammann (2001) gives an overview of the current methods for the valuation of credit risk and considers several applications of credit risk models in the context of derivative pricing. In particular, credit risk models are incorporated into the pricing of derivative contracts that are subject to credit risk. Credit risk can affect prices of derivatives in a variety of ways. First, financial derivatives can be subject to counterparty default risk. Second, a derivative can be written on a security which is subject to credit risk, such as a corporate bond. Third, the credit risk itself can be the underlying variable of a derivative instrument. In this case, the instrument is called a credit derivative. Fourth, credit derivatives may themselves be exposed to counterparty risk. This text addresses all of those valuation problems but focuses on counterparty risk.

Credit risk is considered to be the possibility that a contractual counterparty is not able to fulfil the agreed obligations thereby causing the creditor a financial loss (Altman, 2007). According to this understanding, it is irrelevant whether the counterparty is unable to meet its contractual obligations or is unwilling to continue the contract since it is not enforceable. Ammann, (2001) indicated how determinant the credit risk has been for defining the prices and promised returns of debt. In the case of a debt contract with very high levels of risk, the investors normally expect a higher rate of return as compensation.

Pyle (1997) explains that Credit risk is the change in the value of the asset caused by variations in the perception of both parties to meet the contractual obligations\textsuperscript{xii}. Mileris Boguslauskas (2010) pointed out that at a global level, more than 50% of total risk elements in banks and Financial Institutions (FIs) are Credit Risk alone. Thus managing credit risk for
efficient management of Financial Institutions has gradually become the most crucial task. The risk of being defaulted applies to all the credits in banks. The very important target in banks of determining the capability of the company to pay back its loans is done by applying credit risk estimation. It is essential, to investigate methods to estimate the credit risk because it helps the credit risk managers to issue loans only to reliable clients which minimises the potential losses. Conventionally, the models to estimate credit risk are reduced to three: expert system, credit rating and credit score.

2.4.1 Expert system

As the name indicates expert system arises from the need to invite expert opinion to evaluate risk applications. Sinkey (2002) claimed that the expert system is the method that vast majority of credit risk managers use to estimate credit risk. When a commercial bank receives a loan application, for a specific project, it often arranges a committee of experts to evaluate all available information and agree to a decision on the application. It is obvious that the expert’s knowledge and experience play an essential role in the decision process.

In 1998 Altman and Saunders (1998) claimed that since the late 1970s, most financial institutions had relied exclusively on subjective analyses, which are well known as expert systems to assess the credit risk on corporate loans. In Bullivant (2010) it is also emphasised that bankers information on the various characters of borrowers, including the borrower’s reputation (character), capital, collateral and condition, considered as the 4Cs of credit, in order to make an accurate decision of whether or not to issue loans.

Heffernan (2005), Jesswein (2008), Strischek (2009) tried to widen the Altman & Saunders perspective indicating that the most popular expert system to assess credit risk is the “5 Cs”
system. Liquidity of the business (cash flow) is the fifth C contributed to the system. The experts are able to make a decision by analysing the five factors and considering the relative importance among the 5Cs for that specific case. The five Cs are Character, Cash flow, Capital, Collateral (or security) and Conditions, respectively.

**Character** concerns the quality borrower’s personally, such as the reputation, education background, social status and credit record etc. It is normally adopted to evaluate the percentage of borrowers’ intention to fulfil the financial obligation. For instance, the enterprise culture is regarded as a sign of whether it is a reliable borrower, (Strischek, 2009).

**Cash Flow** indicates the borrower’s liquidity. Usually a liquidity problem leads to a default, while a constant cash flow is conventionally understood to mean a good liquidity. For this reason, loan applicants are normally asked to provide their most recent financial reports (Lundsten and Anyamwu, 2007). Discounted cash flow techniques are the generally accepted methods for valuing firms, (Magin et al, 2006).

**Capital** stands for the assets or capital the borrower owns. There is a close linkage between capital and the approved load. For example, debt to capital ratio reflects the how likely would be the default. The probability of default increases as the leverage increases (Jesswein, 2008).

**Collateral** is the asset that can be used by banks to secure the repayments of loans in the case when the predetermined payments of loans cannot be fulfilled. The value of the asset to be used as collateral depends on its own stability and the liquidity. The collateral that banks prefer the most are real estate and share certificates, (Bullivant, 2010).
**Conditions** are used to consider the macroeconomic status at the time of application. For example, at times of economic growth, generally banks tend to issue more loans. On contrast when the economic growth is negative, banks tend to be more cautious about issuing loans. On top of that, the collateral provided by the applicant is normally disvalued, (Strischek, 2009).

According to Jesswein (2008) although expert system is a widely accepted method among banks in their daily practice issuing loans, there are limitations of this method. The first one is how to recognise default leading aspects for similar borrowers. The second one is how to ensure the appropriate weight for each of the five Cs. Since, it is difficult to indentify an appropriate weight, credit risk managers do not always agree to each other in this matter. Therefore, it is understandable why the experience of credit managers plays an important role in the expert system.

### 2.4.2 Credit rating

The principles of good lending for banks can be reduced to a simplified framework. Credit evaluation is an essential method for ensuring loan quality. Banks normally analyse in various way the loan proposals. Lee (2008) indicated that ‘loan evaluation frameworks’ or checklists are conventionally used in banks in order to analyse a credit application, summarized in a useful mnemonic, *Campari* and *Ice*. The mnemonic of *Campari* stands for Character, Ability, Means, Purpose, Amount, Repayment, and, Insurance while ICE stands for Interest, Commissions, Extras, respectively.

Treacy and Carey (2000) discussed that normally the annual reports of the applicant (either individual or business) of between five and 10 years are used to assess the credit rating.
Normally banks could use credit rating to forecast the possibility of repayment in the future. In other words, banks use credit rating to indicate the risk of individual credit exposure.

Coyle, (2000) suggested that care should be taken by the lender to establish whether a trade supplier might have retention of title over goods supplied, should the lender be looking at those goods as security for its borrowing. From the angle of investors, the credit ratings provided by the rating agencies are reliable.

According to Bessis, (2002) there are normally six to ten different ranks under credit rating. Those 10 ranks are measures of qualitative ordering instead of quantitative measures of risk. In the global financial market, there are basically two kinds of credit rating: external ratings and internal ratings. The former are published regularly by central bank or the credit rating agencies, such as Moody’s, S&P, etc., while the latter are assessed by individual banks (Morgan, 2002).

Mattarocci (1978) discussed that credit ratings produced by agencies such as S&P and Moody’s are considered to be very useful for investors in the credit market. Changes in the credit rating can largely affect market participants because they directly impact on the issuer’s cost of capital, credit spreads and bond returns.

In the study of Wang and Niu (2011), it shows that the first known credit rating system was introduced in the world of credits by the Office of the Comptrollers of Currency (OCC) in the US. Loans with different possibility of default were classified into five categories. In order reduce defaults further in practice banks developed OCC’s five categories into more detailed categories. In the US, more than half of banks have developed 9 to 10 categories for
internal ratings use. In China, the internal ratings are shared among some banks or even to public, which stimulates the development of both internal and external rating.

Allen et al., (2004) stated that the main aim of a credit risk rating system is to enhance the safety of banks by an informative decision process. The appropriate usage of this system enables credit risk managers to identify any variation in risk levels and hence to optimize returns. When the bank starts to become bigger, it means that the internal credit rating for credit risk managers becomes even more important. The structure of internal rating systems are designed by banks and not related to externals. The only exception is the enforcement that regulators and examiners have promoted of internal credit rating.

The Office of the Comptroller of the Currency (OCC) of the US (2005)\textsuperscript{xiv} has asked for a very long time banks to implement a rating system. According to Basel II, it is very important that banks have an internal rating system in order to calculate the capital reservation (Couto and Bulhoes, 2009). Bessis (2002) pointed out that credit rating system is widely adopted in banks throughout the decision process, including monitoring, loan pricing, management decision process, etc. Normally credit rating system applies to the enterprise’s loan applications rather than individual person’s mortgage.

Treacy and Carey (1998) analysed the different mechanisms that banks in the United States apply to evaluate credit risk rating. The study focused on the structure of Bank Internal Rating System and Operating Design of Rating System. According to their comparative study of the bank system relative to the rating agency system, the bank’s internal rating system is capable of helping in three tasks: credit risk management, profitability analysis and product pricing. In the US, credit rating systems are widely adopted for large companies, whereas small companies and consumer credit, such as mortgage loans and credit card approvals, refers to scoring system.
2.4.3 Credit Score

Compared to the previous two approaches credit score is a number, which represent the creditworthiness of a loan applicant. This number can be calculated using the applicant’s credit report. Thus credit report provides fundamental information in the credit score analysis process. Banks represent a big group of investors, take credit scores as an efficient method to forecast a potential repayment in the future and diminish the possibility of losses caused by non-performing loans. Since maximising revenue is a common interest of all the investors, credit scores could help them to determine which applicant is likely to payback, what rate of interest is suitable and what credit limits is appropriate. Credit scoring models are playing an important role in the decision making process towards loan applications, nowadays (Belas and Cipovova, 2011). Credit scoring models are widely used for issuing consumer loans with relatively small amounts, such as credit card and mortgage. Meanwhile, it is getting more involved in business loan applications, also, (Mester, 1997).

Engelmann and Rauhmeier (2006) stated that basically, credit scoring is the favourable model to assess the risks associated with enterprise loans and individual loans. For example, in the US every adult is scored several times each year so that lenders are able to adjust the credit card limits or offer some new loan products. According to Finley (2012) it can be concluded that credit scoring was introduced to banking activities since 1941. From then on, credit scoring as a numerical expression of the creditworthiness of a person has been developed. Based on enormous researches and tests, new classificatory algorithms have been investigated. Specialists in majority of the leading banks develop software to improve the credit scoring services and rating applicants by scoring, monitoring their performances and managing their accounts more convenient in the daily activities.
Credit scoring has considerably improved the efficiency of the assessment towards credit card applications, as well as company loans with relatively small amount. It is a successful numerical concept and has changed the lifestyle of millions of people for better. In the daily banking activities, credit scoring contributes to the cost reduction in the lending process and presented clearly which applicant has minimal risk. Thus, it can be concluded that credit scoring has successfully escalated the competition in credit markets.

In Baesens and Van Gestel (2008), it shows that like any rating tools, a scoring model assesses a borrower’s creditworthiness. The outcome of the model is expressed in terms of a number called “score”. Increasing scores usually indicate declining risk, so that a borrower with a score of 210 is riskier than a borrower with a score of 350. The model which calculates the score is often referred to as a scoring table, because it can be easily displayed in a tabular form.

Engelmann and Rauhmeier (2006) found that scoring models are usually estimated with historical data and statistical methods. The historical data involves information about the performance of a loan, (“good” or “bad”) and about the characteristics of the previous loan. The time span between the measurement of the characteristics on the one hand and the performance on the other hand determines the forecast horizon of the model.

According to the explanation of Engelmann and Rauhmeier (2006), basically there are two steps involved in credit scoring model. The first step is to identify certain factors which influence the probability of default. The second one is to weight them into a statistical score. Specialists offering credit scoring services can interpret this score as a probability of default, or use this score as a classification system. Based on the score, loan applicants can be grouped by higher risk or lower risk.
Altman’s (1968) Z-score model apply a linear discriminatory analysis to classify corporate applicants. This model expresses the best fitting scoring as follows:

- \( Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5 \)
- \( X_1 = \) working capital/total assets ratio
- \( X_2 = \) retained earnings/total assets ratio
- \( X_3 = \) earnings before interest and taxes/total assets ratio
- \( X_4 = \) market value of equity/book value of total liabilities ratio
- \( X_5 = \) sales/total assets ratio

Normally when the credit risk managers get a Z score below a certain value, they would refuse the loan application. In Altman’s initial study, if Z score is below 1.81, it would be considered as “bad”. Credit scoring is a numerical based model which directly reflects the potential risks. With this method, credit risk managers could process loan applications efficiently, but it does not function well in some aspects.

Heffernan (2005) pointed out some limitations of the credit scoring system. They are not unique limitations of credit scoring method only. Actually, such limitations apply to majority of the quantitative methods. The first one is that credit risk managers need to adjust the variables and their weights. Otherwise, the forecasted repayment will be inaccurate since the data are all from the past. The other limitation is that by using credit score model the outcome can be either default or does not default, whereas, in reality there are various outcomes. For example, delay in interest payment is different from default on principle and interest. Due to such limitations, credit scoring model is normally adopted for loans with small amount, such as personal mortgage or small enterprise’s loans.
2.5 Credit risk management in emerging markets

Beegun and Pascale, (2009) pointed out that the effectiveness of the risk management process depends on the existence of a proper risk management framework, including: risk governance, risk assessment, quantification and aggregation, monitoring and reporting and control optimisation. Emerging securities markets can be classified in one of two ways. On the one hand, the term “emerging” may be applied to the characteristics of the market itself, suggesting a securities market that has begun a process of change involving both increasing size and greater sophistication. Alternatively, ‘emerging’ can refer to any securities market in a developing economy as defined by that economy’s level of per capita GDP. The World Bank’s threshold of US$8,956 per capita income is often used as a measure of development: If the income per capita is less than this threshold, the country is considered an emerging market, (Demirguc-Kunt and Detragiache, 1998).

Interactive Data Credit Rating-Emerging Markets adopts this latter approach, applying the country classifications used by the World Bank. That is to say, any economy classified by the World Bank as either low-income or middle-income is viewed as developing, and all securities markets in such developing economies are viewed as emerging markets for the purposes of Interactive Data Credit Rating-Emerging Markets coverage, (Eichengreen and Arteta, 2000). There are some exceptions to this rule. Rating from Hong Kong, Singapore and Taiwan are included, due to their importance as financial centres serving Asia’s emerging markets. Ratings from Israel, Korea and Portugal are also included due to the presence of important national rating agencies in these countries, (Emblemsvag, 2010).

Many investors focus on additional and more practical factors such as development of a stock market, bond and FX market, economic policies, reforms and privatisation and many more. Another important criterion for inclusion as an emerging market is a country’s track record in
terms of debt servicing: any country with a debt default and restructuring record is regarded as belonging to the emerging market universe.

Emerging countries have at least one or more of the following characteristics: Weak economic indicators; defaulted on debt in the past and restructured debt at the present; being classified as a Brady country; Non-OECD countries; Geographic classification (North and South); Political stability; Status of market economy; Currency restrictions; Illiquid stock market; Strong growth rates.

Schmidt, (2000) indicated approximately 85% of the world’s population and 65% of its natural resources are in the emerging countries. Their stock markets have a market capitalisation of not more than 11% of the world markets, the US 50% alone. In the emerging markets, the South African bourse is the biggest, followed by Brazil and Turkey.

Earlier tags for emerging markets were less-developed countries (LDC) or developing countries, such as Vietnam, China, Poland, and Cambodia that are new to the credit card world as a consumer of financial services. Others, such as Brazil, the Philippines, Mexico and Indonesia have had credit card services for many years, but are still considered emerging, because of the low penetration and lack of widespread use of credit card. Reasons for the latter could be no credit bureau, economic conditions, a large unbanked population, lack of merchant acceptance or other situations effecting the use and ownership of credit card.

In all markets, at any stage of development, managing the credit risk is one of the major challenges. This is even more of a challenge in the emerging market, where years of experience and supporting infrastructure may not exist. However, emerging markets also have some opportunities to tackle this key success factor early on and to get it right.
Adler and Jeong (2010) indicated the importance of the credit risks being managed in emerging markets. It is extremely important to establish the process, management structure and, especially, commitment to the credit risk cycle in these markets. The commitment of the management team and the strategic focus on having a fully integrated risk process are central to the successful initiation or continuation of credit issue in the emerging market.

Ramcharran, and Il-Woon (2003) explained that in emerging countries, banks are an essential part of financial systems. Even though liberation has been introduced to domestic financial system, there are various of factors that influence the financial market, such as government regulations and policies. Due to those factors banks are vulnerable and find difficult to manage efficiently the credit risk. In many cases, funds have been invested in poor and risky projects of small and medium sized enterprises. (He and Li, 2005) As a result, banks always have a large number of non-performing loans in emerging countries.

Classens, Djankov and Klapper (1999) have also indicated that external macro economic factors like the external political environment may present a variety of non forecasted issues in several developing countries. For example, the emergence from a repressed political regime may lead to opportunists trying to benefit from the situation.

According to Wang (2008), the non performance loans’ issues may lead to not only bank crisis but also country crisis. As he pointed out, since 1980, more than 100 emerging market countries have suffered this so-called ‘twin crises’. The damage takes a large percentage of the whole world crisis. For example, when the African banking crisis happened, five out of twenty African countries had to direct more than 10% of their GDP to resolve the problem. In Eastern Europe, a large number of banks in almost every country were in trouble. The Asian financial crisis in 1996-1997 caused many bank crises in Thailand, Indonesia, South Korea, etc.
Diaz and Gemmill (2006) described the historical legacy makes banks in emerging market less competitive. In Eastern Europe, China and Vietnam as well, these emerging markets used to be ‘central planned economies’. The communist regime of previous decades has caused the weaknesses in their banking sector. Huang (2007) mentioned some characteristics as the following:

**Relationship between banks and the government:** There is no clear line drawn between the bank role and the government role.

**The functions of the banks:** State banks had a nationwide monopoly position, such as mobilising deposits, supplying credits and so on. In the case of China, all the financial institutions are supervised by the People’s Bank of China which is the central bank in China. Before the economic reform started in 1978, central bank was the only institution for taking deposits and issuing loans.

**Credit allocation:** Under the enormous influence of planned economy, most of the loans were issued based on the planned targets. The financial department in government developed credit plans and allocated loans to their target enterprises. All the credits were given to meet set targets. These targets were set by governments or some institutions and they designed the credit plans, made decisions. The misuse of funds was impeding the development of enterprises or projects beyond the planned target.

**Foreign exchange:** the foreign exchange sector was monopolized. Chinese Yuan (CNY) has an official exchange rate, but it is not a freely convertible currency in the foreign exchange market. In the domestic market, there are restrictions to exchange Chinese Yuan into a foreign currency, such as British Pounds (GBP). The amount and reason must be approved by the bank.
Generally, in emerging countries there are some similar features as those mentioned by Huang (2007):

**The strength of the economy:** the economy is not relatively stable which caused many banking crisis. Banking industry can be developed well in a sound economic environment.

**Government’s unwise intervention:** Regulations and policies of government have major influences on the banking industry. The impact of political intervention can be found in many aspects in banking practice. Normally State-owned banks are influenced dramatically by government when making investment decisions. In some cases, banks are obligated to finance poor and risky projects. Such inefficient market practice caused a large amount of non-performing loans.

**Pressure under globalization:** Banks are facing new risks under the impact of globalization. For instance the financial liberalization exposes banks to strong competition in the global financial market. One of the main reason caused the Asian financial crisis in 1997-1998 was that domestic banks were not competitive enough in credit risk management compared to foreign banks. In the case of China, five years after joining WTO, Chinese financial market was open to foreign banks and investors in December 2006. During the five years protection time, Chinese banks were getting ready to perform on the stage of international financial market.

**Role of foreign banks:** foreign banks entering into domestic financial market can stimulate the development of the efficiency of financial institutions. Modern evaluation methods are introduced to credit risk management. Percentage of non-performing loans in Chinese banks reduced dramatically in the recent ten years, which can be explained by the competition pressure with foreign banks, (Bongini, et al. 2009).
Generally speaking, bank performances are influenced by risks, because general risks can bring banks investment opportunities and difficulties. It is inaccurate to conclude that defaults loans or even bank failure is caused by general risks. In most cases of developed markets, mismanagement, unwise strategies are the factors lead to bank failure. In emerging market, banks are facing higher general risks. Resistance to the impact of economic shock, recession\textsuperscript{v} or currency devaluation will be more difficult than dealing with general risks for any bank.

Properly identifying credit risk (New Straits Times-Malaysia, February 24, 2000\textsuperscript{vi}) needs to be carefully processed in order to have an efficient loan portfolio management. The reason is that financial institutions need to make plans, strategies and managements based on a particular level of risk in the loan portfolio. To identify risks is essential in this process. For example, the board of directors may set a high profitability target for the loan portfolio. As a result there is not enough reservation left for potential loan losses. This mismanagement cannot help with the reduction of loan losses. It is recommended not to breakdown the risk identification process for a better management in a financial institution. Failure in risk identification may increase the possibilities of issuing default loans or even worse, it may bring severe impact on capital reservation, which leads to bank failure.

Duffie and Singleton (2003)\textsuperscript{vii}, suggests that by examining the loan portfolio, it is not complicated to find clue of credit risk and interest rate risk. Credit risk is normally caused by the large amount of non-performing loans, while interest rate risk is influenced by the market interest rate fluctuations. It is necessary to consider interest rate risk when making evaluation of loan portfolio management. In the cases of issuing loans to risky projects with inaccurate high interest rates, it is very likely to evolve into credit risk when the borrowers failed to repay their loans.
Identification of risks in the loan portfolio is the fundamental of risk identification process. Kumbhakar, C. Subal (1991)\textsuperscript{xviii} pointed out that it is essential to examine and verify the identified risks accurately. Evaluation of individual loans normally comes to be the first step of the whole risk identification process. In order to check if enough credit evaluations are made and relevant information is recorded, it is necessary to review a sample of loans. All kinds of credit factors should be analysed in the credit evaluation process, so that it can be determined what lending limits is appropriate to a borrower or to the same industry.

\textbf{2.6 Conclusion}

In order to achieve a clear idea of the risks faced by banks and therefore be able to manage them more efficiently, academic researchers have classified risk into different groups, such as liquidity risk, political and legal risk, operational risk, credit risk, market risk, interest rate risk, foreign exchange risk, commodity price risk, investment portfolio risk and financial derivative risk.

Credit risk is the key issue in the banking industry, especially under the current tough economic climate. The gap between crises gets smaller. Each major financial crisis occurred approximately 4-7 years\textsuperscript{xix} after the last one - at exactly the point where the people with a personal memory of the previous crisis all disappeared (Martin, 2010). In order to maintain a healthy cash flow for business, credit risk managers need to find the balance between taking risk and achieving expected return, since it would be a waste of resources if they stopped giving out loans. It would be healthy to issue loans to selected projects. Hence, it is necessary to understand credit risk very well.
Chapter 2 and 3 are theoretically based. While the former gives an introduction to the credit risk management in the banking industry the latter introduces credit risk management in the Chinese banking system, which is the product of a fast-developing emerging market. It must be pointed out, however, that until 1978, when the Chinese banking industry started reforming from a planned economy to market economy, credit risk management was not taken into consideration in any Chinese bank. Majority of the theories to evaluate risks were not adopted in the daily banking activities. The lack of corresponding knowledge in risk management resulted in a large sum of non-performing loans, which, without a doubt, affected the profitability of banks considerably. Although after some twenty years’ development, the non-performing loan issue has been brought under control, the profitability of banks is still not good enough (Peng, 2007). Hence a combined methodology has been used including analysis on secondary data and questionnaires to examine the current Chinese credit risk management.

The main aspect of this thesis focuses on the credit risk management in terms of how the profitability of major state-owned banks is affected. As pointed out in section 2.4, the transitional system in assessing credit risk was discussed in three ways: expert system, credit rating and credit score. In the ensuing chapter - analysis of Chinese banking system, resolution methods of non-performing loans are discussed.

Crouhy, Galai and Mark (2006) have discussed and compared at a high level the models of credit risk management, but these papers did not specifically examine the Chinese banking industry in practice. My research is going to fill the gap since credit risk managers and regulators face a difficulty in taking appropriate actions based on models without knowledge of how these models are used in practice. As way to resolve the financial crisis scenario, a number of commissions have been set up to investigate this and they have raised questions in the process around risk appetite, regulatory management in banks, model issues and the use of models. Having covered the literature review it is now appropriate to embark on chapter three, where an investigation of the Chinese banking system will be attempted. The reason is
that, the topic, due to its specific features, could not be confined to the literature chapter as it was dedicated to the wider experience in credit risk.
Chapter III

Analysis of Chinese banking system

3.1 Introduction

As a developing country exercising economic reform from a planned economy to a market economy, the Chinese economy is not ranked as the second in the world only behind the US economy. For the last 10 years the GDP has grown at a rate higher than 8% per year. Even though in 2013 the growth was the weakest since 1999, it still managed to hit 7.7% according to the National Bureau of Statistics of China\textsuperscript{xx}(Appendix-3.1) These exceptional figures have made Chinese banking industry a interesting topic among international researchers, (Guo, 2015).

The essential function of the banking system is to balance capital and loans. The target of banks is using the funds efficiently and maximising the profits. In some emerging markets, capital market is not developed well, so banks play the principle role in the financial market. The reform of the Chinese banking system was not as fast as the development of the rest of the country’s economic development. There are so many defects in the banking industry, such as the market structure is not balanced, profitability ratio is relatively below standard, and management is not efficient enough, (Liu and Yan, 2009).

Among all the problems, suffering a large amount of non-performing loans for a relatively long period is considered the most serious one. This problem is manifested particularly in those State-owned banks (SOBs). Since SOBs controls more than half of the national financial market, the development of China’s economy got some influences as well. Thus,
there are enormous research papers about credit risk assessment and reducing NPLs in Chinese banks, (He and Fan, 2004).

Development history is important for the banking sector, because people are more confident to make judgments based on convention when handling money-related terms. The purpose of this chapter is to discuss the difficulties that Chinese banks face when assessing credit risk. The history of Chinese banking development will be introduced in the first part (section 3.2 History of the Chinese banking system), followed by the current Chinese banking system (section 3.3). In section 3.4 banking profitability is discussed. Non-performing loans problems in China are discussed in section 3.5 credit risk assessment in China. The last section is about the resolution methods of non-performing loans.

The current banking distribution in terms of asset (billion RMB) in China is as follows in Chart 3.1.

Chart 3.1 Total asset

![Total asset chart]

Source: China Banking Regulatory Commission
As is shown clearly in chart 3.1, the five large state-owned commercial banks have taken a large percentage of the total asset among all financial institutions in China. Therefore, it is interesting to investigate the credit risk management of these particular banks.

Chart 3.2 Five large commercial banks in China

3.2 Structure and Overview of the Chinese banking system

3.2.1 Development of Chinese banking industry

According to Freixas and Rochet (2008) banks are financial institutions operating mainly two activities: receiving deposits and granting loans. There are a range of activities that are considered, when talking about banking, in recent banking theory. Diamond and Dybvig (1986) explained the mentioned activities following the balance sheet items: (i) asset services,
(ii) Liability services and (iii) transformation services. Asset services are services that are received by loan applicants including the following activities: evaluating, granting and monitoring loans (Diamond and Dybvig, 1986). Liability services are services that are received by the clients making deposits which include the option of exchanging currencies and payment services. Transformation services refer to the scenario when it is more financially advantageous to have a bank deposit under specific conditions rather than investing into a project.

About two hundred years ago, there were three kinds of financial institutions that had the control on the financial market of the country: piaohao, qianzhuan and foreign banks. All of them performed the three activities but the function levels varied. Managers in Piaohao transported money in term of cash between their branches, (Cheng, 2003). This method was later used in the remittance inside China. Remittance services and exchange services marked the beginning of Chinese banking development, (Tamagna, 1942).

Apart from piaohao, there was another group of financial institutions called qianzhuan. Tamagna (1942) defined qianzhuan as a family financial institution and the ownership of these institutions belongs to a single person, various family members or close friends. The mission of running qianzhuan is to benefit through the services of taking deposits, lending and remitting (Tamagna, 1942).

Clients of Piaohao and Qianzhuan are different groups of people. Owners of big enterprises and governors tended to use Piaohao, whereas owners of small businesses and local citizens preferred Qianzhuan. Qianzhuan had the authority to print notes and exchange bills and notes (Cheng, 2003). Before the Chinese domestic market was opened to international trade, qianzhuan dominated local financial business.
In line with piaohao and qianzhuang, foreign banks were the third power in the Chinese financial market and took over the entire international trade business (Rixu, 2015). Piaohao and Qianzhuang could hardly compete with foreign banks in the import and export business because more financial services are required (Rixu, 2015). The increasing international trades stimulated the developments of domestic banks in the early 19th century (Rixu, 2015).

During the period of World War II and the civil war, foreign banks withdrew from Chinese market gradually. Until 2001 China joined the WTO and re-opened the financial market to foreign banks (Halverson, 2004). By 2010, there were 127 foreign banks operating in China (CBRC, 2011). The total assets had grown by 29% (CBRC, 2011). Their aggregate total assets amounted to RMB1.7 trillion, which represented 1.83% of the total banking assets in China. Forty foreign banks have now become locally incorporated (CBRC, 2011). Data from the China Banking Regulatory Commission (CBRC) indicated that at the end of 2010 they accounted for 87% of all foreign banking assets (CBRC, 2011). The top five major drivers of change cited by the foreign banks are: regulatory changes, funding constraints, liquidity, developments in the capital market and economic cycle (Chinese bankers survey, 2011).

3.2.2 The emergence of modern banks with the collapse of the “Three Tiers”

The “Three Tiers” situation collapsed when piaohao and qianzhuang were replaced by modern banks in the new economic environment of industrialization. In this section, the emergence of modern banks in the first decades of the 20th century is discussed.

The modern banking in China emerged with a nationwide economic and political reform. Under the influence of this reforming movement, western science and techniques were introduced to China, foreign languages and culture schools were established (Tan, 2009). The
appearance of new financial demands due to the industrialisation process led to modern banks and help to the evolution of the banking system (Guo, 2011).

The development of modern industry and the cost of railway construction resulted in new financial demands, which were increased dramatically (Heffernan, 2005). The problem of funding projects rose correspondingly. Domestic financial institutions found difficulties to finance long-term projects due to not enough capital (Heffernan, 2005).

Loans from foreign banks were always issued with a political connotation. Thus, it was necessary to establish modern Chinese banks (Peng, 2007). In 1897, the first modern Chinese bank, the China Tongshang Bank otherwise known as the Imperial Bank of China (IBC) xxiii, opened its first branch in Shanghai and months after other branches were opened in big cities, like Beijing and Guangzhou (Peng, 2007). IBC had a large amount of capital and grew rapidly in the business of issuing loans (Peng, 2007). Since 1898 IBC started to issue bank notes to replace those issued by foreign banks (Peng, 2007).

3.2.3 Banking and credit market in the planned economy

There were two major characters of the Chinese economy on the centralised period, which is from 1950s to the late 1970s (Peng, 2007). One was public ownership and the other was widespread political control. Enterprises under public ownership did not have an essential owner, which raised many problems, such as the principle-agent problem xxiii (Peng, 2007).

Massive control from politicians highly influenced the way enterprises were managed. Conventionally speaking, enterprises are all profit-oriented, but there it was exceptional
(MacFarquhar, 2011). Sometimes the principle character of driving by profitability was not applicable (MacFarquhar, 2011). Besides, political consideration enjoys priority in the process of making economic plans. Approval of an economic plan was made by central government (MacFarquhar, 2011). The highest authority power is the National People’s Congress (NPC), which is can be considered as the equivalent to the UK parliament.

Under such politics environment, function of banks was simply collecting deposits and give out loans based on government’s plan (MacFarquhar, 2011). Banks did not need to worry about bad debts, because if the borrowers failed to repay their loans, those bad debts would have been regarded as subsidies (MacFarquhar, 2011). During that period, it was obligated for the state-owned enterprises to provide their employees with a place to stay, health insurance, pensions and etc (MacFarquhar, 2011). It was different from the social security system run by an independent department of government in Western countries.

3.2.4 Banking in Transition and bank reform

In the context of the Chinese economy, the term ‘transition’ means transferring from a planned economy system to a market economy system. It was based on centralised planning and the development of financial market (Rixu, 2015). There were many changes in the economy as well as in the social security system including stabilization, liberalization and deep institutional restructuring (Rixu, 2015).

The Chinese economy has been stimulated under the influence of economic reforms, which was designed to improve the efficiency and resource allocation (Peng, 2007). The Chinese authorities have embarked on gradual changes for the banking sector to be able to support constant growth in the real economy (Peng, 2007). Generally speaking, Chinese banking

In the first period (1978-1993) China started to slowly change its economy with a transition from a planned economy to a market economy (Guo, 2011). A two-tiered banking system, which involved both planning and market economy, was introduced (Peng, 2007). It was marked by the establishment of four specialised banks: Bank of China, Construction bank of China, Agricultural bank of China and Industrial and commercial bank of China (Boateng et al., 2015). These four banks were neither directly controlled by the central bank nor by the Finance Ministry (Pei, 1998). As another important part of banking reform, China has gradually opened its banking operations to foreign competitors (Peng, 2007). Since early 1978, foreign financial institutions were allowed to operate in China with restrictions on the banking activities and trading cities (Peng, 2007).

In the second period (1994-2001), the asset quality of state-owned banks (SOBs) had deteriorated significantly. As a result, the government had to reconsider the wisdom of pervasive political intervention with regard to banks’ credit and lending decisions (Peng, 2007). A legal framework for bank supervision was established in 1995 when two laws (the Central Bank Law and Commercial Bank Law) specifically identified the responsibilities of the central bank and influence in businesses for commercial banks (MacFarquhar). Political loans have accounted for more than one third of total loans for SOBs (Chen and Shi, 2004). Each bank used to have its own system and standards for classifying non-performing-loans till 1995, when the PBC made a new regulation. (Lardy, 1998) This four-category loan classification includes: normal loan, doubtful loan, bad loan and non-performing loans. However, banks were not required to make any provisions for overdue loans.
In 1994, Asset Management Companies were set up which separated the financial assets into good or bad. Meanwhile, a securitised risk hedging mechanism was constructed, which improved the working efficiency and competitiveness of banks (Pei, 1998). This leads to the creation of new types of banks such as: the national joint-stocks and city commercial banks, urban and rural credit co-operatives, joint ventures, and foreign banks (Pei, 1998). The way to develop new financial services in the countryside was to create 12 rural commercial banks since 2001, along with other 80 rural credit cooperatives (Bramall and Ho, 2001).

In 1997, the government determined the importance of reforming banks into market-functioning entities thus improving their profitability (Pei, 1998). The reform focused on restricting business of the large banks. Large state-owned commercial banks (SOCBs) had issued a large number of loans, which turned out to be bad loans, to state-owned enterprises (SOEs) (Peng, 2007). The policy was carried out through capital injections and the cutting off of NPLs.

While the restructuring of the SOCBs is carried out, the Chinese authorities are making efforts to liberalise the banking system (Presber, 2011). This includes increasing the ceiling on lending and deposit rate, reducing the share of directed lending and gradually opening up the capital account (Presber, 2011).

In the third period (2002- present) China gradually opened up its banking markets. Since 2006 the Chinese banking has been available to foreign banks and institutions, which was a commitment in order to join the WTO in 2001 (Boateng et al., 2015). Since December 2003, the China Banking Regulatory Commission has given foreign banks the right to own up to 25% of a Chinese financial institution. Towards the end of 2006, there were a total of six foreign banks and five joint-venture banks. Since 2005, international investors could be shareholders of the stated-owned Chinese banks listed on the Hong Kong and the Shanghai Stock
Exchanges (Liu & Yan, 2009). However, there is a restriction that international investors cannot hold more shares than the Chinese government, because the latter is supposed to hold controlling stakes (Liu & Yan, 2009).

Chinese governors expected to have the bank performance improved with the entry of foreign banks (Peng, 2007). In the summer of 2006, the first financial derivative trade was opened in Shanghai. Hence, after nearly thirty years’ economic reforming, the result is a universal financial system, consisting of money market, capital market, insurance market, foreign exchange market and bullion market (Peng, 2007).

The dual-track banking system was remarkable in the process of Chinese banking reformation. Through this approach the economic and political cost of transition was spread gradually for the changes would be accepted with no complications (Presber, 2011). Chinese bank reform is still ongoing. It is obvious that the reform has had a big influence over Chinese economic development (Presber, 2011).

### 3.3 Banking profitability

Similar to all other businesses, banks generate profit through earning more money than they pay in expenses (Stigum and Branch, 1983). Briefly speaking, two streams contribute the pool of bank income. One is the fees that a bank charges for the services it provides and the other one is the interest it earns on its assets. Whereas the main source of expenses is the interest it pays on its liabilities and other non-interest expenses, such as personnel expenses and other operating expenses (Stigum and Branch, 1983). Bank’s total assets include the personal mortgages, business and other organizations, as well as the securities it holds. The
total liabilities are its deposits and money lend by other banks as well as the money received from trading in the money market commercial paper.

In business studies, pre-tax income and net income are conventionally adopted to analyse profitability. However, in this research I use total equity (shareholders’ equity). The reason is that total asset minus total liability is equivalent to total equity, which is the source of shareholders’ dividends. In other words, dividend represents the profitability that shareholders can receive from their investments and total equity represents the total shareholders’ profitability. A test on the total equity and total asset has been carried out in chapter 6 to investigate whether it is appropriate for shareholders to expect higher rate of return from larger banks with larger amount of total asset.

3.3.1 Earnings and profitability indicators

Profitability indicates a bank’s performance. In fact, profitability shows how efficiently a bank is managed as well as the strategies and risk management capabilities. Healthy and sustainable profitability is required to have a banking system which is stable (Bai and Elyasiani, 2013). The transformation of the Chinese banking system from a planned to a market economy in such a big way can fairly be taken to mean that profitability is now central to the Chinese banking system (Peng, 2007). The profitability of banks can be influenced by some factors. For example, bank size, balance sheet structure, government intervention and macroeconomic environment (Boateng et al., 2015). Hence, in the questionnaire, government policy questions have been included to investigate whether such factor has a strong negative influence over the profitability (Refer to chapter 4)
Bank size is generally considered to be related in a way to the profitability but until now it has not been determined whether this relation is beneficial or not. In Goddard et al. (2004), as well as Garcia-Herrero and Vazquez (2007), it is suggested that those countries with large industries, larger banks are more profitable and reducing costs is important because of economies of scale. Rumble’s (2006) findings pointed out that the consequence of a bank’s aggressive growth strategy is normally an over-sized bank, which is more difficult to manage than a small bank. As to Chinese banks, central government intervenes in the currency market and the large five commercial banks are all state-owned.

The balance sheet structure of a bank is also found to affect profitability (Demirguc-Kunt and Huizinga, 1999). In terms of asset, a larger percentage of loans to total assets should imply more interest revenue due to the higher risk. However, this is not always the case because loan applications need to be approved and constantly monitored which increases costs profitability (Demirguc-Kunt and Huizinga, 1999). Therefore, the profits can increase when there is a larger percentage of loans to assets with a liberalization of interest loans and banks apply mark-up pricing. In other words, the profits of those banks with high share of non-interest earning assets are lower.

In addition, balance sheet structure is also influenced by government intervention. For example, the processes, or the quantity of a loan are monitored by the administration as well as the deposits. Fry (1994) pointed out that administered lending and deposit rates result in the misallocation of credit. A Large proportion of deposits should increase profitability theoretically because, compared to borrowed funds, deposits are considered more stable and lower cost (Fry, 1994). However, widespread branches to take deposits and the corresponding expenses are high in emerging countries. In China, the capped interest rates enable banks to have cheap funding with the deposits. Besides, the ownership structure is implicit in the security of banks, which make state-owned banks stand out and therefore have easier access to receive deposits.
The macroeconomic environment also has a large influence in the profitability of banks on various routes (Masood and Ashraf, 2012). An example is credit risk which is highly affected by economic growth, inflation rates since they may deteriorate the value of collateral as well as the repayment ability of the borrower. Demirguc-Kunt and Huizinga (1999) pointed out the relation between rapid economic growth and high net interest rates in the increase of profits in many countries. Inflation leads to an increase in the profits because it increases the earnings, compensation for any increase in labour costs (Boyd et al. 2001).

3.3.2. Ownership affects banking performance

Banks have a very large influence in the financial market. Credit risk assessment in Chinese banks has become stronger with the economy of the country experiencing a high development. The experience of the central planning economy in earlier time has a big influence over the current banking practices (Lin and Zhang, 2009). Credit risk management in major commercial banks has restructured from an agent of financial supply to a transaction system based on the market. During the reform in the banking industry during the 1980s and 1990s, Chinese banks gradually discovered the fact that to improve the incentives and skills in evaluating credit risk is very important (Peng, 2007). State-owned enterprises (SOEs) were the largest group of debtors. In 1978, SOEs took 77.6% of total loans issued in the entire banking industry, but after the banking reform, this high percentage dropped to 28.8% in 1996 (Cull and Xu, 2003). The increasing of loan applicants outside the planned economy was due to the changes in ownership structure. While processing the additional loan demands, banks need to handle a large amount of NPLs generated from previous years.

In the early 1990s, Li (1990) indicated that the appearing credit risk was caused by the semi-privatised (“Cheng Bao”) enterprises. Such enterprises did not have backup from government. Besides, the responsibility of managing these enterprises falls completely on the
managers. It was a great challenge for managers who did not have sufficient experience in operating with a purely commercial orientation. Hence, in the questionnaire, the question of years of servicing in bank and years of issuing loans have been included to study the working experience of credit risk managers (chapter 4). According to the investigation by Bai et al.’s (1991) in Nanjing credit market, it was suggested to transform those privatized SOEs into joint-stock companies in order to reduce credit risk. The reason is that financial investors are introduced to other financial markets so that the pressure is reduced.

According to Jensen and Meckling (1996), ownership incentives have been very effective in encouraging bank managers to perform the best for shareholders: management behaviour is monitored regularly and management entrenchment is reduced. It has been argued that management ownership may also incur a cost (Fama and Jensen 1983). When the management of a firm own a large amount of the firm’s equity, they may be able to use their votes to defence themselves. It has been found that firm performance increases with ownership at low levels and decreases with ownership at about 40% to 50%.

The relationship between ownership structure and the profitability of banks is also investigated. Boateng and Huang (2013) indicated how common it is that banks are government owned. In countries where the per capita income is low, the tendency is that government ownership of banks increases. A consequence could be less efficient financial systems. Banks would be less profitable if they are privatized. In other words, the government ownership of banks reduces the profits of banks. Berger and Humphrey (1997) pointed out that the enterprise undergoing restructuring could enhance a commercial bank’s efficiency. Berger et al. (2009) found out that the ownership reform and the competition pressure with foreign banks have forced the Chinese commercial banks to have better performance. Since China joined WTO in 2001 the total factor productivity rose by 5.6 per cent every year (Halverson, 2004). With foreign investors entering into the domestic financial market, Chinese banks need to become more competitive. Chapter 5 looks analytically at the
profitability of banks, which is followed in chapter 6 by testing the competition level of Chinese banks using Panzar and Rosse methodology.

### 3.3.3 Capital size and profitability in Chinese banking

How the level of capital affects profitability in banking is not a straightforward research question. After decades of research, it remains a contentious issue for a simple reason that the relationship between capital and profitability varies. Either a positive or negative relationship between capital and firm value is possible depending on whether the capital ratio of a bank is higher or lower than its optimum value. Theories behind the three possibilities of correlation between capital size and profitability are discussed as follows:

- **Hypothesis 1 - no correlation**

Modigliani and Miller (1958) pointed out that in a market with perfect competition, there is no relation between the capital structure and the worthiness of the firm. Moreover, there is also no relation between the firm’s market value and the precise composition of debt financing, as for example the combination of short and long-term debt or secured and unsecured debts, etc. The basic proposition was demonstrated assuming no taxation at the firm level, no bankruptcy and a constant borrowing and lending rate (includes in the case in which the borrowing and lending rate increases with financial leverage in exactly the same rate for all firms and individuals). Alternatively, the average cost of capital is independent of financial leverage (Baker, 2011). The regulators of financial markets may find one of the implications of the theorems very interesting which is that, the expected rate of return to equity invested in the firm \( E(R_e) \) is equal to the expected rate of return in the absence of
borrowing \([E(R)]\) plus an amount that is linearly dependant to the debt to equity ratio. The equation is:

\[
[E(R_e)] = [E(R)] + [E(R) - r_f] \left( \frac{D}{S} \right)
\]

- \(r_f\) is the risk-free borrowing and lending rate
- \(D\) is debt
- \(S\) is equity
- \([E(R)]\) is the rate of return to the asset in the absence of borrowing
- \([E(R) - r_f]\) is the risk premium for the investment without leverage.

The expected rate of return to equity is increased by borrowing if the expected rate of return to the investment without borrowing exceeds the rate of interest on borrowing. According to M-M theorems, the potential effect that the capital can have on a firm’s funding costs is zero and the effect of capital on the volume or price of lending will be either zero or minimum. The correlation between capital size and profitability is zero.

- Hypothesis 2- positive correlation

In the M-M theorem, bankruptcy does not cause any additional cost since the debt holders can sell the assets of the bankrupted firm and recover their investment (Merton, 1974; Stiglitz, 1974). However, in everyday life, it is well known that bankruptcy has a high cost. This is due to the fact of important transactions costs directly linked with bankruptcy. These range from accountant’s and lawyer’s salaries as well as other administrative fees. Moreover, the probability of bankruptcy has a severe negative impact on the value of the firm.
In many countries, an “interest tax shield” created by the tax deductibility of the interest of debt. This together with the fact that dividends cannot be deducted explains that equity is considered more expensive. In effect, the possibility of debt being subsided and the expectations of further debts being subsided also, generate an asset with a positive net present value. As a consequence, the lack of drivers of capital other than tax deductibility of interests leads to firms choosing to be 100% debt financed.

According to “trade-off theory” the advantages on tax deduction of higher leverage are offset by the increase in the expected costs of bankruptcy. The “trade-off theory” says that for each firm there is capital ratio optimal which is variable depending on how much the firm can be benefited of the tax advantages of debt and on how risky the firm’s assets by the market as well as the bankruptcy costs.

“Trade-off theory” indicates how the agency problem between investors and banks, due to the lack of sharing enough information, can be reduced with a high capital (Mehran and Thakor, 2011). A large amount of firm’s funds as well as free cash flow tend to make managers to make investments for their own benefit such as showing their skills and importance to the firm (Jensen and Meckling, 1976). Allen, Carletti and Marquez (2011) indicated the effectiveness of a high capital as a guarantee of the bank’s monitoring incentives which lead to banks offering more surpluses to borrower resulting in higher profitability. Hence, it implies a positive correlation between capital size and profitability.

- Hypothesis 3 - Negative correlation

Pecking order theory is focus on information symmetries between managers and investors, which is the assumptions required for the M-M theorems. Internal sources of finance are
preferable when these can be provided, as these funds carry out fewer costs. The dividend payout policy can help to balance two options: use any profit for investing again in the future and stable payouts.

Based on the pecking order theory of financing, it can be concluded the high cost that bank take when equity or debt are increased because the market receives signals of the manager’s thoughts about the prospects of the bank (Myers and Majluf, 1984). According to pecking order theory the way to obtain the firm’s capital ratio is by combining the investments of the firm and the funds generated in the past by the firm. The reason behind having a good capital ratio is for the firm to ensure enough capital for investing in further opportunities (Myers, 1984). Under stressed conditions, it normally shows a negative correlation between bank’s capital and the profitability, since low profitability represents that the bank needs to increase leverage to raise profits (Milne and Whalley, 2002).

The relationship between bank’s capital ratio and profitability is possible to be positive or negative and it highly depends on the situation of the bank at any given time (Canarella et al., 2014). In summary, there is a higher cost for banks when the capital is high due to a not perfect capital market and tax advantages of debt. In this case, capital and profitability are negatively correlated. However, an alternative approach, the popular “trade-off” theory, claims that a positive correlation between capital size and profitability can be achieved by reducing risk with higher capital which implies a lowering compensation for investors in case of bankruptcy.

The third possibility of the relationship between capital and firm value shows zero correlation between the two. It can be explained by MM theorem that in perfect financial market, there is no additional cost associated with bankruptcy (Iqbal et al., 2012). However, in reality, bankruptcy is costly. According to the trade-off theory and pecking order theory, the
The correlation between capital ratio and profitability depends on the circumstance of the bank, if its capital ratio is different than the optimal capital ratio (Iqbal et al., 2012). In case of banks achieving an optimal capital ratio it is possible that there is no short-run relationship due to the no variation of the value when capital changes according to the first order conditions (Iqbal et al., 2012). In the long term, the capital required by regulators can imply that the bank’s capital ratio is larger than optimal; leading to a negative relationship between capital and value (Iqbal et al., 2012). Therefore, when bank’s capital ratio is exceeded then a higher capital will have an impact on the value.

In the following chart 3.3 of bank capital to asset ratio, it shows that China has a relatively low capital to asset ratio, which is slightly higher than Japan between 2006 and 2013. According to Berger et al (2008) that the business plans of a bank also have influence over capital ratio. In the case of a bank with the aim of expanding market share, due to a new business strategy, it may increase leverage which means a lower capital ratio. In the case of a bank planning a big investment, such as acquiring another bank, it is very likely to keep capital ratio at a high level. Hence, it is possible that Chinese banks have been trying to increase their market share by reducing the capital ratio which implies they have a high risk business strategy (Goddard et al, 2004).

Chart 3.3 Bank capital to asset ratio

![Bank capital to asset ratio](chart.png)

Chart 3.3 (source: World Bank data)
In order to test the hypothesis of the relationship between capital and profitability of Chinese banks between 2004 and 2011, I adopted Augment Dickey Fuller (ADF) test, Johansen’s co-integration test and Granger Causality test, as critically described in chapter 4 and 6.

3.4 Banking competition

In a similar way to other industries, in general the types of competition in the banking sector can be classified into: monopoly, oligopoly, monopolistic competition and perfect competition.

3.4.1 The competitive environment of the Chinese market

3.4.1.1 Monopoly

The market in the condition of monopoly has only one bank, due to the fact that this bank is the only firm that provides financial services to the market, there is no competition and this bank has absolute power in setting the price in the market (Schaeck, K. & Cihák, 2012). Furthermore, other potential banks are unable to enter the market. They also have the ability to charge a different price to different markets, i.e. they may charge a lower price in a very elastic market in order to increase the quantity sold, while a higher price would be charged to the consumers in the market with relatively inelastic market in order to maximize the profit (Schaeck, K. & Cihák, 2012).

Between 1949 and 1978, there was only a single bank available in China which was the People’s Bank of China (PBC). In that period of time, the PBC performed as not only a
central bank but also a commercial bank in the financial system market (Schaeck, K. & Cihák, 2012). In other words, the banking sector was completely monopoly.

3.4.1.2 Oligopoly

The second type of competition is called oligopoly market (Schaeck, K. & Cihák, 2012). Under this competitive environment, the number of banks which are available in the market is considered to be small, while all of them provide either homogenous or heterogeneous products in the market; the entry or exit to the market is quite expensive market (Schaeck, K. & Cihák, 2012). The banks operating in the oligopoly market have power to set the price in the market. The degree of price control by banks in oligopoly is higher than in the monopolistic competition (Welfens, 2014). One special characteristic of oligopoly over monopolistic competition and perfect competition is the interdependence among banking firms. The market in the condition of oligopoly is made up of a few large banks; because the size of the banks is very large, its actions will affect the market conditions due to the fact that in the oligopoly market, there are a small number of banks and each bank is large enough that its actions will affect the market conditions market (Schaeck, K. & Cihák, 2012). Thus, other banks will be aware of one bank’s action and respond appropriately in order to keep their competitive position in the market.

Since the Chinese economic started reforming in 1978 and began transforming into an open market, three more national banks were established. These three banks were specialised in agricultural, construction and general commercial business respectively, as part of the reforming in the Chinese economy. They are the Agricultural Bank of China (ABC), the Bank of China (BOC) and the People’s Construction Bank of China (PCBC).
3.4.1.3 Monopolistic competition

The third type of competition is called monopolistic competition. Under this competitive environment, there are lots of banks in the market, but unlike perfectly competitive markets, these banks offer differentiated products to customers market (Schaeck, K. & Cihák, 2012). The cost of entry and exit to the banking market is low. Banks have a degree of control over the price of the product offered market (Schaeck, K. & Cihák, 2012). In other words, they are price-makers rather than price-takers to some extent.

In 1983, the Industrial and Commercial Bank of China was founded, generating the service of commercial banking from PBC. From then on PBC started to perform both as a central bank and as the main regulatory agency of Chinese banks. During this time, some new banks were founded ranging from nationwide joint-stock commercial banks and urban and rural credit co-operatives (Peng, 2007). In 1994, three policy banks were founded and they are named as: China Development Bank (CDB), Agricultural Development Bank of China (ADBC), and Export Import Bank of China (China Ex-Im bank) (Peng, 2007). These banks became important in the policy loan business even to the point of overtaking the four national specialised banks.

During this time, the role of the four national specialised banks changed to state-owned commercial banks. In the following year, Commercial Banking Law of the People’s Republic of China and the Law of the People’s Republic of China on People’s Bank of China came into effect. This implied a change in the operatively of the banks since now it was required to operate individually, which involve accepting the consequences of their own risks (market (Peng, 2007). Some urban credit co-operatives were restructured to be urban co-operative banks.
3.4.1.4 Perfect competition

In a perfectly competitive environment, banks are not price-makers but price-takers instead. The price of a product offered by banks will be determined by the industry supply or demand, whereas they have no influence to the volumes of demand and supply in the market. The perfect competitive environment in the banking sector has the following characteristics (see Mankiw and Taylor 2014):

1) There are a large number of banks in the market;
2) Banks offer a homogenous product with regards to the cost and attribute of the product;
3) The cost for new banks to enter the market is very low.

Statistics from the China Banking Regulatory Commission\textsuperscript{xxvi} show that in the Chinese banking system there are 973 financial institutions. Out of the 973 financial institutions, 3 are policy banks, 5 are large state-owned commercial banks (SOBs), 12 are joint-stock commercial banks (JSBs), 113 are city commercial banks, 47 are locally incorporated foreign banks and the remaining correspond either other type of financial institutions (see table 3.1) or to cooperatives from rural and also from urban areas. Similar to the majority of financial and capital markets under development, Chinese banks play an essential position in financial intermediation.
Table 3.1 Distribution of financial institutions in China

<table>
<thead>
<tr>
<th>Name of banks</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy banks</td>
<td>3</td>
</tr>
<tr>
<td>State-owned commercial banks</td>
<td>5</td>
</tr>
<tr>
<td>Joint-stock commercial banks</td>
<td>12</td>
</tr>
<tr>
<td>Post office deposit bank</td>
<td>1</td>
</tr>
<tr>
<td>City commercial banks</td>
<td>113</td>
</tr>
<tr>
<td>Rural commercial banks</td>
<td>138</td>
</tr>
<tr>
<td>Rural cooperative bank</td>
<td>20</td>
</tr>
<tr>
<td>Rural credit cooperatives</td>
<td>70</td>
</tr>
<tr>
<td>Three types of new rural financial institutions</td>
<td>325</td>
</tr>
<tr>
<td>Foreign banks</td>
<td>47</td>
</tr>
<tr>
<td>deposit insurance</td>
<td>62</td>
</tr>
<tr>
<td>Financial company</td>
<td>115</td>
</tr>
<tr>
<td>Financial leasing companies</td>
<td>15</td>
</tr>
<tr>
<td>Automobile financial company</td>
<td>16</td>
</tr>
<tr>
<td>Financial service company</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>973</td>
</tr>
</tbody>
</table>

Source: The China Banking Regulatory Commission\textsuperscript{xxvii}

Table 3.2 shows the total assets of the Chinese banking institutions over the period of 2007 to 2013. As the figure indicates, the assets of the Chinese banking institutions have been increasing constantly. The growth of assets in banking sectors suggests that there is an increasing demand for banking services in China. Furthermore, the total assets of the five large state-owned commercial banks (SOBs) and that of all Chinese bank institutions. The market is largely dominated by the 5 large commercial banks, even though the market share of the 5 has been decreasing through the years. It could be explained by the increasing competition from other commercial banks and foreign banks. Since the SOB banks take almost half of the total commercial banking assets, the financial performance of the big five affects the whole financial market dramatically in China.
Table 3.2 Total asset of the 5 large commercial banks from 2007-2013 (RMB, Billion)

<table>
<thead>
<tr>
<th>Year</th>
<th>Financial institutions</th>
<th>State-owned commercial banks</th>
<th>In percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>525,982.50</td>
<td>280,070.90</td>
<td>53%</td>
</tr>
<tr>
<td>2008</td>
<td>623,912.90</td>
<td>318,358.00</td>
<td>51%</td>
</tr>
<tr>
<td>2009</td>
<td>787,690.50</td>
<td>400,890.20</td>
<td>51%</td>
</tr>
<tr>
<td>2010</td>
<td>942,584.60</td>
<td>458,814.60</td>
<td>49%</td>
</tr>
<tr>
<td>2011</td>
<td>1,132,873.00</td>
<td>536,336.00</td>
<td>47%</td>
</tr>
<tr>
<td>2012</td>
<td>1,336,224.00</td>
<td>600,401.00</td>
<td>45%</td>
</tr>
<tr>
<td>2013</td>
<td>1,513,547.00</td>
<td>656,005.00</td>
<td>43%</td>
</tr>
</tbody>
</table>

Source: The China Banking Regulatory Commission

The competition environment has changed dramatically since 1949 when the People’s Republic of China was set up, but still it is not yet free competition. The total number of banks in Chinese market cannot be called small according to the recent figure, but the market seems to be largely dominated by the large five commercial banks. Panzar and Rosse test is adopted in this research to study the competition level of Chinese banks during the period of 2007 and 2013.

### 3.4.2 Theoretical Framework of The Panzar-Rosse Approach

John C. Panzar and James N. Rosse (P-R) developed an empirical test to estimate the degree of competition, in terms of discriminating between oligopolistic, monopolistically-competitive and perfectly competitive markets Jeon et al. (2011). In other words, the P-R test examines input prices and equilibrium gross assuming a competitive scenario to find out the
relation between them. First Rosse and Panzar (1977) and later Panzar and Rosse (1982, 1987), assume the possibility of financial firms maintaining their capital when either entering or leaving any market. Moreover, they explained that operations of potential competitors are the same the ones of already running firms in terms of cost functions. The main assumption is that the market is a long-run equilibrium.

Hence, TRILL (Total Revenue Less Provision of Loan Losses), is considered to be a dependant variable which can be described by two independent variables: interest rate and other expenses. The Panzar-Rosse test evaluates the input prices and equilibrium gross under a competitive scenario to determine the existing relationship between them. They explained how it is possible to achieve a competitive scenario by combining lower prices and the elasticity of the reduced form revenue.

The methodology put forward by Panzar and Rosse (1987) stems from a general equilibrium market model. It gives a lot of importance to the assumption of firms changing their pricing strategy according to the competitiveness of the market to any variation in factor input prices. In other words, one is capable of determining the level of competition by how the firm’s equilibrium revenues vary with change in input prices.

The test to determine the nature of competitive conditions relies on the properties of a reduced form log-linear revenue equation as follows:

\[
\ln R_{it} = \alpha_0 + \sum_{j=1}^{J} \alpha_j \ln W_{jit} + \sum_{k=1}^{K} \beta_k \ln X_{kit} + \sum_{n=1}^{N} \gamma_n \ln Z_{nt} + \varepsilon_{it}
\]  

(1)
Where \( R \) represents the revenue of bank \( i \) at time \( t \); \( w_j \) are the input prices; variables appearing in \( X \) are different in each bank affecting the bank’s revenue and cost functions; the \( n \) terms in \( Z \) are macro variables affecting the entire banking market; and \( \varepsilon \) is a stochastic disturbance term. The Rosse–Panzar H-statistic can be obtained from the equation (1). \( H \) is obtained by the summation of elasticity of total revenue with respect to each of the bank’s \( J \) input prices.

In Eq. (1), \( H = \sum_{j=1}^{J} \alpha_j \)

Rosse and Panzar (1977), Panzar and Rosse (1982, 1987) show that a monopolistic market can be indentify by calculating the H-statistic. In the scenario of the obtained \( H \) being lower than zero, one can say that the market is monopolistic. In this case it is included oligopoly with collusion as well as a conjectural variation short-run oligopoly. In all these cases the effect of raising prices is that marginal costs also increases and lowers equilibrium output and total revenue. The perfect scenario is represented with an H-statistic of one (\( H = 1 \)). In this case, the effect of increasing input prices is the raising of marginal as well as average costs but with no variation on any firm’s results. In this case it is included a natural monopoly which is operational on an ideal market and a firm which optimises sales to achieve a break-even. Finally, the monopolistic competition is represented when the value of \( H \) oscillates between 0 and 1 (\( 0 < H < 1 \)).

The way Panzar and Rose (1987) proposed to analyse the monopolistic competition was in line with the assumption about the manner the firm’s revenue adapts by market forces after an input change. Rosse-Panzar takes into account the fact that there is price variation in banks when there is any change in costs. This highly depends on how competitive the financial scenario is.
A major assumption of the H-statistic is that the tests are applicable when there is a long-run equilibrium on data. The test to determine if there is equilibrium relies on a regression where there is a change in dependent variable and it is shown in Eq. (2). The difference between Eq. (2) and Eq. (1) is the pre-tax profit to total assets term which appears in substitution of the total revenue.

\[
\ln \pi_{it} = \alpha'_0 + \sum_{j=1}^{J} \alpha'_j \ln W_{jit} + \sum_{k=1}^{K} \beta'_k \ln X_{kit} + \sum_{n=1}^{N} \gamma'_n \ln Z_{nt} + \mu_{it} \tag{2}
\]

\[E = \sum_{j=1}^{J} \alpha'_j\]

When E statistic is 0, it indicates long-run equilibrium. If the value of E statistic is less than 0, it reflects disequilibrium. In the P-R framework, it is said to analyse the banks from a long-run equilibrium perspective. The value corresponding to E is obtained from the summation of input price elasticity and also it is tested the hypothesis of its value being 0. If this hypothesis is rejected then the market is not in equilibrium.

The theory and interpretation of the Rosse-Panzar H-statistic

Chart 3.4 Equilibrium test
3.4.3 Prior applications of the model

The Panzar and Rosse model has been adopted with the purpose of estimating the competition in the conditions of the banking system in many studies as shown in Table 3.3. The Panzar-Rosse method was used by Nathan and Neave (1989) to analyse the Canadian Banks, trust companies as well as mortgage companies. The authors indicated that in all the studied cases, there was a rejection of the hypothesis of a monopoly. Moreover, it was concluded that for some of these firms the result was of perfect competition.

Niimi (1998) did a similar test but on Japanese firms for the period from March 1989 to March 1991 which coincides with the peak of the bubble. The study also examined the period from March 1994 to March 1991 which is near the end of the bubble. The result of the study was the Japanese Banking system was competitiveness varied in both period of times. From 1989 to 1991 the banking system was monopolistic. However, from 1994 to 1991 it was found to be monopolistic competition.
Banking industries in Europe have been examined using the Panzar and Posse model, such as Molyneux, Thornton, and Lloyd-Williams (1994), who carried out a study on the banking industry of some of biggest economies in the EU such as: Germany, UK, France, Italy, and Spain. They found that the banking industry in Italy was a monopoly while in the other countries it was monopolistic competition. A more extensive study was carried out by Bikker and Haaf (2002) who analysed the banking industry competitiveness of 23 countries where 17 of these countries were part of the EU and the remaining 6 were from outside the EU. The result was the same for all the studied banking systems. All of them were nearly in monopolistic competition. In this study the authors also discussed that smaller sized banks tend to be less competitive than bigger sized banks. This is because the domestic market much less competitive than international market where all firms need to competitive.

Matthews, Murinde and Zhao (2007) reported a study about what is the condition of competition in the British banking and took into account the biggest banks in the UK between 1980 and 2004, when major structural changes had been made. The results confirmed the consensus finding that competition in British banks was monopolistic competition.

The studies that apply this method for studying banking industry not only focus on already developed markets but also on developing markets. For example, Claessens and Laeven (2003) used this method to study the banking industry of a total of 50 countries. They found that majority of the studied countries were in monopolistic competition. A total of 8 countries between European and South American countries were studied in Gelos and Roldos (2002). Out of these 8 countries only two was found in nearly perfect competition (i.e. Argentina and Hungary). Furthermore, they concluded that high value of degree concentration did not affect to the degree of competition.
Aktan and Masood (2010) assessed the competitive condition in the Turkish banking system during the period of 1998-2008. The result showed that the banking industry in Turkey was in a long-run equilibrium state. Turkish banks were capable to achieving high profitability even though they operate in a monopolistic competition scenario.

The competitive condition in the Chinese banking industry was not investigated until recent years. Jeon et al. (2011) assessed major Chinese banks during 1980-2004 and found out that before foreign banks arrived to the Chinese market, there was a nearly perfect competition. Masood and Sergi (2011) studied 16 Chinese banks from 2004 to 2007 and concluded that they were all in monopolistic competition. Masood and Sergi (2011) found that the Chinese banking industry was in monopolistic competition during 2000-2007. The way to guarantee a competition scenario for the banking industry in China is by approving new policies to promote the development.

To sum, there is a clear trend in the majority of the countries’ banking industry which is that they are in monopolistic competition.

Table 3.3 List of studies using Panzar and Rosse model

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Period</th>
<th>Studied countries</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nathan and Neave</td>
<td>1982-1984</td>
<td>Canada</td>
<td>1982 was perfect competition</td>
</tr>
<tr>
<td>(1989)</td>
<td></td>
<td></td>
<td>1983 and 1984 were monopolistic competition</td>
</tr>
<tr>
<td>Shaffer and Disalvo</td>
<td>1970-1986</td>
<td>Pennsylvania (USA)</td>
<td>Duopoly but high degree of competitiveness</td>
</tr>
<tr>
<td>(1994)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molyneux et.al.</td>
<td>1986-</td>
<td>Germany, the UK,</td>
<td>Germany, the UK, France and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year Range</td>
<td>Countries</td>
<td>Overview</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>(1994)</td>
<td>1989</td>
<td>France, Italy and Spain were near monopolistic competition. Italy was monopoly.</td>
<td></td>
</tr>
<tr>
<td>Bikker &amp; Groeneveld (2000)</td>
<td>1989-1996</td>
<td>15 countries in Europe The result was near monopolistic competition for vast majority of the studied countries, but competition in Ireland and Denmark were lower than other countries.</td>
<td></td>
</tr>
<tr>
<td>De Bandt and Davis (2000)</td>
<td>1992-1996</td>
<td>4 countries The competition in small banks were low, especially in France and Germany.</td>
<td></td>
</tr>
<tr>
<td>Gelos &amp; Roldos (2002)</td>
<td>1994-2000</td>
<td>European and Latin American countries Banking industry sectors with nearly perfect competition were found to be in Argentina and Hungary. The remaining of the countries were found to be in monopolistic competition.</td>
<td></td>
</tr>
<tr>
<td>Murjan and Ruza (2002)</td>
<td>1993-1997</td>
<td>Arab Middle East Monopolistic competition. Oil-producing countries were less competitive than non-oil-producing countries</td>
<td></td>
</tr>
<tr>
<td>Bikker and Haaf (2002)</td>
<td>1988-1998</td>
<td>23 countries Vast majority of countries were in monopolistic competition but some of them perfect competition could not be discarded. Banks with larger</td>
<td></td>
</tr>
<tr>
<td>Researcher/Year</td>
<td>Period</td>
<td>Region</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------</td>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>Claessens and Laeven (2004)</td>
<td>1994-2001</td>
<td>50 countries</td>
<td>The competition of Brazil, Greece, Mexico was high but the degree of USA, Japan, Norway, Turkey was low</td>
</tr>
<tr>
<td>Yuan (2006)</td>
<td>1996-2000</td>
<td>China</td>
<td>The scenario in China before foreign banks entered in the financial market was already of near perfect competition.</td>
</tr>
<tr>
<td>Matthews, Murinde and Zhao (2007)</td>
<td>1980-2004</td>
<td>British banks</td>
<td>British banks was found to be monopolistic competition.</td>
</tr>
<tr>
<td>Masood &amp; Aktan (2010)</td>
<td>1998-2008</td>
<td>Turkey</td>
<td>Monopolistic competition in an equilibrium market</td>
</tr>
<tr>
<td>Fu and Liang (2011)</td>
<td>2000-2007</td>
<td>China</td>
<td>Monopolistic competition</td>
</tr>
<tr>
<td>Masood and Sergi (2011)</td>
<td>2004-2007</td>
<td>China</td>
<td>Monopolistic competition</td>
</tr>
</tbody>
</table>

### 3.5 Credit risk assessment in China

According to the Chinese bankers’ survey (2011), it is forecast that China will become an increasingly important global banking market. Another recent PwC UK report entitled Banking in 2010 predicted that China could overtake the US as the world’s largest banking market as early as 2023 based on projected growth of banking assets. Despite the constant economic growth, Chinese banks have a relatively smaller percentage of non-performing loans compared to other main economic bodies in the world.
According to the statistics from the word bank\textsuperscript{xxx}, from 2009 to 2011, the non-performing loans in Chinese banks were lower than major economic bodies such as Japan, Germany, the UK and the US. (Refer to chart 3.5)

Chart 3.6 NPL to total gross loans in percentage

![Chart 3.6: NPL to total gross loans in percentage](image)

Source: DataWord bank\textsuperscript{xxx},

However, in Chinese banks it was a very frequent to have a high number of non-performing loans. According to the China Banking Regulatory Commission (CBRC), major commercial banks (BOC, ABC, ICBC, CBC, and CBC) by the end of 2009 had in their balance sheet NPLs for the value of RMB 362.73 billion which is a high percentage (i.e. 73\%) of the total number of NPLs in the Chinese banking industry.

3.5.1 Main causes of China’s NPL problem

In 1997 the Asian financial crisis affected the financial industry in Eastern Asian countries and caused large NPL portfolios. However, in China the scenario was different due to the closed capital market that prevented the financial market from being affected by the crises
Even though China avoided the disaster, there was still a large number of NPL burden in China. According to the statistics provided by China Banking Regulatory Commission, the market share of state-owned banks was up to 88% in term of asset and the total number of employees in SOBs was 1,394,800. The non-performing loan ratio was as high as 52.7%. The large amount of non-performing loans in SOBs could be explained in two aspects: (a) sustained losses at state owned enterprises (SOEs) and (b) the lack of a commercial credit culture at major financial institutions.

(a) Sustained losses at state owned enterprises (SOEs)

State-owned enterprises (SOEs) took nearly half of China’s manufacturing, but they had the problem of not being technologically as much prepared as competitors from foreign markets. The SOEs faced extremely difficult challenges from international competitors as the Chinese financial market gradually opened to foreign capital in most industries. SOEs obtained almost their entire funding from large state-owned commercial banks (SOCBs). Since the direction from central government had a big influence over issuing such loans, they are regarded as policy loans.

According to studies in credit risk management, policy loans contributed a large percentage to non-performing loans. From 1980 to the mid-1990s, Chinese banks continued issuing loans to the state-owned enterprises but repayment was very little. They also financed local political projects but not taking into account economical factors or profitability of the projects themselves (Pei, 1998). There is a remarkable contrast between state-owned enterprises and non-state-owned companies. The latter ones are more efficient and grow faster than the former ones, but they have more difficulties in getting funds from banks, particularly those small and medium sized companies.
SOCBs normally give out loans to the same debtor without taking into account profitability or economical factors of the projects because of the extended idea that the government will pay back any loss. SOEs in the construction, real estate, food, and textiles industries were among the most highly leveraged. The constant losses in the SOEs and the unremitting credit support which were offered by SOCBs ended up with a large amount of bad loans in the Chinese banking system.

Poor asset quality could reduce profitability as it limits the funds and the capacity of banks to issue loans. Brock and Suarez (2000) pointed out that evaluating asset quality is a popular topic for credit risk management in emerging countries, for example in China. A general issue among Chinese banks is the poor quality of their assets. The percentage of NPLs to total loans for the banking sector was around 13% in 2004, whereas in Eastern Europe banks the NPL rate was 2.7%. Nonetheless, the restructuring in the Chinese banking system have successfully lower the rate of NPL to less than 10% since 1998 when it was 52%.

(b) The lack of a commercial credit culture at major financial institutions.

The other aspect which has influenced NPL in China is a culture installed in the biggest financial institutions where credits are not focused on commercial purposes, especially in the state-owned banks (Masood and Sergi, 2011). The reason behind this way of banking comes from the period before the restructuring of the sector when the Chinese government routinely advocated issuing loans to state-owned enterprises in order to finance infrastructure projects and social welfare subsidies (Masood, Sergi, 2011). In such cases, profitability was not taken into consideration.
In 1994, three development banks were established. The idea was that the development banks would deal with the policy loans to encourage the SOCBs to have a healthy capital. The Commercial Banking Law was approved in 1995 in order to regulate the lending orientation of commercial banks (Peng, 2007). However, the intention to establish a market-oriented banking system almost failed due to a legacy loan classification.

Until 2002, they way to classify the loan performance was based on the past due period instead of on assessing loan quality. Under the legacy four-category classification system, loans would be considered non-performing only if they were more than one year overdue (Masood and Sergi, 2011). Besides, the part of loan which is overdue is the only amount to be considered as NPL. Therefore, even in the case of a company admitting no fund to pay back the debt or simply has closed down, it would not be considered as a NPL until it is overdue for one year more. Furthermore, in some cases, banks would give out new loans for not solvent SOEs to pay back existing payment obligations.

Furthermore, the interest rate for loans was one of the duties of the central bank (People’s Bank of China) instead of being tailor-made by individual commercial banks, which would tend to set a high interest rate in order to compensate for the potential loss in risky application (Aktan and Masood, 2010). In other words, commercial banks were not supposed to set interest rates which would surpass the set interest rate cap. Nor can they charge a lower interest rate to low risk applicants. As a result, risk and return was not effectively linked.

While the government focused on solving the existing non-performing loans, newly generated bad loans contributed to this problem (CBRC, 2011). Loans in several industries, such as iron and steel, aluminium, cement, and real estate development industries, had helped to increase the total number of NPLs. On October 28, 2004, the PBOC raised the interest rate
for the first time during the last 9 years. After a serious reforming of the banking system, non-performing loans were reduced.

China used to have a large number of non-performing loans as a result of political regulations, which encouraged commercial banks to issue loans to state-owned enterprises, as well as a culture installed in the biggest financial institutions where credits are not focused on commercial purposes. Following a number of central bank reform, NPL in 2006 was reduced by 7.09%\(^ {xxxi}\). Since then, as table 3.4, shows NPL has declined considerably.

Table 3.4 NPLs of Financial Institutions\(^ {xxxi}\) in China (2006 – 2013) (RMB billion)

<table>
<thead>
<tr>
<th>Year</th>
<th>NPL</th>
<th>Substandard</th>
<th>Doubtful</th>
<th>Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>12549.2</td>
<td>2674.6</td>
<td>5189.3</td>
<td>4685.3</td>
</tr>
<tr>
<td></td>
<td>7.09%</td>
<td>1.51%</td>
<td>2.93%</td>
<td>2.65%</td>
</tr>
<tr>
<td>2007</td>
<td>12684.2</td>
<td>2183.3</td>
<td>4623.8</td>
<td>5877.1</td>
</tr>
<tr>
<td></td>
<td>6.17%</td>
<td>1.06%</td>
<td>2.25%</td>
<td>2.86%</td>
</tr>
<tr>
<td>2008</td>
<td>5602.5</td>
<td>2625.9</td>
<td>2406.9</td>
<td>569.8</td>
</tr>
<tr>
<td></td>
<td>2.42%</td>
<td>1.13%</td>
<td>1.04%</td>
<td>0.25%</td>
</tr>
<tr>
<td>2009</td>
<td>4973</td>
<td>2031.3</td>
<td>2314.1</td>
<td>627.9</td>
</tr>
<tr>
<td></td>
<td>1.58%</td>
<td>0.65%</td>
<td>0.74%</td>
<td>0.20%</td>
</tr>
<tr>
<td>2010</td>
<td>4293</td>
<td>1591.6</td>
<td>2042.7</td>
<td>658.7</td>
</tr>
<tr>
<td></td>
<td>1.14%</td>
<td>0.42%</td>
<td>0.54%</td>
<td>0.18%</td>
</tr>
<tr>
<td>2011</td>
<td>4279</td>
<td>1725</td>
<td>1883</td>
<td>670</td>
</tr>
<tr>
<td></td>
<td>1.00%</td>
<td>0.40%</td>
<td>0.40%</td>
<td>0.20%</td>
</tr>
<tr>
<td>2012</td>
<td>4929</td>
<td>2176</td>
<td>2122</td>
<td>630</td>
</tr>
<tr>
<td></td>
<td>0.95%</td>
<td>0.42%</td>
<td>0.41%</td>
<td>0.12%</td>
</tr>
<tr>
<td>2013</td>
<td>5921</td>
<td>2538</td>
<td>2574</td>
<td>809</td>
</tr>
<tr>
<td></td>
<td>1.00%</td>
<td>0.43%</td>
<td>0.43%</td>
<td>0.14%</td>
</tr>
</tbody>
</table>

Source: China Bank Regulatory Commission- Financial Institutions\(^ {xxxi}\)
3.5.2 Management soundness

The Chinese banking system followed a mono-bank model. The People’s Bank of China (PBC) used to play the roles of central and commercial banking at the same time (Guo, 2011). PBC could assist the central government in financing various national production plans. Since such loans are approved by government, as a commercial bank, PBC did not need to monitor the repayment. This centralised control in credit risk management meant that Chinese banks could not manage NPL properly which resulted in a large amount of non-performing loans (Guo, 2011).

During the economic transformation, Chinese banks have restructured the balance sheets, developed modern risk management methods, improved capitalisation, diversified earnings, reduced costs and improved corporate governance and disclosure. Thereby, the total number of non performing loans in commercial banks has been reducing constantly (Guo, 2015). In 2013, the large commercial banks had the rate of non-performing loans reduced to 1.0% from 9.22% in 2006. Meanwhile the Joint - stock commercial banks, city commercial banks and rural commercial banks also had their NPLs falling. (Refer to table 3.5)

Table 3-5 The amount of non-performing loans in China between 2006 and 2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Financial institutions</th>
<th>Large commercial</th>
<th>Joint-stock</th>
<th>City commercial</th>
<th>Rural Commercial</th>
<th>Foreign Banks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>11703</td>
<td>10534.9</td>
<td>1168.1</td>
<td>654.7</td>
<td>153.6</td>
<td>37.9</td>
</tr>
<tr>
<td></td>
<td>7.51%</td>
<td>9.22%</td>
<td>2.81%</td>
<td>4.78%</td>
<td>5.90%</td>
<td>0.78%</td>
</tr>
<tr>
<td>2007</td>
<td>12009.9</td>
<td>11149.5</td>
<td>860.4</td>
<td>511.5</td>
<td>130.6</td>
<td>32.2</td>
</tr>
<tr>
<td></td>
<td>6.72%</td>
<td>8.05%</td>
<td>2.15%</td>
<td>3.04%</td>
<td>3.97%</td>
<td>0.46%</td>
</tr>
<tr>
<td>Year</td>
<td>Loans ($M)</td>
<td>Deposits ($M)</td>
<td>NPL ($M)</td>
<td>NPL Ratio %</td>
<td>Capital ($M)</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
<td>---------------</td>
<td>----------</td>
<td>-------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>4865.3</td>
<td>4208.2</td>
<td>657.1</td>
<td>2.33%</td>
<td>191.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.45%</td>
<td>2.81%</td>
<td>1.35%</td>
<td>3.94%</td>
<td>0.83%</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>4264.5</td>
<td>3627.3</td>
<td>637.2</td>
<td>1.30%</td>
<td>270.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.59%</td>
<td>1.80%</td>
<td>0.95%</td>
<td>2.76%</td>
<td>0.85%</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>3646.1</td>
<td>3081</td>
<td>565.1</td>
<td>0.91%</td>
<td>272.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.15%</td>
<td>1.31%</td>
<td>0.70%</td>
<td>1.95%</td>
<td>0.53%</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>4279</td>
<td>2996</td>
<td>563</td>
<td>1.60%</td>
<td>341</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.00%</td>
<td>1.10%</td>
<td>0.60%</td>
<td>0.80%</td>
<td>0.40%</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>4929</td>
<td>3095</td>
<td>797</td>
<td>1.76%</td>
<td>564</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.95%</td>
<td>0.99%</td>
<td>0.72%</td>
<td>0.81%</td>
<td>0.52%</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>5921</td>
<td>3500</td>
<td>1091</td>
<td>1.67%</td>
<td>726</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.00%</td>
<td>1.00%</td>
<td>0.86%</td>
<td>0.88%</td>
<td>0.51%</td>
<td></td>
</tr>
</tbody>
</table>

Source: China Bank Regulatory Commission- Financial Institutions

3.6 Resolution methods

Large number of Non-performing loans in Chinese banks was mainly contributed by two functions: (a) sustained losses in state-owned enterprises (SOEs) and (b) the lack of a commercial credit culture in major financial institutions. Normally the loan applications from the SOEs are approved even if they have poor and risky projects. In some cases, SOCBs will extend loans to the same debtor without questioning the capacity of repayments. (Guo, 2006)

State-owned banks operated as specialized banks in China before The Commercial Banking Law was released in 1995. Policy incentives were used to influence SOBs in issuing loans to support the development of national industry. Only a few commercial banks were able to analyse bad debts with their own specialised department because bad debts generated by
those state-owned enterprises would be covered by the government. Under the directive from government, SOBs would extend loans to those bad debtors so that the latter could pay back their old debts with newly received loans (Heffenan, 2003). This unhealthy circulation resulted in a constant accumulation of NPL.

Duffee and Zhou (1999) examined models of default swaps. The authors analysed if it would be possible for a bank to use swaps to transfer (for a limited period of time) some of the credit risks of the bank to some other banks. Hence, they recommended the establishment of asset management companies (AMCs) to deal with the non-performing loans.

3.6.1 Establishment of Asset Management Companies (AMCs)

In consideration that a good and healthy financial system was in risk due to a high rate of NPLs, the Chinese government created asset management companies for NPLs disposal. China Cinda is the first asset management company in China. It was initially established on 20 April 1999 and reformed to be a joint-stock company on 29 June 2010. The main business of Cinda is NPL disposal, particularly focusing on the NPLs from the Construction Bank of China (Pierce and Yee, 2001).

In October of 1999, there were three more AMCs created (i.e. Orient, Great Wall and Huarong) to help with the NPLs of the other state-owned banks, were established to take charge of the NPLs of the other state-owned banks (Pierce and Yee, 2001). China Cent, Orient, Great Wall and Huarong have initially registered capital of RMB 10 billion each, funded by the Ministry of Finance of China (MOF). The intention was to reduce the percentage of NPLs, which is shown in the balance sheet of the original bank. NPLs are
supposed to be collected and packaged by AMCs, who then sell those bad loans at a discounted value in a secondary market (Pierce and Yee, 2001).

Basically, there are two types of companies for asset management according to their business range. One AMC is established for the NPLs problem in the entire banking system. The other type of AMC is set up by an individual bank to deal with its own NPLs. Chinese AMCs are generally the second type. AMCs could take necessary precautions to deal with NPL disposals and dissolve financial risks (Pierce and Yee, 2001). SOBs could therefore develop better without a large percentage of NPLs.

3.6.1.1 Organizational structure

The AMCs established in 1999 were state-owned non-bank financial institutions, which operated under relevant legislation, including the *AMC Regulations; the Rules on Accounting Practices of Financial Asset Management Companies*, and the *Rules on Disposition of Assets by Financial Asset Management Companies* announced by the MOF in 2000 (Pierce and Yee, 2001). The organizational structure of AMCs is as shown in figure 3.
State-owned banks need to evaluate their assets, which are supposed to be taken by an AMC, then submit the result of the assessment to MOF for approval. Purchased asset is comprised mainly of NPLs made to state-owned enterprises before 1996.

Up to 1999, four AMCs had been established as a mechanism to manage and dispose of NPLs. In the same year, the Chinese government asked the four AMCs to purchase their first NPL for a value of RMB 1.4 trillion. The real market value of these NPLs was much higher than this price.

Improving the quality of NPLs is a difficult target, but the government has found an alternative way to speed up the recovery of NPLs. In the past few years, a large sum of NPLs has been transferred pricing to AMCs.
3.6.1.2 Legislative Reform

An amended proposal of the *Enterprise Bankruptcy Law* was approved by the Standing Committee of the National People’s Congress in 2005. The new law is a clear movement of the Chinese authorities to internationalise the Chinese banking standards. Actually, there are many similarities in the provisions that are written in the Bankruptcy of the US (Jones and Culler 2005).

The bankruptcy law has stimulated the development of Chinese banking system, although it has a few limitations. Firstly, there is a great implementation issue due to the fact that local politics have tremendously affected the bankruptcy process for a long period of time. Secondly, there are many companies that are not affected by the new *Enterprise Bankruptcy Law* (Peng, 2007). There were nearly two thousand state-owned-enterprises excluded in selected sectors. Therefore, PwC forecast that the policy-oriented bankruptcy may continue in China in the first five years of the implementation of this new law (Peng, 2007).

Since the early 1990s when the Chinese government started shutting down inefficient state-owned enterprises, banks were forced to clear up their NPLs correspondingly. With the establishment of AMCs (Asset Management Companies), NPLs were transferred into four new AMCs: China Cinda, Orient, Great Wall and Huarong. From 1999 to 2004 loans worth over two trillion RMB were transferred. As a result, the rate of NPLs to total gross loans in China has dropped dramatically as it is shows in chart 3.7.
Through years, the four AMCs have developed greatly. Cinda announced a year on year increase of 105 per cent in net profit attributable to the owner of its parent to 3.54 billion RMB. In 2013 Cinda joined HK stock market and became the first Chinese asset management company which is listed in the international stock market. In the same year, Cinda purchased and took over an aggregate amount of 88.8 trillion RMB of non-performing assets from the corresponding commercial banks.

China Orient Asset Management Corporation posted consolidated profits of 1.2 million RMB in 2013. The initially registered capital was 10 billion RMB when it was established in 1999, but now the total assets of China Orient worth 230 billion RMB. Meanwhile, China Great Wall Asset Management Corporation reported consolidated profit of 2.56 billion RMB, an increase of 119 percent compared to 2012. Since established, Great Wall AMC has purchased almost 800 billion RMB non-performing loans in total, from Agricultural bank of China, Industrial and Commercial Bank of China, Bank of China and other financial institutions.
Same as the other three asset management companies, Huarong AMC was also established in 1999, but in 2012 it joined stock market and changed its name to Huarong Asset management Co., Ltd. Huarong is the largest asset management company. The gross profit of Huarong in 2013 was 19.985 billion RMB which was early 50 times more than the figure in 2008.

Chart 3.8 Total gross profit of Huarong Asset Management Co., Ltd.

Source: China Huarong

China's four major asset management companies experienced strong growth and have expanded their services into other areas. They have merged some small banks and expanded into fund management, broking, commodities trading and insurance. Without no doubt that the AMCs could assist banks to manage the financial market and pass banking crisis smoothly.
3.6.2 Credit-information databases: a Unified National System

The central government recognized the importance of developing a centralized credit-reporting system. In 2002, at the Chinese Communist Party’s Sixteenth National Congress, this issue was discussed and relevant policies were formulated to establish a credit-reporting system. The People’s Bank of China (PBOC) took the initiative in forming a task force for developing a credit-information system with data on individuals and firms (Liu and Yan, 2009).

Unlike the private credit-reporting agencies, which were subject to local regulations and faced some restriction of market access, the PBOC initiative involved the establishment of a unified national system. Financial institutions have to inform frequently the PBOC and to provide credit data about their commercial and consumer borrowers. All this credit information is entered into a central database that consists of two subsystems, which are the enterprise credit-reporting system and the consumer credit-reporting system, respectively. (Refer to Table 3.6.) All commercial banks have access to information on the PBOC database when processing loans applications.

By the end of 2006, the national database had pooled 11.16 million credit records of enterprises and 533 million records for individuals. As a result, each lending institution has better access to information when making lending decisions. The database provides important credit information about potential clients, including tax payments, bill payments, court judgements, and police records. Hence, default loans could be reduced. As creditors get better information about clients, they can be more effective and increase the credit ceiling with confidence. (Liu and Yan, 2009)
Table 3.6 Information collected by the People’s Bank of China’s National credit information database

<table>
<thead>
<tr>
<th>Identifying information</th>
<th>Commercial borrowers (enterprises)</th>
<th>Consumer borrowers (individuals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of the enterprise</td>
<td>Person’s name</td>
<td></td>
</tr>
<tr>
<td>Business registration number</td>
<td>Current and previous addresses</td>
<td></td>
</tr>
<tr>
<td>Business address</td>
<td>ID number</td>
<td></td>
</tr>
<tr>
<td>Bank accounts</td>
<td>Date of birth</td>
<td></td>
</tr>
<tr>
<td>Name of the legal representative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit information</td>
<td>Contents of the current and previous credit business, such as loans, bank acceptance drafts, letters of credit, etc. the complete record includes such items as the loan contract number, amount of the loan, type of currency, duration of the loan. Negative information of overdue loans, bad debt and defaults.</td>
<td>List of credit information that includes accounts at banks and other lending institutions. Outstanding balances on credit cards, mortgages, car debts, and other consumer loans and their repayment details. Any negative information of late repayment and defaults.</td>
</tr>
<tr>
<td>Other information</td>
<td>Financial statements of enterprises if accessible</td>
<td>Current and previous employers if accessible</td>
</tr>
</tbody>
</table>

3.7 Conclusion

The economic growth in China has been tremendous in the last ten years with GDP growth rate at more than 8%. As a developing country, the banking industry in China is not mature enough. For example the inefficiency problem is seen in a high number of non-performing loans in state-owned commercial banks, which controls the market with more than half of the market in terms of assets.
Financial institutions in a similar form to banks were initially established in the late Qing dynasty (1644-1911). During that period of time, there were three kinds of financial institutions: Piaohao, qiangzhaung and foreign banks. Piaohao had correspondingly small capital size and mainly did business within a province while qianzhuang covered the whole country. Foreign banks were the third main power in the Chinese banking industry and brought in the concept of modern banking. In 1897, the first modern Chinese bank, Zhongguo Tong Shang Yinhang was established. By 1911, there had been 20 banks established in China. With the set up of the People’s Republic of China in 1949, a national bank, People’s Bank of China was established, followed by other 4 specialised commercial banks. Up to date, there have been 973 financial institutions registered with the Central Bank. Overall, the state-owned banks have the largest market share, but also the largest portion of the non-performing loans.

In the first thirty years of the establishment of China, the economy was under centralised control. Public ownership was widespread. Almost all the enterprises were state-owned, as well as financial institutions. Since political consideration had an over-weight influence on the banking industry, the management of commercial banks was not efficient enough. Together with the culture installed in the biggest financial institutions where credits are not focused on commercial purposes, this has caused a large percentage of non-performing loans and the majority of them were initially issued to state-owned enterprises. To improve economic efficiency and resource allocation, economic transforms have been advocated by central government since 1978.

Great efforts have been made in the past thirty years to gradually open the financial market to international investors and adopt their sophisticated pattern of credit risk management and non-performing loans disposal methods. To date, four asset management companies (AMCs) have been established. The Chinese government is also providing money to AMCs for maximizing returns which would help to improve the recovery rate to enhance the commercial activities of these firms. Apart from the contribution of AMCs to NPL disposal
process, legislative reform also played an important role. For example, in 2005 the National People’s Congress approved the Enterprise Bankruptcy Law, which regulated the Chinese financial market.

According to the statistics from the World Bank, from 2009 to 2011, the non-performing loans in Chinese banks were lower than major economic bodies such as Japan, Germany, the UK and the US. In 2013 the percentage of NPL of financial institutions in China was as low as 1%. It is clear that the reform in the Chinese financial market has achieved a massive success. Since the non-performing loans have been reduced and controlled, the next step should be improving the bank efficiency in terms of profitability, so that Chinese banks can become more competitive facing the challenges from foreign banks. In the following chapter, questionnaires methodology has been discussed in order to examine the relationship between profitability and daily banking activities.
Chapter IV

Research methodology

4.1 Introduction

Chapter three, dedicated to the literature review of the Chinese banking, demonstrated that there is a gap in the empirical research on how credit risk managers are influenced in the process of loan decision-making. The author designed a questionnaire, which covers human behaviour, culture, capability and competence, organisational factors and strategy within a bank (i.e. the status of social reality within a bank, to quote Schwandt, 1994). Equipped with appropriate models the research at hand aims at phasing the ‘human meanings’ in Chinese banks (Gephart, 2004).

4.2 The use of questionnaires and interviews as a mixed research method

Kerlinger (1986) indicated that the objectives of most research require factual, attitudinal and behavioural data. Survey research provides the researcher with the means of gathering both qualitative and quantitative data required to meet such objectives, (Fowler, 1993). Royal (2000) carried out a study by giving out surveys and questionnaires, to employees of various levels of the investment banking industry, to find out what enhances performance and what are the key indicators. Other researchers, such as Watson Wyatt Worldwide Research (2002), Cantrell et al (2006) and Turner and Crawford (1998), adopted surveys and interviews to support their findings. Beaulieu (1994) has also used questionnaire methodology with officers giving out loans asking them about commercial lending. In order to determine how efficient financial managers perform and the majority of the studies that have carried out questioner also include other statistical method on data, which are collected using surveys and questionnaires. However, none of the above mentioned studies have examined the banking credit risk using the questionnaire-based methodology.
In business research, questionnaires are widely used (Denscombe, 2010). Most people feel more confident using questionnaires than using other methods, because they are familiar with questionnaires, (Hussey and Hussey, 1997). A questionnaire can be a useful approach, enabling you to access useful information relatively cheaply from a large amount of relevant information (Cameron and Price, 2009). Besides, the researcher cannot be sure that questionnaires have been completed by the right target group (Nachmias and Nachmias, 1992).

The interviewer can encourage respondents to give clear answers and get much information with little misunderstanding (Denzin and Lincoln, 2005). There are, generally, four types of interviews: the structured interview, the semi-structured interview, the unstructured interview and the group interview. The most commonly used is a mixture of two or more types (May, 2003). Silverman believes that a golden standard among researches is the choice of open-ended interviews (Silverman, 2009).

In this research, personal interview questionnaires rather than mailed or computer-administered questionnaires have been adopted. The former one can be more expensive in term of interviewing time and costs of travelling, but a higher response rate can be expected, typically between 50 and 80 per cent (Remenyi et al., 2002). Besides, respondents would give honest answers to interviewing questionnaires, because questions could be explained wherever that is required. In this case, it is less likely to receive answers to those questions that respondents are not very sure about, or they thought they understood. What is more, the interviewer is able to record additional pieces of information concerning the behaviour of the interviewee, which may be of assistance in the subsequent analysis and interpretation of the interview evidence (Seale, 2004).
Regarding this research, the research adopted both interview and questionnaire as the research method. The questionnaire is designed to generate direct and “objective” answers from closed questions, which are used to collect data rather than get general ideas or opinions from interviewees (Bryman and Bell, 2007). Questionnaires were sent to 100 senior credit managers in Chinese large commercial banks, with credit limitation of authorization power ranged from 50,000 RMB to 100,000,000+ RMB. This is expected to generate a response rate of 65 per cent. The Questionnaire was divided into two parts (refer to appendix-1). The first part includes 5 standard demographic questions about the respondent. In the second part, in total there are 38 questions, which are likely to form the disclosure indices.

In general, all decisions relating to credit lending, such as the lending process originate from the middle and upper lever credit managers. Some of the credit managers are reluctant to give their names when answering questionnaires. To get more information about sensitive topics, respondents’ names would not be disclosed. Annual reports as secondary data are accessible, but detailed information about the process of issuing loans or the resolution of non-performing loans may not be available, because there is a policy to protect the confidentiality of the bank.

4.3 Research design

According to Nachmias and Nachmias, (1976) the research process is comprises six stages: 1) intensive literature review 2) theoretical background consideration, 3) model construct, 4) the data collection, 5) the investigation of the database, and the actual data analysis. Each stage in the sequence is briefly discussed below:
The purpose of a literature review is to build a theoretical framework and model, to identify any essential variables. Quantitative methods have been developed for the task of verifying or confirming theories, and theory verification is an important part of the overall growth of a body of knowledge (Deshpande and Zaltman, 1984). Following Anderson’s suggestion (1983), that research at hand is designed on the basis of the logical empiricist model of scientific method. The purpose of identification operational variables is to estimate how the research variables should be measured. After completing the data collection, the data are examined to determine coding or editing errors and then tested to determine if any characteristics of the data invalidate the use of the panel regression and multiple regression analysis. (Cohen, et al., 2003)

4.3.1 Questionnaire design

4.3.2 The pre-testing questionnaires

Before the questionnaire is finally administered, a pre-testing is needed to be undertaken. (Emory and Cooper, 1991) Such pre-testing could detect possible shortcomings in design. The pilot questionnaire helps to evaluate the questionnaire at the very beginning. Adjustment of questions, formatting and clarity in content could be made based on feedback. The pilot questionnaire helps in assessing the reliability and validity of the questions. Pre-testing provides the opportunity to assess how well the pre-coded questions have been selected, also it is important to determine the quality of the answers and how these answers can be analysed. Besides, a pilot questionnaire could assess the time taken to complete the questionnaire, which is important in my research, since my expected respondents, credit managers, are a group of busy people. Which questions are irrelevant, which are relevant, and whether questions on key issues have been overlooked can also be assessed by pre-testing (Kumar, 2010).
In the pre-testing process of my research, respondents were encouraged to comment on confusing questions. According to their comments, amendments have been made and the layout of the entire questionnaire has been reconsidered. My questionnaire has been pre-tested in two stages. One was having questionnaires evaluated by three credit managers. According to their feedback, questions that are not tightly linked with the testing model have been deleted, as well as over sensitive questions that were left unanswered. Practical questions to Chinese banks have been added to replace those sensitive questions. In the second stage, another three credit managers were requested to complete the questionnaire and provide their comments. This process was effective in reducing errors and identifying ambiguities either in the questions or instructions for completing the questionnaire. The experiment with pre-testing convinced the author that the appropriate sample size should be 100 in total, which apart from other considerations makes grouping of the questions easier. Since the size and branches of the five banks were not the same, the 100 questionnaires were allocated proportionately. The final version questionnaire (Appendix-1) has been revised based on feedback of the pre-testing and suggestions from supervisors.

4.3.3 Sample of choice

It is very important to define the population in order to select an appropriate sample. A sample is most generally defined as a subset from a larger population (Sudman, 1975). Hoelter (1983) found that as a tentative rule of thumb, a sample size greater than 200 is required in order to estimate a non-trivial fit for structural equation models. In this thesis, since the usable sample size was only 100, structural equations appears to be an inappropriate methodology to use. The primary aim of the questionnaire was to determine the relative importance of items included in the annual reports by a sample of different users. The sample selected covered a wide range of annual reports’ users, located mainly in the capital and economic centre—Beijing. It is assumed that any sample selected from this city will be representative of the Chinese population. The reasons for this assumption are 1) most
economic activities are conducted in this city, 2) most of the head offices of corporations, governmental agencies, banks, universities, and accounting firms are also located in Beijing.

The total sample is 100 while the total number of senior managers in risk management departments is 4766. According to the annual reports, by the end of 2011, the total asset of Communication Bank of China was 4.6 trillion RMB while that of the other four banks were between 12 and 15 trillion. Besides, while the domestic branches of Communication Bank of China numbered 2,637 the figure for the other four banks reached to more than 15,000 domestic branches each. The difference in total asset and number of domestic branches indicate that Communication Bank of China is much smaller bank compared to the other four. That’s why the number of interviewed credit risk managers was also smaller than the others.

Respondents are divided into different groups according to the banks they are working. As shown in the following table 4-1.

Table 4.1 Questionnaire respondents

<table>
<thead>
<tr>
<th>Groups</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank of China (BOC)</td>
<td>26</td>
</tr>
<tr>
<td>China Construction Bank (CCB)</td>
<td>21</td>
</tr>
<tr>
<td>Agricultural Bank of China (ABOC)</td>
<td>22</td>
</tr>
<tr>
<td>Industrial and Commercial Bank of China (ICBC)</td>
<td>18</td>
</tr>
<tr>
<td>Communication Bank of China (CBC)</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Information is disclosed by banks through a number of ways. The main disclosure vehicle is the annual report. In addition, there may be interim and quarterly reports and other printed material. The secondary data of this research is concerned exclusively with data obtained from annual reports. Annual reports of the four state-owned Chinese banks will be examined through the financial years between 2004 and 2011.

4.4 Data analysis methods

In this research, analysis is made through primary data and secondary data. The former is collected through questionnaires from 100 senior credit risk managers and the latter is from annual reports of the corresponding five large commercial banks in China. The questionnaire was composed of questions in two main categories. The first category is demographic questions and the second one is questions about credit risk management based issues.

Questionnaires include: the credit manager’s age, sex, marital status, basic and professional education, experience of a credit manager, number of training courses attended and credit limit etc. The purpose was to determine if the above factors influence the lending behaviour of the credit managers. Similar questionnaire methodology based on demographic representation and analysis, has been used in survey work by Royal (2000).

4.4.1 Primary data analysis

The data obtained for the research have been collected through using face-to-face questionnaires, which were answered by senior credit risk managers. The assumption was that all responses by credit managers were factual data and the respondents answered the
questions without any reservation. Such an assumption was necessary because the unwillingness of credit risk managers to give information to researchers was a problem. In this research, as the questionnaires have been carried out through face-to-face meetings, it is assumed that respondents are confident with this form. Hence response to the questionnaire was that the data were factual and reliable for the analysis and interpretation. Anonymous questionnaires are also available upon request.

The population size of this research is 100. Appropriate statistical analysis has been applied to the data to provide evidence to support the hypothesis, as it will be easily understood, explained and supported in the research findings. Excel and SPSS have been used for data analysis of numerical data for the purpose of graphic presentation.

I have used two methods to analyze the questionnaires. They are descriptive statistics, and correlation test to investigate a model, which explains the possibility of achieving a high rate of return. There are many factors that affect loan performances. My interest is to find out which factor or factors combined together would affect the rate of return on lending.

4.4.1.1 Descriptive charts

The graphical presentation and interpretation of all questions have been made according to 100 respondents from five large commercial banks in China. The questionnaire includes seven sections. They are questions about demographic, credit risk management, lending policy, the relative importance of the following aspects for evaluating bank-wide exposure, factors considered when lending to corporate borrowers, importance given to company factors while making lending decisions, expert system and ranking the satisfactory level of loan performance.
4.4.1.2 Correlation equation analysis

Correlation Equation Analysis, is designed to determine the connection between the performance of different variables and whether they have influenced the performance of the bank, in terms of rate of return.

The first part is demographic questions, including some basic personal details of the credit risk managers, such as age, academic qualifications, years of service in the bank, and so on. The second part comprises questions about credit risk management, which have been divided into seven groups. Questions with similar characters are discussed in one group. For example, there are 7 questions on credit risk managers’ attitude towards the importance of various factors affecting lending decisions, 13 questions on lending policy, 6 questions on the relative importance of the following aspects for evaluating bank-wise exposures, 5 questions on factors considered when lending to corporate borrowers, 5 questions on the importance given to company factors while making lending decisions, 2 questions about expert systems and one question about the ranking of satisfactoriness of loan performance.

Factors relating to the bad-loans in a bank are examined in the form of variables. In the questionnaire, independent variables (X) are contributed by two main parts. One is demographic questions, including some basic personal details of the credit risk managers, such as age, academic qualifications, years of service in the bank, and so on. The second part comprises questions about credit risk management, which have been divided into seven groups, including: credit risk managers’ attitude towards the importance of various factors affecting lending decisions; lending policy; factors considered when lending to corporate borrowers, the importance given to company factors while making lending decisions; expert system, and so on.
Dependent variable (Y) is the rate of return on lending.

Simple correlations’ (R) will be used to determine whether the independent variables (X) and dependant variables (Y) are linearly related to each other.

The following formula is adopted to calculate the co-efficient of correlation

\[ r_{xy} = \frac{\sum x_i y_i - n \bar{x} \bar{y}}{(n-1)s_x s_y} = \frac{n \sum x_i y_i - \sum x_i \sum y_i}{\sqrt{n \sum x_i^2 - (\sum x_i)^2} \sqrt{n \sum y_i^2 - (\sum y_i)^2}} \]  \hspace{1cm} (3)

The Multiple correlation results with the use of SPSS can be generated, which explains the relationship between variables. The value of r is between -1 and +1 (-1 ≤ r ≤ +1). The “+” and “-” signs are used for positive linear correlation and negative linear correlations, respectively. If r is close to +1, (i.e. 0 < r < +1) it shows a strong positive linear correlation between x and y. If r is close to -1 (i.e. -1 < r < 0), it shows a strong negative linear correlation. If a value is near 0, then it is possible to say that the relationship is random and nonlinear between the two variables.

4.4.2 Secondary data analysis

4.4.2.1 Panzar and Rosse

The P-R test developed by Panzar-Rosse examines the input prices and the equilibrium gross to determine their relationship under a competitive scenario. The test to determine how competitive a scenario is, it relies on the properties of a reduced form log-linear revenue equation as follows:

\[ \ln R_{it} = \alpha_0 + \sum_{j=1}^{J} \alpha_j \ln W_{jit} + \sum_{k=1}^{K} \beta_k \ln X_{kit} + \sum_{n=1}^{N} \gamma_n \ln Z_{nt} + \varepsilon_{it} \]  \hspace{1cm} (1)
Where R represents the revenue of bank i at time t; wj are the input prices; the terms in X are variables which are different for each bank affecting cost functions and the revenue; the terms in Z are macro variables affecting the entire banking system; and ε is a stochastic disturbance term. The Rosse–Panzar H-statistic can be obtained from Eq. (1). H is the sum of elasticity of total revenue with respect to each of the bank’s J input prices.

In Eq. (1), $H = \sum_{j=1}^{J} \alpha_j$

In the empirical analysis, a statistical package Econometric Views (E-view) has been used to run the following reduced-form revenue equation Eq. (4), which is selected in order to derive the Panzar-Rosse H-statistic:

$$\ln (TR) = \alpha + \beta_1 \ln W_L + \beta_2 \ln W_F + \beta_3 \ln W_K + \gamma_1 \ln Y_1 + \gamma_2 \ln Y_2 + \gamma_3 \ln Y_3 + \varepsilon$$

(4)

Where:

TR = Total revenue

$W_L$ = Ratio of personnel expenses to total assets

$W_F$ = Ratio of interest expenses to total deposits

$W_K$ = Ratio of other operating and administrative expenses to total assets

$Y_1$ = Ratio of equity to total Assets

$Y_2$ = Net loans to total assets

$Y_3$ = Total assets

$\varepsilon$ = a stochastic disturbance term = error
An essential assumption of the H-statistic is the requirement of the market under analyses to be in long run equilibrium. The test to determine if there is equilibrium relies on a regression where there is a change in dependent variable and it is shown in Eq. (2). The difference between Eq. (2) and Eq. (1) is the pre-tax profit to total assets term which appears in substitution of the total revenue.

$$\ln \pi_{it} = \alpha'_0 + \sum_{j=1}^{J} \alpha'_j \ln W_{jit} + \sum_{k=1}^{K} \beta'_k \ln X_{kit} + \sum_{n=1}^{N} \gamma'_n \ln Z_{nt} + \mu_{it}$$  \hspace{1cm} (2)

$$E = \sum_{j=1}^{J} \alpha'_j$$

When E statistic is 0, it indicates long-run equilibrium. If the value of E statistic is less than 0, it reflects disequilibrium. In the PR framework, the long run equilibrium of the bank must be the case. The equilibrium statistic E is the summation of the input price elasticity, and the way to determine whether the market is in equilibrium or not it is to check if the hypothesis of E=0 is rejected. In case of the hypothesis being rejected then the market is not in equilibrium.

In the empirical analysis, the following equation has been adopted and E-view has been adopted to generate E-statistic.

$$\ln (\text{ROA}) = \alpha + \beta_1 \ln W_L + \beta_2 \ln W_F + \beta_3 \ln W_K + \gamma_1 \ln Y_1 + \gamma_2 \ln Y_2 + \gamma_3 \ln Y_3 + \varepsilon$$  \hspace{1cm} (4)

$$\ln (\text{ROE}) = \alpha + \beta_1 \ln W_L + \beta_2 \ln W_F + \beta_3 \ln W_K + \gamma_1 \ln Y_1 + \gamma_2 \ln Y_2 + \gamma_3 \ln Y_3 + \varepsilon$$  \hspace{1cm} (5)
Where:

\[ \text{ROA} = \text{Return on assets} = \frac{\text{Net profit}}{\text{Total Asset}} \]

\[ \text{ROE} = \text{Revenue on equity} \]

\[ W_L = \text{Ratio of personnel expenses to total assets} \]

\[ W_F = \text{Ratio of interest expenses to total deposits} \]

\[ W_K = \text{Ratio of other operating and administrative expenses to total assets} \]

\[ Y_1 = \text{Ratio of equity to total Assets} \]

\[ Y_2 = \text{Net loans to total assets} \]

\[ Y_3 = \text{Total assets} \]

\[ \varepsilon = \text{a stochastic disturbance term} = \text{error} \]

\[ E\text{-statistic} = \beta_1 + \beta_2 + \beta_3 \]

The advantages of using the Panzar- Rosse H-statistic to measure bank competition are as following: first, there are fewer problems to find the required information. The input and revenue data which are required on the estimation of Panzar-Rosse H statistic is easy to obtain (Hempell, 2002). Secondly, in the Panzar-Rosse H statistic model, the specific bank factors can be included in the production function and the difference arising from bank size and ownership can also be examined by the model. Thirdly, the market does not need to be detected and the notion of a local market does not need to be specifically defined when Panzar-Rosse H-statistic is used (Mensi, 2010). Negrin et al. (2006) argue that the Panzar-Rosse H-statistic has the advantage of simplicity and transparency without losing efficiency. However, one disadvantage of Panzar-Rosse H-statistic is that the banking industry investigated is assumed to be in a situation of long-run equilibrium. Hence, a separate test has
to be conducted to make sure this condition is satisfied. In Chapter 6 the section of empirical analysis, Panzar – Rosse H-statistic and Equilibrium test have been utilised correspondingly.

4.4.2.2 Augmented Dickey Fuller (ADF) test

The Augmented Dickey-Fuller (ADF) unit root test method is a model that researchers normally use it to analyse whether a given time series is considered as stationary but also it is useful to determine the integration order in the case of the time series being non-stationary. Unit root tests were initially applied for determining the stationary properties of time data series. Stationarity represents a long run reduction to mean, and obtaining the stationarity of a series helps avoid spurious regression relations. It happens the regression is done between series with unit roots.

Augmented Dickey Fuller (ADF) unit root test method is used to explore the co-integration and causal relationship between total assets (TA) and total equity (TE). The ADF model used to carry out the analyses is described as follows:

\[ \Delta \ln Y = \alpha + T + \omega \ln Y_{t-1} + \sum_{i=1}^{p} \delta \Delta \ln Y_{t-1} + \epsilon \]  \hspace{1cm} (6)

Where:

Y= variable used for unit root test

\( \alpha \) = the constant

T = the trend

\( \omega = p-1 \)
P = the lag order of the autoregressive process

ε = the white noise series

The null hypothesis is $H_0: \omega = 0$. If the value resulting from Eq. (6) is larger than the McKinnon value at 5%, in that case one can accept the hypothesis. In other words, it is defined that $\ln Y$ has a unit root and that it is non-stationary. By contrast, in the case of the value being lower than the McKinnon value at 5%, then the hypothesis of $H_0$ should be discarded then $\ln Y$ is stationary. In the case of the non-stationary series, what it needs to be tested is the first difference and whether or not it stationary or not. In the case of determining that the first difference is stationary, then it is confirmed that the series has a unit root and it is first order integration I. Based on the same theory, the second difference should also be tested. When the second difference is stationary, then it is confirmed that the series has a unit root and it is second order integration.

4.4.2.3 Johansen’s co-integration test

Economists have developed several models to analyse the relationship among variables, whether they behave on the same way as predicted by theory. Co-integration methods have been a popular choice within the economic enjoyed high popularity among economic researchers since these methods were developed twenty years ago. Co-integration methods have been used to test for the weak-form of asset market efficiency, which indicates that the value of any asset should not be predicted by using the value of other assets. However, these methods are based on an assumption which is difficult to justify in some cases. The assumptions made using the pure unit-root often are made based not on empirical facts but on convenience. This is due to the limitations of the unit-root method that cannot difference between unit-root and a close alternative.
The test proposed by Johansen (1988, 1991) has been widely accepted for testing for co-integration with the order of integration: one (i.e. I(1)) and zero (i.e. I(0)). The way the Johansen methodology works is as follows: first of all is the testing of the series for unit root. Second is for the series that have been identified with unit root are included into a vector auto regression form and hence it is possible to determine if there is found any linear combinations of integration order of zero.

The Johansen (1988) method can be easily found in the literature related to economics since it has become a standard. According to the co-integration theory, it is possible to determine if variables under study are co-integrated when their difference is stationary (i.e. they are first order integration series). The testing for co-integration relationship can be done by two methods: EG two-step procedure (Engle and Granger, 1987) and Johansen co-integration test (Johansen, 1988 and Juselius, 1990) based on Vector Auto Regression (VAR).

For co-integration test, I have used Johansen’s multivariate co-integration tests by which the relationship is found by applying the following vector auto-regression (VAR) model:

\[ \Delta \ln Y = \sum_{i=1}^{P} \Gamma_i \Delta \ln Y_{t-1} + \Pi \ln Y_{t-1} + BX_t + \epsilon \]  \hspace{1cm} (7)

In this formula,

\[ \Gamma_i = -\sum_{j=i+1}^{P} A_j \]

and \[ \Pi = \sum_{i=1}^{P} A_i - I_m \]
Where

\[ Y_t = n \times 1 \text{ vector of I (1) variables.} \]

\[ \Gamma = n \times n \text{ matrix of coefficients to be tested.} \]

\[ B = n \times h \text{ matrix} \]

\[ X_t = h \times 1 \text{ vector of I (0) variables} \]

\[ \Pi = \text{the rank of the matrix and integrates the long-run relationships of the variable. Moreover, its value is considered to be important since it represents the number of co-integrating vectors. If rank of } \Pi = 0, \text{ then it is possible to say that there is no co-integration between the variables.} \]

4.4.2.4 Granger causality test

Software E-views has been selected to run the Granger causality test, in order to find out whether the past value of bank size (in term of total asset) will help to predict the value of total equity. The theoretical framework of Granger causality test is as follows:

The pair-wise Granger causality tests can be used to determine if the \( X_t \) series values in the past can be used to predict the values of a new series called \( Y_t \), by using also past values of \( Y_t \). First of all the ADF unit root test is applied on the two series, then after this test is applied the Johansen co-integration test preceded by a Granger causality test. The equation of the Granger causality test is as follows:
\[ X_t = \sum_{i=1}^{n} \alpha_{x,i} X_{t-i} + \sum_{i=1}^{n} \beta_{x,i} Y_{t-i} + \mu_{x,t} \tag{8} \]

\[ Y_t = \sum_{i=1}^{n} \alpha_{y,i} Y_{t-i} + \sum_{i=1}^{n} \beta_{y,i} Y_{t-i} + \mu_{y,t} \tag{9} \]

Where

\[ X_t = \text{the log of the first variable at time } t, \]

\[ Y_t = \text{the log of the second variable at time } t. \]

\[ \mu_{x,t} \text{ and } \mu_{y,t} = \text{the white noise error terms at time } t. \]

\[ \alpha_{x,i} = \text{the parameter of the past value of } X, \text{ telling how many values of } X \text{ are required to explain the value of } X \text{ at present.} \]

\[ \beta_{x,i} = \text{the parameter of the past value of } Y, \text{ telling how many values of } Y \text{ are required to explain the value of } X \text{ at present. Similar meanings apply to } \alpha_{y,i} \text{ and } \beta_{y,i}. \]

**4.5 Limitation of Research methodology**

Generally speaking, questionnaires can be divided into two main types: open questions and closed questions (Blaikie, 2000). In this research, I used a mixture of the two in order to achieve a balance. Open questions alone may give very many explanations, but the data gathered can be difficult to analyse, and hard to present as tables or charts. Since respondents of my research questionnaires are middle and upper level credit managers, who are pressured by time, closed-ended questions are adopted in my questionnaire. A limited range of responses from which to choose could save answering time. Closed questions are useful for obtaining comparative data. It is easier to analyse and provide quantitative data although it seldom explains the reasoning behind the figures (Cameron and Price, 2009).
There are several limitations referred to in this questionnaires research methodology. One is the possibility of non-response bias. Kanuk and Berenson (1975) suggested that the concern here is of non-response error which can invalidate research findings. However, it is not possible to gain access to all the senior credit managers. The second limitation is that having similar characteristics between interviewee groups would lessen the concern about potential non-response bias and the ability to generalize the results. The third one is the ability of respondents to provide the desired data. Linsky (1975) also suggested that it is important to target those individuals in the organization with the knowledge and experience of the subject under examination. The last one is that respondents may give the answer which they think researchers will be happy to hear, rather than giving the real answer, thus distorting the accuracy of the research findings (Dillman et al., 1972).

Another main limitation is a secondary data panel. I studied the competitive condition of five large commercial banks in China over the period of 2004-2011. The relationship between total asset and total equity was supposed to be estimated using three different methods: ADF unit root test, Johansen’s co-integration test and Granger causality test. In the case of the two variables showing stable long run relationship with each other in the Johansen’s Co-integration test, then it is possible to apply the Granger causality test. I used Eviews to run those tests based on the quarterly data, which are 32 observations, between 2004 and 2011. I think the computing result might be different if data from a longer time period could be applied.

4.6 Conclusion

An academic study about the use of a credit model in banks can be framed in many different ways. This chapter highlighted the procedural matters surrounding the research. It gives information about research methodology in general and a comparison of data collecting methods. Further, it provides a design of this research by describing the overall research
methodology of the study which includes the design of interview questions and the design of
the questionnaire. The philosophical stance of adopting a combined research methodology
has been described.

Methods, which are used to analyse primary and secondary data, have been presented in
section 4.4. Chapters five and six will present the primary data analysis and secondary data
analysis respectively. The finding of this research and the conclusion are in the following
chapter. Suggestion for further research is to test research findings in a larger sample study.
Chapter V

Primary data analysis

5.1 Introduction

Garber (1998) and Basu (2003) stated that there are many internal microeconomic factors that can cause bank failures and banking crisis. Poor management and unwise lending can lead to over-exposure of a risky open foreign exchange position, (Gavin and Hausmann, 1996). Credit risk is considered as a major risk in banks and has become more important with the 2008 financial crisis and the subsequent regulatory controls. Therefore, it is imperative to investigate any potential weak chain in the banking system, for instance credit risk management, and improve its efficiency. In my research, both primary data and secondary data have been collected for detailed analysis. Chapter five focuses on primary data analysis and the secondary data will be discussed in chapter six.

In general there are three aspects which could affect loan performance according to Saied (2000), which are the lenders (bank), the clients (borrowers) and the external and internal environment. My study focuses on the aspect of lenders (banks). If the incorrect and inadequate information from clients is accepted during the loan application process or the bankers fail to estimate the value of collaterals, it may lead to non-performing loans, (Clarke, 1987). In other cases, non-performing loans are caused by taking risky investments in order to get a higher rate of return. Laevan (1999) pointed out that higher profitable investments are always more risky than lower profitable ones.

In order to investigate the loan performance under the current credit risk management and analyse how lending attributes of the credit risk managers influence the loan performance, in
terms of rate of return, I designed a questionnaire (refer to Appendix-1) to collect primary data from senior credit risk managers for research analysis.

All the respondents were from the top five large commercial banks in China. Since all of them were senior credit risk managers, face-to-face questionnaires are more appropriate to obtain personal attributes than conventional questionnaires could be. The actual number of respondents is 100 as shown in the following chart 5.1. Excel (refer to section 5.3), E-views (refer to section 6.1, 6.2, 6.3) and SPSS (refer to section 5.4) software have been used for data analysis of numerical data for the purpose of graphic presentation.

5.2 Data

The primary data have been collected through face-to-face questionnaires. Participant Consent Forms were provided to all respondents at the very beginning. The questionnaire was composed of questions in two main categories. The first category is demographic questions and the second one is questions about credit risk management based issues. The graphical presentation and interpretation of all questions have been made according to 100 respondents from 5 large commercial banks in China.

I have used two methods to analyze the questionnaires. They are descriptive statistics and correlation test to investigate a model, which explains the inter-relation among all the factors and how they affect loan performances. My interest is to find out which factor or factors combined together would affect the rate of return on lending.
5.3 Descriptive Statistics

In this section, distribution of respondents is shown in charts with a corresponding explanation. Briefly speaking, there are two main parts in the questionnaire. The first part is demographic questions, including some basic personal details of the credit risk managers, such as age, academic qualifications, years of service in the bank, and so on. The second part comprises questions about credit risk management, which have been divided into seven groups. Questions with similar characters are discussed in one group. For example, there are 7 questions on credit risk managers’ attitude towards the importance of various factors affecting lending decisions, 13 questions on lending policy, 6 questions on the relative importance of the certain aspects for evaluating bank-wise exposures, 5 questions on factors considered when lending to corporate borrowers, 5 questions on the importance given to company factors while making lending decisions, 2 questions about expert systems and one question about the ranking of satisfactoriness of loan performance.
5.3.1 Demographic Questions

Demographic questions are focused on basic information of senior credit risk managers, including: the senior credit risk bank manager’s age, sex, marital status, education, experience as a senior manager, number of training courses attended, etc. Demographic questions were designed to determine if the basic personal information such as the factors mentioned above would influence the attitude and behaviour of the senior credit risk managers when issuing loans. The distribution of respondents is shown by ten charts (See, appendix 2).

5.3.1.1 Credit Risk Managers’ Age

According to the graph of Figure 5.1 in appendix 2.5.1, the largest group of the respondents, i.e. 39%, were middle-aged, between 35 and 44. The second large group was 45 and above, which took 34%. There were 27% of the respondents at the age between 25 and 34. Credit risk management is a job that requires working experience in order to determine whether the conditions of a client are optimal for granting the loan. The second reason is that under Chinese culture mature people, at around forty years old, are considered more reliable than young people. That is why there are more middle-aged managers since they have more experience, to investigate the key conditions, than young people just graduated from university.
5.3.1.2 Credit risk managers’ Gender

The data of “credit risk managers’ gender” is shown in Appendix 2.5.2 -Figure 5.2. Generally speaking, there are more male than female managers working on credit risk management. Female staff took 39% out of the total of responded credit risk managers. In ICBC and the Communication Bank of China, the rate of male to female credit risk managers is about 8:5. In Bank of China and Construction Bank of China, male to female ratio is about 8:4. In the Agricultural Bank of China, the rate was 10:12, which is the only one with more female respondents than male. In recent years, there has been an important increment in the number of females working at senior positions. However, in Chinese society the male still has priority over the female. It is likely that Chinese cultural attitude has led to such ratings.

5.3.1.3 Credit Risk Managers’ Marital Status

The data of “Credit risk managers’ marital status” shows that 70% of the respondents were married. The other 27% were single. There were only 3% respondents who said they were divorced. In Chinese culture family relationship is highly evaluated and young couples are encouraged to settle down in their early 20s. This is because it is believed that living in stable relationships with their families could help people to concentrate on work. Hence, there are very few credit risk managers who remain single at a mature age. (refer to appendix 2.5.3)
5.3.1.4 Credit risk managers’ Monthly salary

The data of “credit risk managers’ monthly salary” shows that 56% of the respondents were paid between ten thousand and fifteen thousand RMB (About £1,500). The other 39% of the respondents were paid between five thousand and ten thousand RMB. There were only 5% of credit risk managers from the Bank of China who said they were paid fifteen thousand or more every month. As it was reported by the National Bureau of Statistics of China, in 2011, the average wage of people living in cities was RMB 21810 per year, which is RMB1818 per month. The credit risk manager’s wage is 2.5 to 7.5 times above the average. This high income makes credit risk managers more loyal to their jobs and be more responsible to any loan authority. (Refer to appendix 2.5.4)

5.3.1.5 Ranking of Banks

The data of “Banks’ ranking” shows that, out of the 100 respondents, there were 43% who came from provincial banks. This percentage number was slightly more than it shows for headquarter-levelled and local-levelled, which took 33% and 24% respectively. Headquarters and provincial branches have more lending powers compared with local branches. Therefore, there are a larger number of credit risk managers in these offices since there are more businesses to deal with. (Figure refer to appendix 2.5.5)
5.3.1.6 Years of service within the organization

The data of “Years of service within the organization” shows that 38% of the respondents served in the organization for 6-10 years followed by respondents who served 20+ years, 11-20 years and 1-5 years at the percentage of 31%, 22% and 9% respectively. The majority of credit risk managers have been working for more than 5 years, because staff loyalty is highly valued in Chinese banks. Any staff promotion is not only related to academic qualifications, but also the evaluation of several years’ performance. (Figure refers to appendix 2.5.6)

5.3.1.7 Years of service in issuing loans

There are 37% out of all the respondents from large commercial banks served 11-20 years issuing loans. The figures for respondents who have served 1-5 years, 6-10 years and 20+ years, were of 29%, 21% and 13% respectively. The majority of credit risk managers have been working for more than 5 years, because credit risk management is a serious position. It requires many years’ of working experience. Besides, giving loans and managing the instalments is a constant job, which involves many years time to complete a case. (Figure refers to appendix 2.5.7)

5.3.1.8 Highest academic qualification

According to the data that the largest number (38%) belong to undergraduates. Post graduates were the second largest group, with 35%. Professional Diploma holders constituted 27%, and there were no PhD degree holders. In China, these 5 large commercial banks enjoy a very good reputation, including staff benefits. Since they are very popular, they have priority to
choose new staff from the best graduate students fresh from top universities. In some cases, the best students are nominated to join the pre-graduate training courses. Successful candidates could sign contracts straight away and start working right after they finish university. (Refer to appendix 2.5.8)

5.3.1.9 Frequency of trainings on credit risk

When questioned about the frequency of training 83% of the respondents from large Chinese commercial banks said that once every month they had to attend a credit risk training session, whereas 17% said they attended the trainings courses once every 6 months. There is a minimum number of training courses to be attended each year. The length may vary among banks from 30 to 50 hours each year. Normally, new staffs have more training courses to attend in order to catch up with the regulations and policy. Refer to the empirical result in 5.4.1, the correlation between years working in banks and frequency of attending training courses. There is a significant correlation which has to be considered as weak at the 0.01 level (2-tailed). This is understandable as people may or may not attend according to their years of work. Eager people may attend more and less eager employee may avoid some of the sessions. (Figure refers to appendix 2.5.9)

5.3.1.10 Credit limit that you can authorize

There were 17% respondents who can authorize loans up to one million RMB, whereas 20% can give loans up to five million RMB. The loans available largely depend on the total deposit in the bank. The majority of the respondents (63%) can authorize credit up to ten million RMB or more. The empirical result in 5.4.1 shows that the authority to issue loans are positively correlated to age, marital status, monthly salary, ranking of banks, years working
in bank, years issuing loans and qualifications. In other words, credit risk managers who have bigger authority in issuing loans are normally older, married, with higher monthly salary, longer experiences working in banks and issuing loans also holding higher qualification. This is understandable, because through years working in banks and dealing with loans credit risk managers could get more experiences which can increase the confident of the credit risk managers’ judgement over applications. (Figure refers to appendix 2.5.10)

5.3.2 Credit risk management

Questions in the second part of my questionnaire asked about the attitude of credit risk managers towards the importance of various factors affecting lending decisions. It includes:
The qualitative and quantitative issues relating to credit risk management in the Chinese financial sector; attitude towards the importance of various factors affecting lending decisions, lending policy, the relative importance of different aspects considered for evaluating bank-wide exposures, factors considered when lending to corporate borrowers, importance given to company factors while making lending decisions and expert systems, etc.. The respondents were asked about their attitude towards the importance of various factors affecting lending decisions and lending policy. The factors in question were importance and reliability of data, importance of personal experience, importance of credit screening methods and importance of financial statements and non-financial data.

5.3.2.1 Data of applicants is helpful

Out of 100 respondents, 89% of them found data were very helpful and 11% of them found data helpful in making lending decisions. None of the respondents were neutral or disagreed as to its importance. To apply for loans, there are many documents that applicants are obliged
to supply, including 3 years’ annual reports and records of paying tax. Data provided in such documents is helpful for credit risk managers to evaluate the applicant. According to the correlation test (refer to section 5.4.2), the credit risk managers who found the data more helpful also agree to that credit screen method is very helpful, because both of them are straightforward and data can be used to assist the credit screening method. On the daily routine of credit risk management, both the data of applicants and credit screening method should be highly evaluated. (Figure refers to Appendix 2.5.11)

5.3.2.2 Are you influenced by non-professional factors?

According to the 100 respondents, all of them agreed that non-professional factors would influence the decision making when considering loan applications. For example, one senior manager said that state-owned firms which enjoy priority over loan applications, affects the authorization, in a way. This recalls what was discussed in section 3.3, that there were two important characteristics of the Chinese economy during the centralised period. One was public ownership and the other was widespread political control. The purpose of this question is to study whether or not the loan decision making process is still influenced by some non-professional factors, such as politics, other than a loan applicant’s qualification. It is not a surprise that all the credit risk managers gave an identical answer. (Figure refers to appendix 2.5.12)

5.3.2.3 Factors influencing loan decision making

Before the main questionnaire was developed, I carried out a pilot questionnaire (refer to section 4.4.2). According to the feedbacks, I found that lending decisions by credit risk managers were also influenced by some external non-financial factors, such as personal
experience, government policy or head office regulation. When asked what factors influence loan decision-making the most, the answer was head office decision, government policy and personal experience: 61% of the respondents found government policy plays an important role, 34% found head office decision affects making lending decisions and only 5% from Bank of China found personal experience is important when giving out loans. Government policy is a big influence. For example, after the United States housing bubble in 2007, the Chinese Banking Regulatory Commission put barriers over projects related to property investment. Therefore, the authorising process to issue loans became stricter. (Figure refers to appendix 2.5.13)

5.3.2.4 Personal experience plays an important part

Considering the importance of credit risk management to loan performance discussed in Section 2.3.2. I put the question of personal experience in the questionnaire in order to study the attitudes of credit risk managers to see if they consider this factor important or not. When asked if personal experience plays an important role in lending decisions, 78% of the respondents agreed to its importance and 22% were found to be strongly agreeing, neutral, disagreeing and strongly disagreeing. Personal experience is not non-professional judgement over applicants, but an overall impression. For example, a restaurant owner applied for loans for refurbishment. All the documents supplied seemed satisfactory, but the credit risk manager suspected that the turnover of this restaurant was unusually high. In this case, an experienced credit risk manager would report this new finding and visit the place in person and given the credit risk manager’s approval the loan is rejected saving the bank from issuing a risky loan. (Figure refers to appendix 2.5.14)
5.3.2.5 Financial statements of companies are important

This question is about credit managers’ view of the importance of financial statements provided by applicants. With regard to the question of whether financial statements play an important role in lending decisions, 49% of the respondents agreed its importance, whereas 51% totally agreed to the factor as shown in the graph. Among all, 62% of respondents from Bank of China totally agreed the importance of a financial statement and 31% of respondents from Communication Bank of China ticked the option, totally agree. None of the respondents were found to be neutral and none of them disagreed and strongly disagreed. Financial statements reflect the performance of an applicant. A bank could hardly forecast the repay capacity of an applicant without such basic information (Hwang and Liaw, 1997). As previously discussed in section 2.4, a financial statement is one of the main generic resources to determine the probability of default. I put this question in order to study credit managers’ attitudes towards this factor. (Figure refers to appendix 2.5.15)

5.3.2.6 Non-financial data are important

Despite the simplicity of the question it is clear that most people are going to be unanimous on financial statements. That is why I thought it was inevitable to ask questions on non-financial factors, expecting that the response would be more varied. When asked if non-financial statements play an important role in lending decisions, 84% of the respondents totally agreed to their importance and 14% ticked the option of Agree to the factor as shown in the graph. None of them strongly agreed and none of them disagreed. For example, the environmental performance is one of the non-financial data. Carbon emission of a factory may affect its application because of the fact that it may be located near a valuable forest, historical place or other circumstances. Hence, if there are campaigns to close down a factory
it would affect the activity of the factory leading to maybe debt or closing down which would mean a non-performing loan. (Figure refers to appendix 2.5.16)

5.3.2.7 Credit screening methods are reliable

When asked if credit screening methods (used to check every applicant’s financial stability and debt, if applicable) play an important role in lending decisions, 81% of the respondents totally agreed to their importance and 19% agreed to the factor as shown in the graph. None of them were found to be neutral and strongly agreeing and none of them disagreeing or strongly disagreeing. The credit screening method is straightforward and the output is significantly easy to be interpreted by the credit risk manager. (Figure refers to appendix 2.5.17)

5.3.3 Lending Policy

Questions were asked related to lending policy which enquired if credit officers were allowed to give credit to relatives, rate of return on lending, percentage of bad debt out of total loan, the percentage of credit ceiling allocated to different industries, credit risk assessment review, borrower’s performance, credit quality report, risk adjusted return on capital(RAROC) framework, use of derivatives, sharing of default information, verification of applicant’s data and penalizing credit officers issuing default loans.
5.3.3.1 Are credit officers allowed to give credits to relatives?

In section 3.5, it has been explained what the main causes of China’s non-performing-loans were. Basically, issuing loans to a less qualified applicant was a problem, so I put this question to study if there is any regulation to prevent credit managers from making an unwise decision. The survey result shows that 45% of the respondents said that credit officers are allowed to give credits to relatives. However, the rest 55% of respondents said it is not permitted. The reason for the contrast was due to different understanding of the term relatives. It is not permitted to give loans to one’s wife or husband, but some credit risk managers are less cautious over this sensitive issue and they expand this regulation to cover the extended families. (Figure refers to appendix 2.5.18)

5.3.3.2 The rate of return on lending in your bank

Rate of return stands for the income received from a loan on top of the initial investment. Out of 100 respondents, there were 41% of respondents who said that the rate of return on lending in their banks is between 11-15%. About 32% of respondents said that the return on lending is more than 20%. 17% of respondents claimed the return of lending is between 16-20%. 10% of respondents, all from Bank of China chose the option 5-10%. From this figure, it is observed that all the five banks have achieved a higher rate of return than I expected since the Loan Prime Rate (LPR) announced by Central Bank was no more than 6.55\textsuperscript{xiv}. Among the five banks, Bank of China has a correspondingly lower rate of return than others. It can be partially explained by political loans arranged for the state-owned enterprises. (Figure refers to appendix 2.5.19)
5.3.3.3 The percentage of bad debt out of total loans

Loans are good unless it is one hundred percent certain that a loan is not going to be repaid under the existing arrangement. This definition of non-performing loans shows the close relationship between the nature of loans and risk (Bloem and Gorter, 2001). All of the respondents from large commercial banks ticked the same option box which indicates fewer than 5%. However, in 2003 this figure was as high as 28% according to the China banking regulation commission. There is a dramatic drop of bad debts, because to join the stock market, bad debts should be at a widely acceptable level. Bank of China used to give loans to state-owned-companies, particularly in the vehicle industry and suffered a big loss for a long time. Before being listed in the Hong Kong stock market in 2006, Bank of China sold some bad debts to private debt companies and cleared the non-performing loans. This explains the fast reduction of bad debts. It is possible that the bad debts had been resolved through Asset Management Companies (See section 3.6.1). (Figure refers to appendix 2.5.20)

The rate of non-performing loans in Chinese commercial banks has been reducing constantly according to the China bank regulation commission. The dramatic drop in non-performing loans before 2008 can be explained by Asset Management Companies (AMC). In section 3.6.1 it was mentioned that in order to maintain a good and healthy financial system, Ministry of Finance in China had had to fund four AMCs to reduce the percentage of non-performing loans (NPLs), which is patently clear from the balance sheet of the original banks. Meanwhile cleaning up the NPLs from previous years, it is strictly controlled to generate new NPLs in current years by using modern credit risk management, such as 5Cs and credit rating system. The purpose of this question is to learn whether the credit risk managers are happy with this achievement or not.
5.3.3.4 The percentage of credit ceiling allocated to one single industry by the bank

Credit ceiling cannot be simply understood as the amount that a bank wishes to lend out, but also the amount that a bank can lend out. Lenders will establish a credit ceiling above which they will not be willing to issue loans. Eaton and Gersovitz (1981) investigated that the amount of credit ceiling is determined by lenders' perception of borrowers' disutility of exclusion. In order to examine how the credit risk managers reduce risk by splitting investments, I put this question in my questionnaire. Among all the respondents, 45% of them said the credit ceiling allocated to one single industry is up to 20%. Out of the 45%, Bank of China contributed 15% of credit risk managers. The other 28% respondents who answered credit ceiling allocated to different industries is less than 5% in each industry. There were 14% of respondents who said that it should be less than 15% and the remaining 13% of respondents said that the credit ceiling is 10%. These percentages show the different regulations that each of the 5 major banks has. (Figure refers to appendix 2.5.21)
5.3.3.5 *The interval of Credit Risk assessment being reviewed in your bank*

This question examines the frequency of the financial analysis, because according to Higgins (2012) financial analysis is considered as a practical tool in terms of determining the performance level of lending and borrowing. The survey results show that 45% of the respondents agreed that the credit risk assessment review is done bi-annually. This option is followed by an annual check at 24%. There were 16% of respondents who said a monthly review is done, whereas 15% of respondents said a quarterly review is being carried out in their branches. According to the banking regulation, credit risk assessment must be reviewed at the end of each financial year. Some credit risk managers are more cautious, so they review risks twice a year, quarterly, or, monthly. As discussed in section 2.4, many researchers have contributed to credit risk assessment. Making a financial analysis frequently helps to determine the success which has been achieved in light of investment plans, particularly those related to profitability and liquidity. Hence, the repay of each instalment also affects the interval of assessment (Baker, 2011). (Figure refers to appendix 2.5.22)

5.3.3.6 *The frequency of examining borrowers’ performance?*

The survey results show that 45% of the respondents from all the five large commercial banks review the borrowers’ performances every month, followed by 39% of all respondents who said that reviews have been made annually. 10% respondents all from Bank of China said that they examine the borrowers’ performances on a quarterly-basis. Only 6% of all the responses showed that the review is done on a monthly basis, in which Agricultural Bank of China and Communication Bank of China contributed 3% each. A very large percentage of the credit risk managers check the borrowers’ performances on a monthly basis but if there is a belated repay, the credit risk manager would check the debt owner straight away in great depth. (Figure refers to appendix 2.5.23)
5.3.3.7 *Do you prepare regular ‘Credit Quality Reports’?*

This question is designed to learn if credit risk managers will make reports to examine the constancy of repaying their loans by existing debtors. According to the 100 respondents, it was not surprising to observe that none of the respondents gave a negative answer for this question. Regular credit quality reports have been prepared in all the large commercial banks in China. This shows the importance the five large commercial banks attach to the quality of their functioning. Credit quality reports can be used to forecast the possibility of default on loan repayments of existing debtors. As it has been explained earlier a sufficient risk policy plays an important role in a successful credit risk management (See section 2.3.2.2). (Figure refers appendix 2.5.24)

5.3.3.8 *Have you developed the ‘Risk Adjusted Return on Capital (RAROC)’ Framework for Risk Pricing in your bank?*

When asked whether they have developed the ‘Risk Adjusted Return on Capital’ framework for risk pricing in the bank, all of the respondents accepted that they have developed a model because RAROC is a useful measurement of profitability. (Figure refers to appendix 2.5.25)

5.3.3.9 *Have you developed any framework to study inter-bank exposures?*

Interbank exposures imply the possibility of direct contagion. The “structure” of the interbank market affects contagion risk. The collapse of one bank would have the consequence of other banks collapsing as well. Hence, it is important to take into account the degree of interbank linkages (Degryse and Nguyen, 2007). When asked whether they have
developed any framework to study inter-bank exposures, 100% of the respondents from all the interviewed large commercial banks said that they have developed a framework to study inter-bank exposures. For example, the rate of inter-bank loans is one of the factors in estimating interbank exposure. It is observed that all the five large commercial banks are members of both China Foreign Exchange Centre and National Interbank Centre. The two centres are actually contained in one department, which is supervised by Chinese Central Bank\textsuperscript{xlv}. Each member announces the rate of interbank loans (called Shibor) individually and based on the result Chinese Central Bank develops the loan prime rate. It shows that interbank exposure is highly valued. (Figure refers to appendix 2.5.26)

5.3.3.10 Does your bank use ‘Derivatives’ (credit default swap) to manage Credit Risk?

When asked about if their bank uses ‘Derivatives’ to manage credit risk, all of the respondents accepted that their bank uses ‘Derivatives’ to manage credit risk. All the 5 large commercial banks cleared their bad debts before joining the stock market. Credit default swap was one of the methods used to reduce the number of non-performing loans. As discussed in section 3.6, there were many asset management companies (AMCs) created with the purpose of accepting NPLs from state-owned commercial banks. (Figure refers to appendix 2.5.27)

5.3.3.11 Do you share default information among banks?

According to the credit risk managers from 5 large commercial banks in China, all of the respondents said that default information has been shared among banks. Chinese Central Bank provides a list\textsuperscript{xlv} of companies with poor credit history. All banks, not only the 5 large
commercial banks, have access to this list. Any company on this default list is less likely to get loans from any Chinese bank. (Figure refers appendix 2.5.28)

5.3.3.12 Is the applicant data verified?

Regarding the question, if applicant’s data is verified, all the respondents gave a uniform response. They do verify the data either via phone or by visiting the company in person. Credit risk managers are obligated to verify applicants’ data, just in case some applicants may try to use false information. (Figure refers to appendix 2.5.29)

5.3.3.13 Are there penalties for credit officers that issue default loans?

When asked whether their banks penalize credit officers who issue default loans, all of the respondents said that their banks have penalty regulations for credit officers who issue default loans. However, a few respondents added that if the default was due to macroeconomic failure rather than the credit manager’s personal mistake, the penalty is not applicable in this case. For example, if a Chinese milk powder factory was issued loans and all documents from the applicant were fine at the applying stage. However, if due to poor management, a few years later the factory went into bankruptcy, the credit risk manager could not have forecast this failure even if he/she has done the assessment properly. Penalties would not be applicable in this case. However, if the credit risk manager insisted to give loans regardless of the fact that the factory had been suffering continuous loss, the credit risk manager would be penalised by being removed from the department. (Figure refers to appendix 2.5.30)
5.3.4 The relative importance of the following aspects that you consider for evaluating bank-wide exposures.

The survey enquired about the relative importance of the following aspects that banks consider for evaluating bank-wide exposures. In this regard, credit risk managers were questioned about the study of financial performance, operating efficiency, past experience, bank rating on credit quality, internal matrix for studying bank-wide exposures and counter party or country risk.

5.3.4.1 Study of financial performance

It is shown that all the respondents from the five large commercial banks found that it was very important to study the financial performance of applicants when issuing loans. The financial performance showing on annual reports is an obligated term to be checked. That is the reason why none of them called it unimportant, or, very unimportant as shown in the figure. Instead, they were unanimous on the choice ‘very important’. (Figure refers to appendix 2.5.31)

5.3.4.2 Operating Efficiency

When asked about the importance of operating efficiency, 79% of the respondents said that it was very important. The other 21% considered it important and none of the respondents considered it unimportant. All respondents from ICBC gave the same evaluation, very important, on this factor. The reason why operating efficiency is highly evaluated is that operating efficiency includes a series of analyses based on the level of non-interest expense
relative to the non-interest income, earning asset level and overall revenue. Kwan and Eisenbeis (1997) have investigated models to examine the interrelationship between the operational and profitability efficiency. (Figure refers to appendix 2.5.32)

5.3.4.3 Past Experience

85% respondents regarded the factor “past experience” as very important. There were 15% who considered it as an important factor to check the applicants. None of the respondents take it as unimportant as shown in the figure. This shows that past experience is a very important factor to forecast whether the loan would default. If the applicant had belated payments in the past, his new application would be considered with more care. (Figure refers to appendix 2.5.33)

5.3.4.4 Bank rating on Credit Quality

The survey results show that when asked about the importance of bank rating on credit quality, 62% of the respondents said that it was very important, whereas the other 38% believed this factor was important. Bank rating on credit quality is not only applicable to a single company when applying loans, but also to a particular industry. As explained in section 2.5.2 a credit rating analyses an individual or a company worth a credit. For example, since the 2007 American property crisis, all property companies in China are facing difficulty in obtaining loans from a bank, even if the company has an outstanding credit quality history. (Figure refers to appendix 2.5.34)
5.3.4.5 Internal Matrix for studying bank-wide exposures

With regard to the importance of an internal matrix for studying bank-wise exposures, all the respondents said that it was very important. The reason is that if a credit risk manager finds something suspicious he/she should know who to report to. (Figure refers to appendix 2.5.35)

5.3.4.6 Counter party or country risk

Country risk is associated with investing in a foreign country, including politics risk, exchange rate risk and economic risk. For example, if a multi-national enterprise applies for loans to establish a factory, it makes a difference if it is located in Syria or in the US. In other words, the location of this new factory may influence the success of this application or the rate of loan if it is approved. According to all the respondents, there were 59% who believed that the country risk or counterparty risk for studying bank-wise exposures was very important. 36% of the respondents said that it was important. There were a small number (5%) credit risk managers, all from Bank of China, who considered the counterparty risk as neutral. None of the respondents consider it unimportant or very unimportant, as shown in the figure. (Figure refers to appendix 2.5.36)

5.3.5 Factors considered when lending to corporate borrowers (%) 

The survey enquired about various factors when lending to corporate borrowers. The factors in question were ownership background, capital size, set up year and credit history.
5.3.5.1 Ownership background

Here the respondents were questioned regarding what they thought about the importance of ownership background with reference to State-owned and non-State owned entities.

5.3.5.1.1 State-owned

Regarding the importance of an applicant’s ownership when giving out loans, the survey results show that there were 10% of the respondents all from the Bank of China who found this factor neither important nor unimportant. The other 7% of the respondents said it was important. The other, 83% considered it very important. In section 3.5.1, it has been explained that state-owned-enterprises used to largely contribute to the total number of non-performing loans in banks. The question about the ownership of the loan applicant is included in the questionnaire because I want to work out if it still has any influence over the decision making. (Figure refers to appendix 2.5.37)

5.3.5.1.2 Non-state-owned

The survey results show that when asked about the influence of non-state ownership of applicants, 10% of the respondents, all from the Bank of China, found this factor neutral. There were 52% of respondents who considered it important. The other 38% of the respondents considered it very important. From this chart and the previous one it is possible to see that Bank of China does not have much priority over the applicant’s ownership, whereas the other banks consider this factor important. Namely, a state-owned company should be a trustworthy applicant with the economical backup of a country. However, in the
1980s, there were many state-owned-companies who used this as a big advantage and made banks suffer considerable loss. Boateng and Huang (2013) suggest that privatization is an important tool to revitalize the under-performing state-owned companies. Empirical result in section 5.4.5 shows that correlation is significant but weak at the 0.01 level (2-tailed). Compared with state-owned companies (0.391), non-state-owned companies (0.820) have more influence over the rate of return. That explains why the ownership of the applicant was considered as an important factor by most of the respondents. (Figure refers to appendix 2.5.38)

5.3.5.2 Statures of Applicants’ business

The stature of an applicant’s business refers to the development of a firm in the market, whether it is promising or declining. However, in reality, definition of promising and declining can vary among banks, branches, or even credit managers sitting next to each other.

5.3.5.2.1 Promising: the question aims at enquiring whether the future prosperity of the client company means anything for the credit manager

Regarding how credit risk managers evaluate the applicant in terms of which sector their business is in, the survey results show that there were 6% of the respondents finding this factor neutral and all of them from the Bank of China. Another 49% of respondents evaluated this factor as important. The other 45% of the respondents considered it very important. The reason behind this rating result is that a company in a developing industry may have a lot of potential. For example, with air pollution becoming a serious problem, alternative energy turns to be a hot topic in recent years. Companies working on projects involving wind, solar, hydro and other alternative energy sources attract a lot of attention. The Chinese Government
approved a new plan\textsuperscript{xlvii} to stimulate the development of electrical vehicles. It will save energy and reduce the cumulative effect of $CO_2$ emissions from vehicles. Companies investigating these new technologies are going to have a big market. Loan applications from such promising companies attract serious consideration from credit risk managers. (Figure refers to appendix 2.5.39)

5.3.5.2.2 Declining: This question is to ask the opinion of credit risk managers as to whether they would consider the stature of an applicant’s business, particularly when it is going down.

Regarding how credit risk managers evaluate the applicant in terms of which sector their business is in, the survey results show that there were 51\% of the respondents who were found to be neutral. 43\% of respondents considered it important. Only 6\% of the respondents considered it very important; the reason being that any business would have ups and downs. One respondent said as long as it is not a dramatic declining caused by some serious errors, he would not say no to such an applicant straight away. He would need to investigate first of all why the company is declining and only then attempt to make a fair judgement. (Figure refers to appendix 2.5.40)

5.3.5.3 Capital size

Firm size in terms of capital is a very useful factor when granting loans (Hendricks, 1997). The level of importance, however, would vary from bank to bank. The question is aimed at teasing out these differences as expressed by the credit managers.
5.3.5.3.1 Big Firm

According to the survey results, it is shown that when asked about the importance of the capital size of a big firm, 93% of the respondents considered it very important. The other 7% of respondents considered it important. The reason is that big firms have a higher capacity in the market so it is possible to apply for a large number of loans. Besides, big firms are believed to have a high ability to pay back the loans and are less risky in terms of fraud. (Figure refers to appendix 2.5.41)

5.3.5.3.2 Small and medium-sized enterprises

The survey results show that when asked about the importance of the capital size of medium and small sized firms when lending, 38% of the respondents considered it very important. There were 56% of respondents considered it important. The other 6% of the respondents were neutral about it. The access to credits by small and medium sized enterprises (SMEs) is vital for SMEs being able to first of all start up and second of all to be able to invest for growth. The issue of credit availability to small firms may impede the growth of SMEs (Boateng and Abdulrahman, 2013). However the characteristics and risk factors of SME’s have impacts on repayment. Hence the factors like capital size, ownership and experience of obtaining finance should be studied. (Figure refers to appendix 2.5.42)

5.3.5.4 Set up year

The respondents were asked about the importance of the set up year with reference to newly set up and providing a business plan.
5.3.5.4.1 Old well-established

Regarding the results for the importance of the set up year of a firm when applying for loans, it is shown that as to old and well-established firms, 94% of the respondents considered it very important. The other 6% of respondents, in which Agricultural Bank of China and Communication Bank of China shared half-and-half, considered it important. None of the respondents were neutral about it. Neither were there any respondents who considered it unimportant as shown in the figure. (Figure refers to appendix 2.5.43)

5.3.5.4.2 Newly set up

Regarding the results of the importance of the set up year of a firm when applying for loans, it is shown that as to newly set up firms, there were 39% of the respondents considered it very important. The rest 61% consider it important. None of the respondents were neutral about it. Neither were there any respondents who considered it unimportant as shown in the figure. (Figure refers to appendix 2.5.44)

5.3.5.5 Credit history

The respondents were asked about the importance of credit history with reference to the director/owner of the company giving a personal guarantee and providing a property deposit.
5.3.5.5.1 Providing business plan

Regarding the results of the importance of providing a business plan when a firm is applying for loans, it is shown that there were 95% of the respondents who considered it important. The other 5% of respondents, all from Bank of China, were found to be neutral. (Figure refers to appendix 2.5.45)

5.3.5.5.2 Director/owner of the company gives personal guarantee

The survey results show that when asked about the importance of director/owner of the company giving a personal guarantee, 11% of the respondents considered it as very important. The other 89% considered it important. None of the respondents were neutral about it. Neither were there any respondents who considered it unimportant as shown in the figure. (Figure refers to appendix 2.5.46)

5.3.5.5.3 Providing property deposit

The survey results show that when asked about the importance of providing a property deposit, all the respondents considered it very important. (Figure refers to appendix 2.5.47)
5.3.6 Importance given to company factors while making lending decisions

The respondents were asked about the importance given to company factors while making lending decisions; the factors in question were fixed assets, accounting turnover, profitability of the company, and being in business less than or more than two years.

5.3.6.1 Fixed assets

The survey results show that all the respondents highly evaluated the importance of fixed assets of a company. There were 55% who considered it very important and the other 45% of the respondents considered it important. None of the respondents considered it unimportant. (Figure refers to appendix 2.5.48)

5.3.6.2 Accounting turnover

The importance of the accounting turnover of a company was also highly evaluated according to all the respondents. The majority of credit risk managers considered this factor to be very important. Only 10% of the respondents, all from Bank of China, considered it important. None of the respondents considered it unimportant. (Figure refers to appendix 2.5.49)
5.3.6.3 Profitability of company

As shown in the survey result that there were 45% of respondents who considered that the profitability of a company is very important when applying for loans. 10% of respondents all from Bank of China found this factor important. The other 45% of respondents considered it neither important nor unimportant, but none of the respondents from Chinese banks considered it unimportant. (Figure refers to appendix 2.5.50)

5.3.6.4 In business for less than 2 years

The survey results show that when asked about the importance of being in business for less than 2 years, almost half of the respondents were neutral and 10% of respondents from Bank of China considered it very unimportant. There were only 39% respondents considered it important as shown in the graph. One respondent from Bank of China said that in recent years the Internet industry has been developing dramatically. There are many new firms doing internet related business, such as designing web pages and on line shopping services. Since it is a newly emerged industry, there is more room to develop. For banks, there are more profits to expect. That is why no respondents took it to be a very important factor. (Figure refers to appendix 2.5.51)

5.3.6.5 In Business for more than 2 years

The survey results show that when asked about the importance of being in business for more than 2 years, more than half of the respondents (51%) were found neutral. The other 49% of respondents considered it important. None of the respondents considered it unimportant, or
very important. Every beginning is difficult. If a company can survive the first two years, it is likely to be a serious business. Besides, constant financial statements of the previous years can be provided. That is why 49% of the respondents chose important for this factor. (Figure refers to appendix 2.5.52)

5.3.7 Expert system

As discussed in 2.4.1, expert system is, among the traditional methods, the one that majority of managers use for analyzing credit risk (Sinkey, 2002). The respondents were asked about the 5Cs of expert system for credit risk management i.e. character, cash flow, capital, collateral and conditions.

5.3.7.1 Do you consider all the 5 Cs while making decisions?

5Cs for credit risk management are: character, cash flow, capital, collateral and conditions. The response for these is as follows:

When asked whether their banks considered all 5Cs while making lending decisions, all the respondents said that they consider all the 5Cs in loan decision making. There was not even one single respondent to say No. However, I do not think each factor of the 5Cs could be equally evaluated. In the following five questions, respondents were required to rank the 5Cs in order of importance. The purpose is to examine the relevant importance of 5Cs. For example, one respondent ranked capital the most important (No. 1) and conditions the least important (No. 5). The other respondent ranked collateral the most important (No.1) and the conditions the least important (No.5). (Figure refers to appendix 2.5.53)
<table>
<thead>
<tr>
<th>Character</th>
<th>Cash flow</th>
<th>Capital</th>
<th>Collateral</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent A</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Respondent B</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

5.3.7.2 Ranking of 5Cs in the order of relevant importance

5.3.7.2.1 Character

The character of loan applicants includes the borrower’s personal nature, reputation, knowledge, social status and etc. When asked about the relative importance of character compared with the other four factors, none of the respondents considered this factor the most important among the others. There were 28 respondents out of 100, who said it was the fourth important factor and 49 respondents ranked character as the least important. Whereas 5 respondents from Bank of China and 4 from Agricultural Bank of China ranked Character the second important factor among the others. Besides, also there were 14 respondents who ranked character the third important factor among the others. It is observed that the majority of the respondents rank character relatively low. This can be due to the reason that it is difficult to evaluate the worth of a good reputation in terms of cash. Further, the reputation or social status of a borrower can hardly be used for liquidity once a default happens. (Figure refers to appendix 2.5.54)

5.3.7.2.2 Cash Flow

When giving out loans, the cash flow of the firm applying is a factor worth a serious consideration. The reason is that a healthy cash flow is essential to the survival of any
business. Cash flow of the borrower can be used to estimate the possibility of repayment of loans. In other words, a constant cash flow shows that the borrower is running a business with capacity of development. It is less likely to default. There were 33% of the respondents, among them one third from Bank of China, who ranked this factor as the No. 1 important. This was followed by 27% of the respondents who considered it the second important factor among others. There were 25% and 15% of the respondents considered it the third and fourth important, respectively. None of the respondents said it is the least important as demonstrated in table 5.1. (Figure refers to appendix 2.5.55)

Table 5.1 5C – Character

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very</td>
<td>11</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Important</td>
<td>5</td>
<td>3</td>
<td>10</td>
<td>6</td>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Unimportant</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>Very unimportant</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>26</td>
<td>18</td>
<td>22</td>
<td>21</td>
<td>13</td>
<td>100</td>
</tr>
</tbody>
</table>
5.3.7.2.3 Capital: the amount of capital held by the client

When asked about the importance of capital compared to the other 4 factors, 29% of the respondents, including 10% from the Bank of China put it as the most important in ranking, whereas, the majority of the respondents (42%) considered it the second most important factor. Followed by 19% of the respondents who took it as the third most important and 10% took it the fourth. It is not a surprise to find that no respondent put capital as the least important in the ranking list, because if a default happens, capital can be used to pay back the remaining loans. (Figure refers to appendix 2.5.56)

5.3.7.2.4 Collateral

In the literature review expert system section, it was explained that collateral has a big influence over the success of loan application since poor loan collateral might be a problem to credit risk management. It is observed that the majority of the respondents evaluated collateral relatively high because it is a security pledge against default of repayment. The survey result shows that 38% of the respondents listed it the most important factor, followed by 22% of the respondents who considered it the second most important. The other 36% of the respondents took collateral to be the third most important factor and 4% of them ranked it the fourth most important factor to be considered seriously. There was no one who put it at the fifth of the ranking list. (Figure refers to 2.5.57)
5.3.7.2.5 Conditions

Condition indicates the macroeconomic status of the economy. When asked about the importance of condition in making lending decisions, there were very few respondents who ranked it one of the top three factors. Only 3% of the respondents from ICBC and another 3% from Construction Bank of China considered it the third important factor among all 5Cs. Majority of respondents (51%) ranked it the last important, whereas the other 43% of respondents considered it the fourth important. Condition is considered as a relatively less important factor to credit risk managers. This can be explained by the nature of this factor, which is macroeconomic related. Conventionally speaking, banks are willing to issue loans when the economy is booming, whereas during a recession, it is difficult to obtain loans. Credit risk managers do not have any influence over the general economy trend. (Figure refers to appendix 2.5.58)

5.3.8 Ranking the satisfactory level of loan performance

When asked about loan performance, all of the respondents said they were satisfied, but none of them ticked the option very satisfied. (Figure refers to appendix 2.5.59)

5.3.9 Conclusion

Since questions with similar characters are discussed in one group, the conclusion is made accordingly in 8 sections.
5.3.9.1 The demographics

According to the respondents (100 in total), there are 39% of the credit risk managers who were middle-aged, i.e. between 35 and 44. Younger managers took no more than 27%. Among all, the male credit risk managers took 61% over 39% female managers. The gender ratio was largely due to the character of Chinese society. Females have been permitted to take some important positions in recent years. Throughout history, it has always been the male taking high positions. Also under the traditional Chinese culture influence, most of the credit risk managers are married. The average salaries of the respondents are between ten to fifteen thousand RMB, per month, whereas the average wage of people living in cities is no more than two thousand RMB per month. It is obvious that the incomes of credit risk managers are a lot better than other people.

5.3.9.2 Credit risk management

Since staff loyalty is highly evaluated in Chinese banks, it is not surprising that 53% of the respondents have served the organization for more than 10 years. Even more, fifty respondents have been working in the position of issuing loans for more than 10 years. With regard to their educational background, 35% of them hold postgraduate certificates. Training courses are held on a regular basis in the five large commercial banks. There are 83% of credit risk managers who attend training courses once per month. With the years of working experience increasing, there will be less training courses to attend. The credit limit authorization is also varies according to years of service. Statistics show that credit risk managers with more years of working experience have greater authorization power.
Following the demographic questions, the second part of the questionnaire is credit risk management related questions. There are 89% of credit risk managers who agreed that data were very helpful. Statistics show that less experienced managers found data to be more helpful. All the respondents admitted that non-professional factors may affect their decision making. 61% of respondents said that government policy is a big influence, whereas 34% said head office decision is a big influence. Personal experience is a factor which cannot be neglected in the process of making a lending decision. All of the respondents agreed with this. Actually, 22% of them strongly agreed. With regard to financial statements as a compulsory factor, 51% totally agreed. However, this does not mean that non-financial statements are not important. On the contrary, 84% of the respondents totally agreed that they are important. Credit screening is a method to check one’s financial stability and debts. 81% of the respondents totally agreed that this process is very important.

5.3.9.3 Lending policy

Lending policy related questions are the third part of my questionnaire. It is sensitive handling applications from the credit risk manager’s family member. That is why more than half of the respondents said it is not permitted to do so. The rate of return is a key factor of any lending. The majority of the respondents said this figure is between 11-15%. However, all the credit risk managers from Bank of China said that in their bank, the figure is between 5-10%, which is lower than the other four large commercial banks. About the bad debt percentage out of the entire loans, all the respondents said the number is lower than 5%. Most of the respondents (45%) agreed that the credit ceiling for one single industry should be less than 20%. Credit risk assessment reflects the loan performances. That is why 45% of respondents said it is done twice a year. The borrowers’ performance will influence the setting of installments. Nearly half of the respondents check their clients’ performance every month. Besides, regular credit quality reports are made in all the five large commercial banks. All the respondents admitted that they use two frameworks. One is Risk Adjusted Return on Capital (RAROC)’ Framework, which is a model to measure the profitability. The other one
is to study inter-bank exposure. All the five banks use credit default swap to manage bad debts, as well as sharing all default information. Each applicant’s data is verified with care according to all the respondents, because there are strict penalties for credit officers who issue default loans.

5.3.9.4 The relative importance of the aspects that you consider for evaluating bank-wide exposure

The fourth part of the questionnaire requires respondents to evaluate the relative importance of many factors. For example, all respondents ticked the box “very important” to the question of studying financial performance. Operating efficiency is important according to 21% of the respondents. The other 79% believed that this factor is very important. There are 15% of respondents who think that past experience is important and 85% think it is very important. Bank rating is important to 38% and very important to 62% of respondents. Internal matrix for studying bank-wise exposures is highly evaluated according to all respondents. However, they do not evaluate counter party risk equally high. 59% of respondents rank it the highest and 36% think it is important. The other 6% of respondents think this factor is neutral.

5.3.9.5 Factors considered when processing applications from corporate borrowers

The following part is a group of questions about factors considered when lending to corporate borrowers. The majority of the respondents considered that ownership background was important. Only 10% of respondents, all of them from Bank of China, found that applicants from state-owned businesses and non-state-owned business are not treated differently. The stature of an applicant’s business also has an important role according to the 100 credit risk managers. 45% of respondents found it very important that the applicant’s business is at a
promising sector. However, only 6% of respondents found it very important if it is at a declining sector, because the reasons for the decline are considered. The attitudes towards capital size and set up year are similar. More than 90% of respondents agreed that big firms, also old or well-established ones, are very important factors. About 40% of the respondents found that small/medium firms, set up for a short time are also a very important factor. The credit history of applicants is considered seriously. 95% of respondents found that providing a business plan is important when applying for loans. 89% of respondents found that a personal guarantee is important. With regard to property as a deposit, all of the respondents thought that it is very important.

5.3.9.6 Importance given to company factors when making lending decisions

The sixth part of the questionnaire is also about ranking importance. Respondents were required to give their opinions over several factors, including fixed assets, accounting turnover, profitability and years of doing business. Around half of the respondents took fixed asset and profitability as a very important factor. Regarding accounting turnover, the respondents seemed to have an almost united answer. 90% of them took this factor to be very important. The years of doing business was a factor which received many different attitudes. 10% of respondents said it is very unimportant if the applicant’s company has been in business for less than two years, whereas 39% thought it is an important factor. If the company has been set up for more than 2 years, financial statements can be provided. Therefore, the factor of years being in business for more than 2 years is no longer the most important. That is the reason 51% of respondents said it is neutral.
5.3.9.7 **Expert system**

The last part of the questionnaire is about expert systems. 5Cs is the widely adopted method to deal with loan applications. Hence, it is not a surprise that all of the credit risk managers from the five large Chinese commercial banks said that they consider all the 5Cs. The relative importance of the five factors is in the order of collateral (38% of respondents ranked it the most important) cash flow, (33% of respondent ranked it the most important) capital (29% of respondents ranked it the most important). No one considered character to be the most important factor. Instead, there were 9% of the respondents putting it as the second important factor. Statistics show that condition is the least important factor among the 5Cs.

5.3.9.8 **Satisfactory level of loan performance**

All the credit risk managers are satisfied with the current loan performances. However, no one chose the option very satisfied, which means there is still some room to improve.

5.4 **Correlation test**

In the descriptive analysis, questions, due to the large number, have been divided into 8 groups according to general type. Correlation tests have been carried out into 8 groups accordingly. Figures show significant correlation at 0.01 level are selected and put in the following tables for further discussion.
5.4.1 Empirical results of correlation test of the demographics questions

Table 5.2 Empirical results of correlation test of the demographics questions

<table>
<thead>
<tr>
<th></th>
<th>bank</th>
<th>Age</th>
<th>Marital status</th>
<th>Monthly salary</th>
<th>Ranking of bank</th>
<th>years in bank</th>
<th>years issuing loans</th>
<th>qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marital status</td>
<td>-</td>
<td>.583</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ranking of bank</td>
<td>-</td>
<td>-</td>
<td>-.464**</td>
<td>-</td>
<td>-.257</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>years in bank</td>
<td>-</td>
<td>.912</td>
<td>.552</td>
<td>.353</td>
<td>-.366</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>yrs issuing loans</td>
<td>-</td>
<td>.866</td>
<td>.535</td>
<td>.470</td>
<td>-.322</td>
<td>.883</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Qualification</td>
<td>-</td>
<td>.611</td>
<td>.303</td>
<td>-</td>
<td>-.647</td>
<td>.490</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>attend training</td>
<td>-</td>
<td>.680</td>
<td>-</td>
<td>-</td>
<td>-.516</td>
<td>.496</td>
<td>.362**</td>
<td>-</td>
</tr>
<tr>
<td>credit limitation</td>
<td>-</td>
<td>.645</td>
<td>.663</td>
<td>.475</td>
<td>-.537</td>
<td>.649</td>
<td>.598</td>
<td>.366**</td>
</tr>
<tr>
<td>the rate of return</td>
<td>.301</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-.438</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Correlation is significant at 0.01 level

Source: based on research questions (refer to section 5.3.1)

Note: Only significant results are selected and put in this table. The original result generated by SPSS is displaying in appendix 2.6.1.

Table 5.1 shows the correlation result which is significant at the 0.01 level. It is surprising to find out that rate of return is significant but negatively correlated to the ranking of banks. According to the questionnaire coding (1 stands for headquarter, 2 stands for provincial branches and 3 stands for local branches), higher rates of return are more likely to have
happened to headquarters than to provincial branches or local branches. The author thinks the reason is that higher- ranking branches and headquarters have larger assets, which attract more investment projects. Local small branches are handling small projects due to the limitation of their total asset. Small branches may not be able to issue large loans to finance a project even if it is a very profitable one. In section 6.3, I have run co-integration test to examine the inter relationship between total asset and total equity, to be able to prove the positive correlation between the rate of return and ranking of branches.

5.4.2 Credit risk management

Table 5.3 Empirical result of correlation test of questions about credit risk management

<table>
<thead>
<tr>
<th></th>
<th>the rate of return</th>
<th>Is data helpful factors influencing decision</th>
<th>personal experience</th>
<th>Financial statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>factors influence decision</td>
<td>.626</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Financial statement</td>
<td>-.395</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>non-financial data</td>
<td>-</td>
<td>-</td>
<td>-.318</td>
<td>-</td>
</tr>
<tr>
<td>Credit screening methods</td>
<td>-.436</td>
<td>.319</td>
<td>-.558</td>
<td>-.227</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-.358*</td>
<td>-.290*</td>
</tr>
</tbody>
</table>

"Correlation is significant at 0.01 level

Note: Only significant results are selected and put in this table. The original result generated by SPSS is displaying in appendix 2.6.2

All the questions related to credit risk management have been put in the second group and the empirical results of correlations test show that the variable ‘factors influencing decision making’ is positively related to rate of return. According to the questionnaire coding (1=personal experience, 2= government policy, 3 =headquarter decision) it shows that headquarter decisions are very important to loan applicants. In Chinese banks, credit risk
managers should strictly follow headquarters decisions when issuing loans. I think it is because the higher level of management team has better information resources than any ordinary credit risk managers. The variables “financial statements” and “credit screening methods” show negatively correlations with the “rate of return”, it is because of the questionnaire coding. The interpretation is that credit risk managers who more strongly agree to exam applicants’ financial statements and use credit screening methods are more likely to issue loans with higher rate of return.

5.4.3 Lending policy

Table 5.4 Empirical result of correlation test of lending policy related questions

<table>
<thead>
<tr>
<th></th>
<th>the rate of return</th>
<th>loans to family</th>
<th>% of credit ceiling</th>
</tr>
</thead>
<tbody>
<tr>
<td>loans to family</td>
<td>-.885**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>% of credit ceiling</td>
<td>.496**</td>
<td>-.687**</td>
<td>-</td>
</tr>
<tr>
<td>exam performance</td>
<td>.779**</td>
<td>-.964**</td>
<td>.768**</td>
</tr>
</tbody>
</table>

"Correlation is significant at 0.01 level

Note: Only significant results are selected and put in this table. The original result generated by SPSS is displaying in appendix 2.6.3

The third group of variables is those questions related to lending policy. Empirical results of correlation test show that credit risk managers who believe it should be allowed to issue loans to family are more likely to generate higher rate of return. It shows credit risk managers are more confident with the applicants who are their family or relatives, because they have known applicants for relatively long time and able to get their accurate income information. It is almost impossible for applicants to apply loans using faked documents. It is obvious that
majority of credit risk managers are not willing to assist their family with the loan applications if there is a higher risk of default.

5.4.4 The relative importance of the following aspects that you consider for evaluating bank-wide exposures

Table 5.5 Empirical result of correlation test of questions about the relative importance of operating efficiency, past experiences and bank rating

<table>
<thead>
<tr>
<th></th>
<th>the rate of return</th>
<th>operating efficiency</th>
<th>past experiences</th>
<th>bank rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>operating efficiency</td>
<td>-.290**</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>bank rating</td>
<td>-.544**</td>
<td>.355**</td>
<td>.421**</td>
<td>-</td>
</tr>
<tr>
<td>country risk</td>
<td>-.320**</td>
<td>.555**</td>
<td>.432**</td>
<td>.786**</td>
</tr>
</tbody>
</table>

Correlation is significant at 0.01 level

Note: Only significant results are selected and put in this table. The original result generated by SPSS is displaying in appendix 2.6.4

The fourth group includes questions about the relative importance of some factors in the process of issuing loans. As it is shown in table 5.5, the rate of return is negatively correlated to operating efficiency, bank rating and country risk. According to the risk return theory the low risk and high risk are differentiated by a low potential return and a high potential return respectively, since credit risk managers who evaluate those factors less important are taking more risks, a higher rate of return is expectable. It is understandable that country risk is positively correlated to operating efficiency, past experiences and bank rating. For example, if an applicant wants to expend his business to a multinational company and set up oversea branches, credit risk managers would seriously consider the operating efficiency of his business, together with the past experiences and bank rating of his company.
5.4.5 Factors considered when lending to corporate borrowers

Table 5.6 Empirical result of correlation test of questions about the factors considered when lending to corporate borrowers

```
<table>
<thead>
<tr>
<th></th>
<th>the rate of return</th>
<th>state-owned non-state-owned</th>
<th>Promising</th>
<th>Declining</th>
<th>big firm medium &amp; small</th>
<th>old-well-established</th>
<th>Newly set up</th>
<th>providing business plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>state-owned</td>
<td>.391**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>non-state-owned</td>
<td>.820**</td>
<td>.690**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Promising</td>
<td>-.583**</td>
<td>.306**</td>
<td>-.420**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Declining</td>
<td>.451**</td>
<td>-.449**</td>
<td>-.591**</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>big firm</td>
<td>-.346**</td>
<td>.318**</td>
<td>-</td>
<td>-.527**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>medium &amp; small</td>
<td>.476**</td>
<td>.400**</td>
<td>.789**</td>
<td>-.503**</td>
<td>.556**</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>old-well-established</td>
<td>-.319**</td>
<td>.293**</td>
<td>-</td>
<td>-.604**</td>
<td>.921**</td>
<td>.574**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Newly set up</td>
<td>.748**</td>
<td>.310**</td>
<td>.876**</td>
<td>-.727**</td>
<td>.391**</td>
<td>.900**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>providing business plan</td>
<td>-.289**</td>
<td>-</td>
<td>-.261**</td>
<td>.533**</td>
<td>-</td>
<td>-.268**</td>
<td>-.287**</td>
<td>-</td>
</tr>
<tr>
<td>personal guarantee</td>
<td>.443**</td>
<td>-</td>
<td>-.496**</td>
<td>.314**</td>
<td>-.655**</td>
<td>-.719**</td>
<td>-.653**</td>
<td>-</td>
</tr>
</tbody>
</table>
````

**Correlation is significant at 0.01 level

*Note: Only significant results are selected and put in this table. The original result generated by SPSS is displaying in appendix 2.6.5*

Questions about the factors that credit risk managers would like to take into consideration in the process of issuing loans have been gathered in the fifth group. The empirical result shows that the rate of return is significantly related to the ownership of applicant’s company, the
size, how many years applicant’s company has been set up as well as if the applicant is able to provide a business plan about what they are going to do with the loans.

The ownership of applicant’s company is positively related to rate of return. Non-state-owned business has more significant correlation than state-owned ones. It is because the latter ones have access to get lower interest loans due to the government policies. As discussed in 3.6.1. Chinese banks used to issue loans to state-owned enterprises without expectation of repayment. Majority of those loans turned out default and contributed to the large number of non-performing-loans. Through years, non-state-owned companies have developed a lot but still cannot compete with state-owned companies in getting cheap loans.

5.4.6 Importance given to company factors while making lending decisions

Table 5.7 Empirical result of correlation test of questions about importance given to company factors while making lending decisions

<table>
<thead>
<tr>
<th></th>
<th>the rate of return</th>
<th>fixed asset</th>
<th>accounting turnover</th>
<th>Profitability</th>
</tr>
</thead>
<tbody>
<tr>
<td>fixed asset</td>
<td>.549**</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>accounting turnover</td>
<td>.557**</td>
<td>-.302**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Profitability</td>
<td>.752**</td>
<td>.953**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>business &lt; 2 yrs</td>
<td>.805**</td>
<td>-</td>
<td>.841**</td>
<td>.473**</td>
</tr>
<tr>
<td>business more than 2 yrs</td>
<td>.395**</td>
<td>.887**</td>
<td>-.340**</td>
<td>.822**</td>
</tr>
</tbody>
</table>

“Correlation is significant at 0.01 level

Note: Only significant results are selected and put in this table. The original result generated by SPSS is displaying in appendix 2.6.6
Accounting turnover and profitability are not significantly correlated at 0.01 level, so the table is empty vertically and horizontally. It means when considering loan applications, credit risk managers take ‘accounting turnover’ and ‘profitability’ as two independent items. In other words, if the credit risk manager is happy with the accounting turnover of applicant’s company, he/she will not consider the factor of the profitability.

The sixth group includes those questions about the financial status of applicant’s company. The fixed asset, accounting turnover, profitability and whether or not applicant’s business has been set up for more than 2 years are all positively correlated to rate of return. Besides, the factor “business set up for less than 2 years” has the most significant correlation among the five factors. This is because applicants normally should provide the latest three years accounting reports. Credit risk managers should give special consideration to those applications when the company has less than 2 years experiences doing business. In this process of loan decision making, additional work is involved so higher interest rate of loans shall be expected.

5.4.7 Expert system

Table 5.8 Empirical result of correlation test of expert system related questions

<table>
<thead>
<tr>
<th>Character</th>
<th>Cash flow</th>
<th>Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash flow</td>
<td>-.352**</td>
<td>-</td>
</tr>
<tr>
<td>Capital</td>
<td>-.281**</td>
<td>-.294**</td>
</tr>
<tr>
<td>Collateral</td>
<td>-</td>
<td>-.480**</td>
</tr>
<tr>
<td>Condition</td>
<td>-.768**</td>
<td>-</td>
</tr>
<tr>
<td>the rate of return</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

"Correlation is significant at 0.01 level
Note: Only significant results are selected and put in this table. The original result generated by SPSS is displaying in appendix 2.6.7.

Expert system includes character, cash flow, capital, collateral and condition. Table 5.7 shows all the significant correlations. It can be found that rate of return is positively correlated to capital. Referring to 2.5.1, capital represents the assets or capital the borrower holds. A leverage of debt to capital is an indicator of how probable is the bankruptcy or default. This factor applies to interbank loans. A lending bank can use this factor to figure out the default risk and make a decision of whether or not issuing loans to the applicant and the accurate interest rate.

5.4.8 Ranking the satisfactory level of loan performance

Since all of the respondents said they were satisfied with the rate of return, correlation test is not applicable.

5.4.9 Summary

The empirical correlation result shows that 26 factors are significantly correlated to the rate of return in total. They are: ranking of banks (-0.438), factors influencing decision (0.626), financial statement (-0.395), credit screening methods( -0.436), loans to family (-0.885), percentage of credit ceiling(0.496), exam performance (0.779), operating efficiency (-0.290), bank rating (-0.544), country risk (-0.320), state-owned (0.391), non-state-owned (0.820), promising (-0.583), declining ( 0.451), big firm (-0.346), medium and small company (0.476), old-well-established (-0.319), newly-setup (0.748), providing business plan (-0.289), personal guarantee (0.443), fixed asset (0.549), accounting turnover (0.557), profitability
(0.752), business less than 2 years (0.805), business more than 2 years (0.395), capital (0.272).

Among them, there are 11 factors showing more than +/− 0.5 significant correlations to the rate of return: factors influence decision (0.626), loans to family (-0.885), exam performance (0.779), bank rating (-0.544), non-state-owned (0.820), promising (-0.583), newly-setup (0.748), fixed asset (0.549), accounting turnover (0.557), profitability (0.752), business less than 2 years (0.805).

In the loan decision making process, those above 11 factors worth exceptional attention from credit risk managers, because the aim of banks is to maximise the profitability through the activities of lending and borrowing. Credit risk managers should put into their minds those factors which have significant correlation with the rate of return, so that they can use this knowledge to generate greater profitability for shareholders.

5.5 Conclusion

In this chapter, I have made primary data analysis based on the feedback from 100 senior credit risk managers. I made face-to-face questionnaires (refer to Appendix-1) with 26 respondents from bank of China, 18 from ICBC, 22 from Agricultural bank of China, 21 from Construction Bank of China and 13 from Communication bank of China. These five banks are the large commercial banks in China considering their capital size and market share. Since poor management and unwise lending can cause bank failures, it is necessary to analyse the lending attributes of the senior credit risk managers as well as to observe the loan performance under the current credit risk management. Therefore, any potential limitations of credit risk management could be solved.
The first part is a descriptive analysis, including demographic information of the respondents and credit risk management related questions. The latter ones help to learn the respondent’s attitudes when handling loan applications. In the banking industry, very few researches have been made to examine the credit risk managers’ opinions and their influence on loan performances.

The second part is correlation test to investigate factors which could explain the possibility of getting a high rate of return on loans. According to the data collected through my questionnaire, I found that there are 11 factors showing more than +/- 0.5 significant correlations to the rate of return: factors influence decision (0.626), loans to family (-0.885), exam performance (0.779), bank rating (-0.544), non-state-owned (0.820), promising (-0.583), newly-setup (0.748), fixed asset (0.549), accounting turnover (0.557), profitability (0.752), business less than 2 years (0.805). Credit risk managers should closely exam those factors of applicants in order to generate higher rate of return.

In the following chapter, secondary data analysis will be made to investigate the competition status of the five large commercial banks in China and the inter-relationship between capital size and profitability of banks.
Chapter VI

Secondary data analysis

6.1 Empirical analysis of Panzar – Rosse H statistic

6.1.1 Competition test

To analyse the competition of the five large commercial banks in China, I used the following equation:

\[
\ln (TR) = \alpha + \beta_1 \ln W_L + \beta_2 \ln W_F + \beta_3 \ln W_K + \gamma_1 \ln Y_1 + \gamma_2 \ln Y_2 + \gamma_3 \ln Y_3 + \varepsilon \quad (10)
\]

Where:

\( TR = \) Total revenue

\( W_L = \) Ratio of personnel expenses to total assets

\( W_F = \) Ratio of interest expenses to total deposits

\( W_K = \) Ratio of other operating and administrative expenses to total assets

\( Y_1 = \) Ratio of equity to total Assets

\( Y_2 = \) Net loans to total assets
\[ Y_3 = \text{Total assets} \]

\[ \varepsilon = \text{a stochastic disturbance term} \]

In Nathan and Neave (1989), TRILL (gross revenue less provision for loan losses) was considered to be the dependent variable. Gross revenue has been used also as a dependent variable to make the calculation of the regression, but in reality the two regressions are nearly the same. In Yuan (2006) operating revenue was considered to be the dependent variable. Following the Chinese accounting standards, the term operating revenue includes: revenues from loans, security transactions, and exchange trades. In Shaffer and Disalvo (1994) gross revenue was considered to be the dependent variable. In my research, total revenue includes interest income, fees and commission income and other operating incomes.

One of the variables is total asset for identifying economy of scale. This is incorporated in the regression, alike in the studies carried out by Nathan and Neave (1989) and Claessens and Laeven (2004)

H-statistic is computed based on the following equation:

\[ H = \beta_1 + \beta_2 + \beta_3 \]

Software E-views has been adopted to run the H statistic test, using the calculation method as discussed in section 4.4.2.1 and the following table shows the result of competitive conditions tests of the five large commercial Chinese banks over a period of 2004–2011. H-statistic shows that the bank’s competition in China is a monopolistic competition at a very high degree of 0.72 (as it is showing in table 6.1). Hence, the null hypothesis is rejected at 1% level. In China, banking sector is thus highly concentrated, nonetheless there is still completion. In general it is possible to say that the market structure is in monopoly competition not simply monopoly.
Table 6.1 Empirical result of Panzar and Rosse H statistic test

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A)</td>
<td>8.03086</td>
<td>8.503797</td>
<td>0.944385</td>
<td>0.5182</td>
</tr>
<tr>
<td>(\beta_1)</td>
<td>0.224863</td>
<td>0.651661</td>
<td>0.345062</td>
<td>0.7885</td>
</tr>
<tr>
<td>(\beta_2)</td>
<td>0.642267</td>
<td>2.171637</td>
<td>0.295753</td>
<td>0.8169</td>
</tr>
<tr>
<td>(\beta_3)</td>
<td>-0.142939</td>
<td>0.670503</td>
<td>-</td>
<td>0.8663</td>
</tr>
<tr>
<td>(\gamma_1)</td>
<td>1.176255</td>
<td>0.862671</td>
<td>1.363503</td>
<td>0.4029</td>
</tr>
<tr>
<td>(\gamma_2)</td>
<td>0.077623</td>
<td>1.534848</td>
<td>0.050574</td>
<td>0.9678</td>
</tr>
<tr>
<td>(\gamma_3)</td>
<td>-0.262792</td>
<td>0.357551</td>
<td>-</td>
<td>0.5965</td>
</tr>
<tr>
<td>H-Statistic</td>
<td>0.724191</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Besides, the statistic of R-square is very close to 1 at 0.916, which indicates that this model fits the data. The reason is that R-squared is always between 0 and 1. When it is 0, it indicates that the model explains none of the variability of the response data around its mean. Whereas, 1 indicates that the model explains all the variability of the response data around its mean. As discussed in section 4.4.2.1 Panzar and Rosse H-statistic test is based on an important assumption that the market is long run equilibrium. In the following section 6.1.2, Equilibrium test was carried on.
6.1.2 Equilibrium test

In a market, which is in equilibrium status, there should be no correlation between the prices of input factors and a dependant variable. In Nathan and Neave (1989), ROA was estimated as a dependent variable and defined the equilibrium E-statistic as the summation of parameters. In Claessens and Laeven (2004) and Yuan (2006), equilibrium test was conducted. The same theory applies when calculating the ROE (return on Equity) as a dependent variable. In both tests with ROA and ROE as dependent variables respectively, E-statistic <0 indicates disequilibrium market, while E=0 indicates equilibrium market. The following equation has been adopted to generate E-statistic:

\[
\ln (\text{ROA}) = \alpha + \beta_1 \ln W_L + \beta_2 \ln W_F + \beta_3 \ln W_K + \gamma_1 \ln Y_1 + \gamma_2 \ln Y_2 + \gamma_3 \ln Y_3 + \varepsilon \quad (4)
\]

\[
\ln (\text{ROE}) = \alpha + \beta_1 \ln W_L + \beta_2 \ln W_F + \beta_3 \ln W_K + \gamma_1 \ln Y_1 + \gamma_2 \ln Y_2 + \gamma_3 \ln Y_3 + \varepsilon \quad (5)
\]

Where:

ROA = Return on assets = Net profit/ Total Asset

ROE = Revenue on equity

\( W_L \) = Ratio of personnel expenses to total assets

\( W_F \) = Ratio of interest expenses to total deposits

\( W_K \) = Ratio of other operating and administrative expenses to total assets

\( Y_1 \) = Ratio of equity to total Assets

\( Y_2 \) = Net loans to total assets

\( Y_3 \) = Total assets
\( \varepsilon \) = a stochastic disturbance term = error

\[ E\text{-statistic} = \beta_1 + \beta_2 + \beta_3 \]

In the P-R (Panzar and Rosse) framework, banks have to be analysed from a long-run equilibrium perspective. The equilibrium statistic \( E \) can be obtained by summing up the input price elasticity, and the hypothesis of \( E=0 \). In the case of the hypothesis being rejected then it is possible to say there is no equilibrium in the market. The equilibrium conditions are checked by applying the estimation of \( \ln ROA \) and \( \ln ROE \) for Chinese banks between the years 2004–2011 can be seen in the tables 6-6 and 6-7 respectively.

Table 6.2 Empirical result of the estimation of Ln ROA based on formula 4

<table>
<thead>
<tr>
<th>Dependent variable: LOG (ROA)</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>-21.71941</td>
<td>12.4796</td>
<td>-1.740393</td>
<td>0.332</td>
</tr>
<tr>
<td>( \beta_1 )</td>
<td>0.802293</td>
<td>0.956333</td>
<td>0.838926</td>
<td>0.5556</td>
</tr>
<tr>
<td>( \beta_2 )</td>
<td>-2.072915</td>
<td>3.186949</td>
<td>-0.650439</td>
<td>0.6329</td>
</tr>
<tr>
<td>( \beta_3 )</td>
<td>1.036175</td>
<td>0.983985</td>
<td>1.05304</td>
<td>0.4836</td>
</tr>
<tr>
<td>( \gamma_1 )</td>
<td>0.767635</td>
<td>1.265998</td>
<td>0.606348</td>
<td>0.653</td>
</tr>
<tr>
<td>( \gamma_2 )</td>
<td>1.236976</td>
<td>2.25244</td>
<td>0.549172</td>
<td>0.6803</td>
</tr>
<tr>
<td>( \gamma_3 )</td>
<td>1.080815</td>
<td>0.524718</td>
<td>2.059802</td>
<td>0.2877</td>
</tr>
<tr>
<td>E-Statistic</td>
<td>-0.234447</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 6.2
Table 6.3 Empirical result of the estimation of Ln ROE based on formula 5

<table>
<thead>
<tr>
<th>Dependent variable: LOG (ROE)</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>α</td>
<td>2.72E-10</td>
<td>2.83E-10</td>
<td>0.961951</td>
<td>0.5123</td>
</tr>
<tr>
<td>β1</td>
<td>-1.38E-11</td>
<td>2.17E-11</td>
<td>-0.637363</td>
<td>0.6388</td>
</tr>
<tr>
<td>β2</td>
<td>6.21E-11</td>
<td>7.23E-11</td>
<td>0.859097</td>
<td>0.5482</td>
</tr>
<tr>
<td>β3</td>
<td>-2.01E-11</td>
<td>2.23E-11</td>
<td>-0.902738</td>
<td>0.5325</td>
</tr>
<tr>
<td>γ1</td>
<td>1</td>
<td>2.87E-11</td>
<td>3.48E+10</td>
<td>0</td>
</tr>
<tr>
<td>γ2</td>
<td>-6.77E-12</td>
<td>5.11E-11</td>
<td>-0.132609</td>
<td>0.9161</td>
</tr>
<tr>
<td>γ3</td>
<td>1</td>
<td>1.19E-11</td>
<td>8.41E+10</td>
<td>0</td>
</tr>
<tr>
<td>E-Statistic</td>
<td>2.82E-11</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

In table 6.2, ROA was taken as dependent variable, E statistic ≠ 0 at 10% level and r-squared is very high at 0.97. This is a clear indication of a no equilibrium scenario of the banking industry market. For the equilibrium hypothesis of P-R, it should be rejected. However, taking ROE as dependent variable for the same period, E statistic =2.82E-11= 0, while r-squared is close to 1, as shown in table 6.3. In other words, using ROE as dependent variable to estimate E-statistic, the market appears to be at equilibrium during 2004-2007. Since there is a conflict in generating E statistic using ROA and ROE as dependent variables respectively, the conclusion is that the Chinese banking market was questionable during 2004-2011. It cannot be confirmed whether it is equilibrium or not.

The reason for this conflict is understandably due to the limitation of a secondary data panel (5 banks alone). In this research, I have studied the 5 large commercial banks in China. Hence, the data I used in the P-R model was based on these 5 large commercial banks, instead of the whole Chinese banking industry. Even if the 5 large commercial banks together share more than half of the Chinese banking market, they can hardly stand for the entire
banking industry market in China. That is most probably why the equilibrium test results for the market inconclusive.

In other research papers, the Chinese banking market has been found to be at equilibrium. Yuan (2006) made an equilibrium test of the Chinese banking industry during the period of 1996-2001. In 2001 the results show a substantial variation from E=0 at the 10% level, which indicated a scenario of non equilibrium on the banking industry market in 2001. For the other years, the market was at equilibrium. Fu and Liang (2011) studied the Chinese banking industry over the period of 2000-2007, finding that the market was at equilibrium as well. Hence, I positively assume that the market remains equilibrium throughout my research period 2004-2011. The conflict, of E statistic using ROA and ROE as dependent variable respectively, was due to the limitation of the data panel. If it could be possible to access the data of the whole Chinese banking industry and then make an equilibrium test, it is likely that the E statistic would be zero.

6.2 Empirical analysis of ADF

With the idea of testing the 3 hypothesis of the relationship between capital size and profitability discussed in section 3.4.3, ADF test, Johansen’s co-integration test and Granger causality test are going to be used to exam the relationship between total asset (represent capital size) and total equity (represent profitability). The software Eviews has been used to run those tests based on the quarterly data between 2004 and 2011.

Unit roots as well as the corresponding order of integration for the two variables, total asset (TA) and total equity (TE), were tested applying the Augmented Dickey–Fuller (ADF) tool. The null hypothesis is considered to be non-stationary. For the two variables, TA and TE, the
computed ADF test statistic of all the 5 large commercial banks is greater than 5% which is widely accepted as the critical value, and therefore the null hypothesis is accepted. TA and TE are non-stationary as shown in table 6.4.

Table 6.4 Total asset and Total equity are non-stationary

<table>
<thead>
<tr>
<th>Banks</th>
<th>Variables</th>
<th>ADF-statistic</th>
<th>Probability</th>
<th>Critical value at 5%</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank of China</td>
<td>TA</td>
<td>1.811694</td>
<td>0.8</td>
<td>-2.963972</td>
<td>Non-stationary</td>
</tr>
<tr>
<td></td>
<td>TE</td>
<td>-2.129261</td>
<td>0.5</td>
<td>-3.568379</td>
<td>Non-stationary</td>
</tr>
<tr>
<td>ICBC</td>
<td>TA</td>
<td>0.835713</td>
<td>0.993</td>
<td>-2.963972</td>
<td>Non-Stationary</td>
</tr>
<tr>
<td></td>
<td>TE</td>
<td>0.248459</td>
<td>0.9712</td>
<td>-2.963972</td>
<td>Non-Stationary</td>
</tr>
<tr>
<td>Construction Bank of China</td>
<td>TA</td>
<td>1.372506</td>
<td>0.9984</td>
<td>-2.963972</td>
<td>Non-Stationary</td>
</tr>
<tr>
<td></td>
<td>TE</td>
<td>1.719090</td>
<td>0.9994</td>
<td>-2.963972</td>
<td>Non-Stationary</td>
</tr>
<tr>
<td>Communication Bank of China</td>
<td>TA</td>
<td>2.575623</td>
<td>1</td>
<td>-2.967767</td>
<td>Non-Stationary</td>
</tr>
<tr>
<td></td>
<td>TE</td>
<td>2.137661</td>
<td>0.9999</td>
<td>-2.960411</td>
<td>Non-Stationary</td>
</tr>
<tr>
<td>Agricultural Bank of China</td>
<td>TA</td>
<td>1.642079</td>
<td>0.9993</td>
<td>-2.963972</td>
<td>Non-Stationary</td>
</tr>
<tr>
<td></td>
<td>TE</td>
<td>1.401553</td>
<td>0.9985</td>
<td>-2.963972</td>
<td>Non-Stationary</td>
</tr>
</tbody>
</table>

In order to eliminate the heteroskedasticity of total assets and total equity, their natural logarithms were taken and defined as LnTA and LnTE. ADF tests were carried out on total asset and total equity and the logged of total assets and total equity were differentiated by the order of integration corresponding to each of them as appears in Table 6-9.
As to the variables of total assets and total equity, I have found a unit root that is statistical significant following the conventional levels for total assets and total equity. To determine if the order of integration is one (1) at the 5% level, I applied the Augmented Dickey–Fuller tests on their first difference. The results of the unit root test show that in most of the banks, both Ln TA and Ln TE are stationary, except the Ln TE of ICBC which is Non-stationary. In this case, ADF tests of Ln TA and Ln TE on their 2\(^{nd}\) difference should be computed. The result is as shown in table 6-9 that both Ln TA and Ln TE of all the five examined Chinese banks were stationary at the 2\(^{nd}\) difference. Hence, the null hypothesis of unit root should be rejected. Therefore, now it is possible to carry out a co-integration test using all the series required for the estimation procedure which are regarded as order II (2).

Table 6.5 Result of ADF unit root test

<table>
<thead>
<tr>
<th>Banks</th>
<th>Variables</th>
<th>ADF-statistic</th>
<th>Probability</th>
<th>Critical value at 5%</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank of China</td>
<td>Ln TA</td>
<td>-7.098985</td>
<td>0</td>
<td>-3.580623</td>
<td>Stationary</td>
</tr>
<tr>
<td></td>
<td>Ln TE</td>
<td>-5.819297</td>
<td>0.0003</td>
<td>-3.580623</td>
<td>Stationary</td>
</tr>
<tr>
<td>ICBC</td>
<td>Ln TA</td>
<td>-6.577363</td>
<td>0</td>
<td>-2.971853</td>
<td>Stationary</td>
</tr>
<tr>
<td></td>
<td>Ln TE</td>
<td>-4.539223</td>
<td>0.0012</td>
<td>-2.971853</td>
<td>Stationary</td>
</tr>
<tr>
<td>Construction bank of China</td>
<td>Ln TA</td>
<td>-6.50729</td>
<td>0</td>
<td>-2.971853</td>
<td>Stationary</td>
</tr>
<tr>
<td></td>
<td>Ln TE</td>
<td>-5.703811</td>
<td>0.0001</td>
<td>-2.971853</td>
<td>Stationary</td>
</tr>
<tr>
<td>Communication bank of China</td>
<td>Ln TA</td>
<td>-6.855618</td>
<td>0</td>
<td>-2.971853</td>
<td>Stationary</td>
</tr>
<tr>
<td></td>
<td>Ln TE</td>
<td>-6.139224</td>
<td>0</td>
<td>-2.971853</td>
<td>Stationary</td>
</tr>
<tr>
<td>Agricultural bank of China</td>
<td>Ln TA</td>
<td>-8.185447</td>
<td>0</td>
<td>-2.971853</td>
<td>Stationary</td>
</tr>
<tr>
<td></td>
<td>Ln TE</td>
<td>-4.344153</td>
<td>0.002</td>
<td>-2.971853</td>
<td>Stationary</td>
</tr>
</tbody>
</table>
6.3 Empirical analysis of Co-integration test

Following what the theory says, the co-integration test is applicable on non-stationary series. As proved by the previous ADF test the variables, total asset and total equity, are integrated of order 0 which is non-stationarity. The 1st difference of TA and TE show stationarity, except for Total equity in Agricultural bank of China, is Non-stationary. The adequate process to find whether or not there is any relation between total assets and total equity is by testing for a co-integrating equation. When testing co-integration relationships, I used the Johansen and Juselius method of testing. The co-integration tests results are shown as follows in table 6-6.

Table 6.6 Johansen Co-integration tests

<table>
<thead>
<tr>
<th>Bank of China</th>
<th>Null Ho</th>
<th>J-trace</th>
<th>Prob</th>
<th>J-max</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>R=0</td>
<td>9.194888</td>
<td>0.3477</td>
<td>6.469426</td>
<td>0.5537</td>
<td></td>
</tr>
<tr>
<td>R=1</td>
<td>2.725462</td>
<td>0.0988</td>
<td>2.725462</td>
<td>0.0988</td>
<td></td>
</tr>
<tr>
<td>ICBC</td>
<td>R=0</td>
<td>5.828995</td>
<td>0.7156</td>
<td>4.512584</td>
<td>0.8017</td>
</tr>
<tr>
<td>R=1</td>
<td>1.316411</td>
<td>0.2512</td>
<td>1.316411</td>
<td>0.2512</td>
<td></td>
</tr>
<tr>
<td>Construction Bank of China</td>
<td>R=0</td>
<td>15.41096</td>
<td>0.0515</td>
<td>13.94115</td>
<td>0.0562</td>
</tr>
<tr>
<td>R=1</td>
<td>1.469808</td>
<td>0.2254</td>
<td>1.469808</td>
<td>0.2254</td>
<td></td>
</tr>
<tr>
<td>Communication Bank of China</td>
<td>R=0</td>
<td>9.197080</td>
<td>0.3475</td>
<td>6.342745</td>
<td>0.5696</td>
</tr>
<tr>
<td>R=1</td>
<td>2.854335</td>
<td>0.0911</td>
<td>2.854335</td>
<td>0.0911</td>
<td></td>
</tr>
<tr>
<td>Agricultural Bank of China</td>
<td>R=0</td>
<td>8.601144</td>
<td>0.4035</td>
<td>6.035635</td>
<td>0.6086</td>
</tr>
<tr>
<td>R=1</td>
<td>2.565510</td>
<td>0.1092</td>
<td>2.565510</td>
<td>0.1092</td>
<td></td>
</tr>
</tbody>
</table>
The trace statistic is less than the 5% critical value, so this model shows no co-integration of the two variables, Total asset and Total equity. The probabilities of all five banks show significant at 5%, so null hypothesis should be accepted. According to co-integration theory, there are no co-integration vectors for this model meaning the lack of stable long run relationships between total assets and total equity.

6.4 Conclusion

The software Eviews has been adopted to make the secondary data analysis based on quarterly data between 2004 and 2011, which has been discussed through two parts.

The first part tests the competitive levels among the five large commercial banks in China over the period 2004-2011 using the Rosse–Panzar model. The competitive conditions among the five large commercial Chinese banks have been analysed. The evidence from the Panzar–Rosse methodology suggests that the five large commercial banks in China were monopolistically competitive. In the coming years, banks should be putting effort into improving the competition level.

The second part of the analysis was contributed by two tests in sequence. ADF unit root test was made at the beginning to test if the variables, total asset and total equity, are non-stationary. The finding is that they are non-stationary of order at level I(0). Hence, the Co-integration test is applicable. However, according to theory, my calculated statistic is interpreted as there is no co-integration between total asset and total equity. As mentioned in 4.4.2.3 that Granger Causality test is applicable whenever the variable’s time series are found to be either stationary or with integration order 0 from the ADF test, or otherwise when the time series are considered as order of integration 1 and co-integrated. Since the empirical
result of Co-integration test does not show any long run relationship between total asset and total equity according to the data between 2004 and 2011, there is no need to carry Granger Causality test.

Even if total asset and total equity are co-integrated, the Granger Causality test shows nothing about the causal relationship between the two variables. (Refer to appendix 3) As discussed in 3.4.3, the relationship between capital and profitability could be positive or negative depending on bank’s circumstance. If capital ratio is higher than optimal capital ratio, it shows a negative relationship because high capital is considered to have a high cost for banks. However, “trade-off” theory claims that high capital may lower the risk and as a consequence lower any compensation to investors due to bankruptcy. In this case, it implies a positive correlation between capital size and profitability.

In 6.3, the empirical result shows that there is no correlation between capital and profitability. Theoretically, it is possible because according to MM theorem in perfect financial market, the capital structure has no influence on the value of the firm. However, Chinese financial market is far from perfect financial market, since it does not meet the assumptions of the perfect financial market at all.

As discussed previously, according to the trade-off theory and pecking order theory, the correlation between capital ratio and profitability depends on the circumstance of the bank. In other words, the capital ratio can be either above or below the optimal capital ratio. When banks successfully achieve their optimal capital ratio, it does not show any short-run relationship between capital ratio and profitability. This is due to the reason that the first order conditions that are considered as standard represent that the value is not influenced by any variation in the capital. In this study, the examined time period of which the tests apply
are from 2004 to 2011. It is relatively a short time period. Thus, it can be concluded that
capital ratio of Chinese banks during this time period was close to the optimum capital ratio.

Berger et al, (2009) indicated that the business plans of a bank also have influence over
capital ratio. In the case that bank has a determined business strategy, it normally shows a
lower capital ratio because in order to expand market share, it is necessary to leverage up
rapidly. However, when a bank is planning the acquisition of another bank, regulators can ask
for increasing the capital ratio for the new bank to have an appropriate capital.

Since the optimal capital ratio of banks’ suffer oscillations over the business cycle, it is also
very likely that the capital and profitability relation suffer oscillations as well in a cycle
manner, tending to be more positive at difficult times since banks that increase their
capital ratios improve their profits as well as give confidence to investors. Hence, it is
possible that during a particular time period, there shows no correlation between capital and
profitability.
Chapter VII

Conclusion and Recommendation

7.1 Introduction

This study aimed at finding out how credit risk decisions are made and how these decisions are affected by some factors ranging from personal to rational and institutional. As the profitability of banks depends a great deal on these managers’ decisions, the research aimed at tracing the factors that impact on profitability. In this chapter, the main findings of this research is reviewed and outlined hoping that it will result in some useful contribution to the banking industry with a few tangible recommendations. I present the main studies and contributions to the current Chinese banking industry.

This study aimed to develop a framework for Chinese banking credit risk management in order to improve the loan performance. In this chapter, a review has been made over the main findings of this research. I present the main studies and contribution to the current Chinese banking industry.

7.2 Accomplishment of research objectives

In Chapter 1, I stated the aim of this research was to examine the impact of the reform of Chinese banking system on certain aspect of credit risk management. In order to achieve this aim, there are several objectives to implement. The accomplishment of the objectives is discussed as follows:
• Develop a thorough understanding of credit risk management in the banking industry. (refer to section 2.2, 2.3 and 2.5)

• Discuss the transitional system in assessing credit risk (refer to section 2.4)

• Develop an up-to-date understanding of Chinese banking industry development including the changes of competition level (refer to section 3.2 and 3.4)

• Discuss the non-performing-loans problems in Chinese banks and the resolution methods (refer to section 3.5 and 3.6)

• Critically analyse the significances of some factors in the process of credit risk management and investigate which factor(s) shall influence the rate of return in the Chinese banking industry (refer to chapter 5)

• Using an analysis tool to find out the current competition level (refer to section 6.1)

• Critically test the robustness of the interrelationship between the capital size of banks and profitability (refer to section 6.2 and 6.3)

7.2.1 Develop a theoretical understanding of the current situation of credit risk management in banking industry.

In Chapter 2 the literature review was carried out to identify the background information of credit risk management in the banking industry. The review showed the principles of credit risk management and the credit risk management in emerging economies was also identified.

7.2.2 Discuss the transitional system in assessing credit risk

In chapter 2 literature review on the credit risk management, I discussed the transitional system in assessing credit risk and the development of credit risk assessment through three aspects. They are expert system, credit rating and credit score.
7.2.3. Develop an up-to-date understanding of Chinese banking industry development, including the changes of competition level

The specific issues relating to credit risk in China were discussed in chapter 3. The development of Chinese banking began with the banking revolution in 1978 and the process of changing the economy from a planned economy to the market economy of today. The sustainable growth of the Chinese economy developed quickly in the last ten years. The annual GDP growth rates were no less than 8% consistently. All the five large Chinese commercial banks used to hold a significant percentage of non-performing loans before joining the international stock market. The loan performance has improved dramatically since 2006. Besides, the competition level in Chinese banking industry is no longer oligopoly as in 1949 when the new government was set up. Panzar and Rosse H-statistic test has been adopted to find out the current competition level of Chinese banks.

7.2.4 Discuss the non-performing-loans problems in Chinese banks and the resolution methods

In chapter 3, credit risk assessment in China has been discussed. Basically the main cause of non-performing-loans in China was the centralised banking industry. There were sustained losses at state owned enterprises and the whole market was suffering from the absence of a veritable commercial credit culture. The Chinese centre government over-influenced the lending and borrowing activities. In order to clear up the large sum of non-performing-loans, some asset management companies (AMCs) were established.
7.2.5 Critically analyse the implementation of some existing conceptual credit risk management processes.

Chapter 4 discussed the research methodology. In this research I combined primary data analysis and secondary data analysis. There are very few researches in the banking industry which adopted questionnaires as a primary data collection method. I designed a questionnaire to study the behaviours of credit risk managers in the process of loan decision making. All the primary data has been collected through face-to-face meetings. With my explanations and participative approach, the respondents could complete the questionnaire more confidently and efficiently.

As it shows in chapter 5 the questionnaire is usefully divided into several sections. The first one is demographic questions, followed by credit risk management related questions. The third sector is about lending policy and contained many questions to discover credit risk managers’ attributes when issuing loans. Questions about the relative importance of the following aspects that credit risk managers may consider for evaluating bank-wide exposures have been put in a same group which is the fourth sector. The fifth group are questions about factors considered when lending to corporate borrowers. The sixth group are questions about the importance given to company factors while making lending decisions. Questions about the relative importance of the 5Cs have been put in the seventh group followed by the last group, which is question about the satisfactory level of loan performances.
7.2.6 Critically analyse the significances of some factors in the process of credit risk management and investigate which factor(s) shall influence the rate of return in the Chinese banking industry.

I designed questionnaires to learn the credit risk managers’ attributes and the influence of such factors over loan performance in term of rate of return. Microsoft® Excel 2010 and SPSS have been used to make corresponding analysis as discussed in Chapter 5. Each question reflects a habitual behaviour or attitude of credit risk managers in the process of issuing loans. In order to study whether those factors has an influence over the rate of return, correlation test was adopted. In section 5.4 the empirical results of correlation tests show that a few factors have influence over the rate of return. Among them, ranking of banks, which was interpreted as total asset, has been studied further in chapter 6.

7.2.7 Using an analysis tool to find out the current competition level

In chapter 6, Eviews has been used to run the Panzar and Rosse model in order to identify the competitive condition of the Chinese banking industry. The empirical result shows that a way of measuring the competitive condition is by summing up the elasticity of the reduced form revenue function with reduced prices. In China, banking sector is thus highly concentrated, nonetheless there is still completion. The market structure cannot be considered as a monopoly since it is monopolistically competitive.
7.2.8 Critically test the robustness of the interrelationship between the capital size of banks and profitability.

In section 6.2 and 6.3 two tests had been run to examine the inter-relationship between total asset and total equity of the five large commercial banks in China. ADF was the first one to test if all variables are non-stationary. Based on the result, a co-integration test was carried out. If it shows long-run relationship between total asset and total equity, a third test - Granger causality would have been used to estimate the heteroskedasticity of the two variables and find out if it is accurate to use the amount of total asset to predict the amount of total equity. However, according to the empirical result, which has been generated by Eviews, there is no need to run Granger causality test since the co-integration test does not show any stable long run relationship between total asset and total equity.

7.3 Contribution

One of the main contributions of this research is finding out the factors which influence the rate of return. In chapter 5, primary data analysis, descriptive analysis was performed as the first part in order to give a brief idea of credit risk managers’ attitudes towards loan applications. Their personal attributes including education background are also discussed. The reason is to find out any correlation between factors, which influence the loan performance eventually. In order to define the factors that have some influence on the rate of return, I made a correlation test.

Analysing the result shows that the possibility of getting a higher rate of return is closely correlated to 11 factors. These are factors influencing decision (0.626), loans to family (-0.885), examine performance (0.779), bank rating (-0.544), non-state-owned (0.820), promising (-0.583), newly-setup (0.748), fixed asset (0.549), accounting turnover (0.557),
profitability (0.752), business less than 2 years (0.805). Credit risk managers should closely exam those factors of applicants in order to generate higher rate of return.

Among all the 11 factors, ranking of banks attracts my interests and further tests have been carried out. I interpreted the ranking of banks as the total asset in balance sheet. The reason is that the fundamental difference between higher ranked branches (such as headquarters) and lower ranked branches (such as local branches) is the amount of total asset. In other words, headquarters have more funds available for issuing loans than local branches. I want to find out if the amount of total asset can be used to predict the rate of return, because getting a high profitability is the aim of making the lending and borrowing activities. In balance sheet, total equity represents profitability because it equals to total asset minus total liability. Thereby, ADF unit root, co-integration test and Granger causality tests have been adopted to study the inter-relationship between total asset and total equity.

In the secondary data analysis (chapter 6), competition levels among the five large commercial banks have been tested using the Rosse and Panzar model. The result shows that during the period between 2004 and 2011, all the five large commercial banks were monopolistically competitive. In the second part of this chapter, I made a close study of total asset and total equity. An ADF unit root test was applied for determining whether the two variables are non-stationary. The result shows that total asset and total equity are non-stationary of order at level I(0). Then a co-integration test was adopted. According to theory, the statistical results are interpreted as there is no co-integration between total asset and total equity. Hence, there is no need carry out Granger Causality test.
7.4 Recommendation

My recommendation includes two parts. The first part is a suggestion to Chinese banking. The second part is to future researchers.

7.4.1 Recommendations for Chinese banking credit risk management

The following are recommendations for credit risk management in the Chinese banking industry, based on my primary data analysis results and secondary data analysis results:

- Credit risk managers at around 30 years old should be offered more opportunities because they have up-to-date knowledge from university.
- Number of female credit risk managers should be increased. Risk-seeking, risk-neutral and risk-averse preferred credit risk managers should be balanced in the total number.
- Percentage of credit ceiling allocated to each industry should be increased.
- Applicants should be examined in detail when processing their loan applications, the following factors should be evaluated highly: if the applicant’s company is state-owned or not, if it is profitable through a year or not, if the company is at the stage of promising or declining, if the company is newly set-up or old-well-known, if the bank rating of the applicant’s company shows default records, if there is any personal guarantee, if the fixed asset is large enough, if accounting turnover is healthy enough, if the capital size is big enough, if there is any collateral when applying loans.
- The Panzar-Rosse test shows that the five large commercial banks in China are monopolistically competitive. It is recommended that competition level be further improved because competition could lower the financial intermediation costs and improve economic efficiency and profit. (Matthews et al., 2007)
7.4.2 Recommendations for future work

The following are recommendations for future work which will enhance the quality of the framework and support the model:

- Due to limited research time I ran the tests based on the statistics from the five large commercial banks in China. It is recommended that the tests should be carried out across a wide range of banks in China in the future in order to assess its discriminatory powers.

- In retrospect some questions in my questionnaire have received a uniform answer. It is recommended to ask more complex questions in future studies. The answers may then be more varied.
References


Appendix

Appendix 1 Questionnaire

Questionnaire

1. Name: 
2. Age: 
3. Sex: 
4. Marital Status: 
   - Single [ ] 
   - Married [ ] 
   - Divorced [ ] 
5. Monthly salary (RMB) 
   - 3000-4999 [ ] 
   - 5000-9,999 [ ] 
   - 10,000-15,000 [ ] 
   - 15,000+ [ ] 
6. Bank name/Branch: ______________________________________
7. Ranking of Bank 
   - Headquarter [ ] 
   - Provincial [ ] 
   - Local [ ]
8. Years of service within the organization: 
   - 1-5 [ ] 
   - 6-10 [ ] 
   - 11-20 [ ] 
   - 20+ [ ]
9. Years of experience issuing loans: 
   - 1-5 [ ] 
   - 6-10 [ ] 
   - 11-20 [ ] 
   - 20+ [ ]
10. Highest academic qualification before joining the bank 
   - Secondary school [ ] 
   - Undergraduate [ ] 
   - Postgraduate [ ] 
   - PhD [ ] 
   - Professional Diploma [ ] 
   - Other (please indicate) [ ]
11. How often do you attend training courses, which are related to issuing loans? 
   - Once a week [ ] 
   - Once a month [ ] 
   - Once every 6 month [ ] 
   - Once a year [ ]
12. What’s the credit limitation of your authorization in issuing loans (RMB) 
   - Less than 50,000 [ ] 
   - Less than 100,000 [ ] 
   - 100,000+ [ ]
13. When making decision, is data reliable and helpful? 
   - Very helpful [ ] 
   - Helpful [ ] 
   - Neither helpful nor unhelpful [ ] 
   - Unhelpful [ ] 
   - Very unhelpful [ ]
14. Are you influenced by non-professional factors when issuing loans?
   Yes □       No □

15. Please indicate the factor(s), which may influence your loan decision making.
   Personal experience □ □
   Government policy □ □
   Head office decision □

16. Your personal experience plays an important part in making lending decisions
   Totally agree □       Agree □
   Disagree □       Strongly disagree □
   Don’t know □

17. Financial statements of different companies are important when issuing credit
   Totally agree □       Agree □
   Disagree □       Strongly disagree □
   Don’t know □

18. Non-financial data are important in issuing credit
   Totally agree □       Agree □
   Disagree □       Strongly disagree □
   Don’t know □

19. Do you think credit screening methods are reliable
   Totally agree □       Agree □
   Disagree □       Strongly disagree □
   Don’t know □

20. Are credit officer allowed to give credits to relatives
   Yes □       No □

21. What is the rate of return on lending in your bank?
   5-10% □       11-15% □       16-20% □       20%+ □

22. What is the percentage of bad debt out of total loans?
   Less than 2% □       less than 5% □       6-10% □
   10-20% □       20%+ □

23. What is the percentage of credit ceiling to a given industry?
   Less than 5% □       less than 10% □       less than 20% □

24. At what interval is the Credit Risk assessment is reviewed in your bank?
   Monthly □       Quarterly □       Bi-annually □       Annually □

25. How often do you examine borrower’s performance?
   Monthly □       Quarterly □       Bi-annually □       Annually □

26. Do you prepare regular ‘Credit Quality Reports’?
   Yes □       No □
27. Have you developed ‘Risk Adjusted Return on Capital (RAROC)’ Framework for Risk Pricing in your bank?
   Yes □       No □

28. Have you developed any framework to study inter-bank exposures?
   Yes □       No □

29. Does your bank use ‘Derivatives’ (credit default swap) to manage Credit Risk?
   Yes □       No □

30. Do you share defaults information among banks?
   Yes □       No □

31. Is applicant data verified?
   Yes □       No □

32. Are there penalties for credit officers that issue default loans
   Yes □       No □

33. Please indicate the relative importance of the following aspects that you consider for evaluating bank-wise exposures (on a scale of 1 to 5, where 1 = very unimportant; 3= neither important nor unimportant; 5 = very important)

<table>
<thead>
<tr>
<th>Aspect</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study of Financial Performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Efficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past Experience</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank rating on Credit Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal Matrix for studying</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counter party or country risk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
34. How much do you rate the corporate borrowers below (on a scale of 1 to 5, where 1 = very unimportant; 3= neither important nor unimportant; 5 = very important)

<table>
<thead>
<tr>
<th>Ownership background</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>State-owned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-state-owned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Which sector they are in</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Promising</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Declining</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Big firms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium size and small firm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set up year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old well-established</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Newly set up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit history</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Providing business plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Director/owner of the company gives personal guarantee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Providing property deposit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

35. How much do you rate following company factors in making decision of loans? (On a scale of 1 to 5, where 1 = very unimportant; 3= neither important nor unimportant; 5 = very important)

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed assets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounting turnover</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profitability of company</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In business less than 2 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Business more than 2 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

36. Do you look at all the 5 Cs when you give loans?
   Yes □ No □

37. Ranking of 5Cs in order of relative importance, please.(on a scale of 1 to 5, where 1 = very unimportant; 5 = very important)

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Character</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash Flow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collateral</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditions</td>
<td></td>
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</table>
38. Please rank the satisfactory rate of loans

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Totally satisfied</td>
<td>☐</td>
<td>Satisfied</td>
</tr>
<tr>
<td>Unsatisfied</td>
<td>☐</td>
<td>Strongly unsatisfied</td>
</tr>
<tr>
<td>Don’t know</td>
<td>☐</td>
<td></td>
</tr>
</tbody>
</table>
## Appendix 2.5.1

### Figure 5.1 Credit risk managers’ age (Excel 2007)

<table>
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<th></th>
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</thead>
<tbody>
<tr>
<td>25-34</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>5</td>
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<tr>
<td>35-44</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>7</td>
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<tr>
<td>45+</td>
<td>10</td>
<td>4</td>
<td>8</td>
<td>9</td>
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</tbody>
</table>

Credit Risk Manager's age

- Communication Bank of China
- Construction Bank of China
- Agricultural Bank of China
- ICBC
- Bank of China

The chart and table above represent the distribution of credit risk managers' ages across various banks in China.
Appendix 2.5.2

**Gender of Credit Risk Managers**

<table>
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<tr>
<th></th>
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<tbody>
<tr>
<td>Male</td>
<td>18</td>
<td>11</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>7</td>
<td>12</td>
<td>7</td>
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</tbody>
</table>

**Figure 5.2 Credit risk managers’ gender**

Appendix 2.5.3

**Marital Status of Credit Risk Managers**

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<tbody>
<tr>
<td>Single</td>
<td>8</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Married</td>
<td>18</td>
<td>13</td>
<td>17</td>
<td>15</td>
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<tr>
<td>Divorced</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
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</tbody>
</table>

**Figure 5.3 Credit risk managers’ marital status**
Appendix 2.5.4

**Figure 5.4 Credit risk managers’ monthly salary**

### Monthly Salary of Credit Risk Managers

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</thead>
<tbody>
<tr>
<td>3,000-4,999</td>
<td>0</td>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5,000-9,999</td>
<td>11</td>
<td>5</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>10,000-15,000</td>
<td>10</td>
<td>13</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>15,000+</td>
<td>5</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>

Appendix 2.5.5

**Figure 5.5 Ranking of Banks**

### Ranking of Banks

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<th></th>
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</thead>
<tbody>
<tr>
<td>Headquarter</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Provincia</td>
<td>10</td>
<td>8</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Local</td>
<td>9</td>
<td>4</td>
<td>3</td>
<td>6</td>
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</tbody>
</table>

224
Appendix 2.5.6

**Service Year within Organization**

<table>
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<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5yrs</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>6-10 yrs</td>
<td>8</td>
<td>9</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>11-20yrs</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>20+ yrs</td>
<td>10</td>
<td>2</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

Figure 5.6 Years of service within the organization

Appendix 2.5.7

**Years of Experience in Issuing Loans**

<table>
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<tr>
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<th></th>
<th></th>
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<tbody>
<tr>
<td>6-10 yrs</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>1-5yrs</td>
<td>8</td>
<td>6</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>11-20yrs</td>
<td>12</td>
<td>6</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>20+ yrs</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Figure 5.7 Years of service issuing loans
Appendix 2.5.8

**Education Qualification**

<table>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary school</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>11</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>3</td>
<td>6</td>
<td>11</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>PhD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Professional Diploma</td>
<td>12</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Figure 5.8 Highest academic qualifications**

Appendix 2.5.9

**Frequency of Attending Training Courses**

<table>
<thead>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Once a week</td>
<td>22</td>
<td>16</td>
<td>19</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>Once a month</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Once every 1/2 year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once a year</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Figure 5.9 Frequency of trainings on credit risk**

226
Appendix 2.5.10

**Figure 5.10 Credit limits of your authorization**

<table>
<thead>
<tr>
<th>Bank of China</th>
<th>ICBC</th>
<th>Agricultural Bank of China</th>
<th>Construction Bank of China</th>
<th>Communications Bank of China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1,000,000</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Less than 5,000,000</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>10,000,000+</td>
<td>16</td>
<td>12</td>
<td>14</td>
<td>15</td>
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</tbody>
</table>

Appendix 2.5.11

**Figure 5.11 Data of applicants is helpful**

<table>
<thead>
<tr>
<th>Bank of China</th>
<th>ICBC</th>
<th>Agricultural Bank of China</th>
<th>Construction Bank of China</th>
<th>Communications Bank of China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very helpful</td>
<td>23</td>
<td>16</td>
<td>21</td>
<td>17</td>
</tr>
<tr>
<td>Helpful</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Neither helpful nor unhelpful</td>
<td>21</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Unhelpful</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Very unhelpful</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
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</tbody>
</table>
Appendix 2.5.12

Are you influenced by non professional factors

<table>
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<tr>
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Yes</td>
<td>26</td>
<td>18</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>No</td>
<td>18</td>
<td>12</td>
<td>15</td>
<td>18</td>
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</tbody>
</table>

Figure 5.12 Are you influenced by non professional factors

Appendix 2.5.13

Factors influencing issuing loans

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal experience</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>Government policy</td>
<td>12</td>
<td>15</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Head office decision</td>
<td>7</td>
<td>3</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

Figure 5.13 Factors that influence loan decision making
Appendix 2.5.14

Figure 5.14 Personal experience plays an important part

Appendix 2.5.15

Figure 5.15 Financial statements of companies are important
Appendix 2.5.16

Figure 5.16 Non-financial data are important

Appendix 2.5.17

Figure 5.17 Credit screening methods are reliable
Appendix 2.5.18

Credit officers could issue loans to relatives

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>6</td>
<td>9</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>No</td>
<td>20</td>
<td>9</td>
<td>11</td>
<td>9</td>
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</tbody>
</table>

Figure 5.18 Are credit officers allowed to give credits to relatives

Appendix 2.5.19

The rate of return on lending

<table>
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<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>5-10%</td>
<td>10</td>
<td>0</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>11-15%</td>
<td>10</td>
<td>8</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>16-20%</td>
<td>0</td>
<td>4</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>20%+</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

Figure 5.19 The rate of return on lending in your bank
Appendix 2.5.20

**Figure 5.20** The percentage of bad debt out of the total loans

Appendix 2.5.21

**Figure 5.21** The credit ceiling allocated to one single industry by the bank in percentage
Appendix 2.5.22

**The interval of credit risk assessments is reviewed**

![Graph showing the interval of credit risk assessments reviewed for different banks.]

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Monthly</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Quarterly</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Bi-Annually</td>
<td>10</td>
<td>9</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Annually</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>6</td>
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</tbody>
</table>

**Figure 5.22 The interval of Credit Risk assessment being reviewed in your bank**

Appendix 2.5.23

**The frequency of examining borrowers' performance**

![Graph showing the frequency of examining borrowers' performance for different banks.]

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Monthly</td>
<td>10</td>
<td>9</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Quarterly</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bi-Annually</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annually</td>
<td>6</td>
<td>9</td>
<td>8</td>
<td>12</td>
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</tbody>
</table>

**Figure 5.23 The frequency of examining borrowers’ performances?**
Appendix 2.5.24

**Figure 5.24** Do you prepare regular ‘Credit Quality Reports’

Appendix 2.5.25

**Figure 5.25.** Have you developed the ‘Risk Adjusted Return on Capital (RAROC)’ Framework for risk pricing in your bank?

234
Appendix 2.5.26

**Figure 5.26** Have you developed any framework to study inter-bank exposures

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<tbody>
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<td>22</td>
<td>21</td>
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<tr>
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<td></td>
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</tbody>
</table>

Appendix 2.5.27

**Figure 5.27** Does your bank use ‘Derivatives’ (credit default swap) to manage Credit Risk

<table>
<thead>
<tr>
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</thead>
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<td>18</td>
<td>22</td>
<td>21</td>
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</table>
Appendix 2.5.28

**Default information for sharing**

![Bar chart showing default information sharing among banks](chart1.png)

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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>26</td>
<td>18</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>No</td>
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</tbody>
</table>

**Figure 5.28 Do you share default information among banks**

Appendix 2.5.29

**Is applicant data is verified**

![Bar chart showing applicant data verification among banks](chart2.png)

<table>
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<tr>
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</thead>
<tbody>
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**Figure 5.29 Do you verify applicant’s data?**
Appendix 2.5.30

**Figure 5.30 Are there penalties for credit officers issue default loans**

Appendix 2.5.31

**Figure 5.31 Study of financial performance**
Appendix 2.5.32

**Operating Efficiency**

![Operating Efficiency Chart]

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**Figure 5.32 Operating Efficiency**

Appendix 2.5.33

**Past Experience**

![Past Experience Chart]

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**Figure 5.33 Past experiences**
Appendix 2.5.34

**Figure 5.34 Bank rating on credit quality**

Appendix 2.5.35

**Figure 5.35 Internal matrix for studying bank-wide exposures**
Appendix 2.5.36

If counter party or country risk is important

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Figure 5.36 Counter party or country risk

Appendix 2.5.37

State-owned

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Figure 5.37 State-owned
Appendix 2.5.38

The importance of ownership background
Non-state owned

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Figure 5.38 Non-state owned

Appendix 2.5.39

Promissing: whether the company has a future

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Figure 5.39 Promising
Appendix 2.5.40

**Figure 5.40 Declining**

Appendix 2.5.41

**Figure 5.41 Big firm**
Appendix 2.5.42

Figure 5.42 Small and medium-sized enterprises

Appendix 2.5.43

Figure 5.43 Old well-established
Appendix 2.5.44

Figure 5.44 Newly set-up

Appendix 2.5.45

Figure 5.45 providing business plan
Appendix 2.5.46

**Personal guarantee**

![Graph showing personal guarantee for different banks.](image)

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**Figure 5.46** Director/owner of the company gives personal guarantee

Appendix 2.5.47

**Property Deposit**

![Graph showing property deposit for different banks.](image)

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**Figure 5.47** Providing property deposit.
Appendix 2.5.48

Figure 5.48 Fixed assets

Appendix 2.5.49

Figure 5.49 Accounting Turnover
Appendix 2.5.50

Figure 5.50 Profitability of company

Appendix 2.5.51

Figure 5.51 In business for less than 2 years
Appendix 2.5.52

**Figure 5.52 In business for more than 2 years**

Appendix 2.5.53

**Figure 5.53 Do you consider all the 5 Cs while making decisions**
Appendix 2.5.54

Figure 5.54 Character

Appendix 2.5.55

Figure 5.55 Cash flow
Appendix 2.5.56

Figure 5.56 Capital

Appendix 2.5.57

Figure 5.57 Collateral
Appendix 2.5.5

Figure 5.58 Conditions

Appendix 2.5.59

Figure 5.59 Ranking satisfactory of loan performance
### Appendix 2.6 Correlation result

#### Appendix 2.6.1 Empirical results of correlation test of the demographics questions

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Note: Sig. (2-tailed) values are followed by asterisks to indicate significance levels: *p < 0.05, **p < 0.01, ***p < 0.001.
### Appendix 2.6.2 Credit risk management

#### Correlations

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**. Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).
### Appendix 2.6.3 Lending Policy

#### Correlations

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**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

a. Cannot be computed because at least one of the variables is constant.
**. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix 2.6.4 The relative importance of the following aspects that you consider for evaluating bank-wide exposure

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Appendix 2.6.5 Factors considered when lending to corporate borrowers

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<td>.000</td>
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### Appendix 2.6.6 Importance given to company factors while making lending decisions

**Correlations**

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<th>fixed asset</th>
<th>accounting turnover</th>
<th>profitability</th>
<th>business less than 2 yrs</th>
<th>business more than 2 yrs</th>
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</tr>
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<td>.557**</td>
<td>.752**</td>
<td>.805**</td>
<td>.395**</td>
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<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
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<td>.198*</td>
<td>.887**</td>
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<td>.000</td>
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<td><strong>profitability</strong></td>
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</tr>
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</table>

**. Correlation is significant at the 0.01 level (2-tailed).**

**. Correlation is significant at the 0.05 level (2-tailed).**
### Appendix 2.6.7 Expert system

#### Correlations

<table>
<thead>
<tr>
<th></th>
<th>the rate of return</th>
<th>Character</th>
<th>Cash flow</th>
<th>Capital</th>
<th>Collateral</th>
<th>Condition</th>
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<tr>
<td>Pearson Correlation</td>
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<td>-0.21</td>
<td>-0.024</td>
<td>0.272***</td>
<td>-0.230**</td>
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<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<td>Sig. (2-tailed)</td>
<td>0.00</td>
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<td>0.000</td>
<td>0.000</td>
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<td>-0.352***</td>
<td>-0.281**</td>
<td>0.129</td>
<td>-0.768***</td>
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<td>0.812</td>
<td>0.006</td>
<td>0.021</td>
<td>0.867</td>
<td>0.867</td>
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</tr>
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<td>-0.352***</td>
<td>1</td>
<td>-0.294**</td>
<td>-0.480***</td>
<td>0.017</td>
</tr>
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<td>Pearson Correlation</td>
<td>0.272***</td>
<td>-0.281**</td>
<td>-0.294**</td>
<td>1</td>
<td>-0.528***</td>
<td>0.256**</td>
</tr>
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<td>0.003</td>
<td>0.000</td>
<td>0.010</td>
<td>0.010</td>
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</tr>
<tr>
<td>Pearson Correlation</td>
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<td>-0.480**</td>
<td>-0.528**</td>
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<td>-0.768***</td>
<td>0.017</td>
<td>0.256</td>
<td>-0.117</td>
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<td>0.866</td>
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</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).
Appendix 3- Empirical Analysis of Granger causality test

Granger causality test demands that the economic variables should be of stationary series. Since proved in the previous ADF test, Ln TA and Ln TE series are stationary at 2\textsuperscript{nd} difference, Granger causality test on variables LnTA and LnTE of the 2\textsuperscript{nd} difference can be applied. The results of Granger Causality test are shown in table 6-11.

Table 6-11 Granger Causality test

<table>
<thead>
<tr>
<th>Banks</th>
<th>Null Hypothesis</th>
<th>F-statistic</th>
<th>Probability</th>
<th>Result</th>
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<tr>
<td>Bank of China</td>
<td>LN_TE does not granger cause LN_TA</td>
<td>0.06527</td>
<td>0.8002</td>
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<td>0.01636</td>
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<td>LN_TE does not granger cause LN_TA</td>
<td>0.00122</td>
<td>0.9724</td>
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</tr>
<tr>
<td></td>
<td>LN_TA does not granger cause LN_TE</td>
<td>4.3E-0.5</td>
<td>0.9948</td>
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</tr>
<tr>
<td>Construction Bank of China</td>
<td>LN_TE does not granger cause LN_TA</td>
<td>0.07523</td>
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<td>LN_TA does not granger cause LN_TE</td>
<td>0.29236</td>
<td>0.5933</td>
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<tr>
<td>Communication Bank of China</td>
<td>LN_TE does not granger cause LN_TA</td>
<td>0.59939</td>
<td>0.4458</td>
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<td></td>
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<td>0.8666</td>
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</tr>
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<td>Agricultural Bank of China</td>
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<td>0.63912</td>
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<tr>
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<td>0.01750</td>
<td>0.8958</td>
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</table>

The probability of null hypothesis is significant at 5%. Therefore, the null hypothesis regarding the relationship between Ln TA and Ln TE should be accepted. This means that, total asset is not a Granger cause to total equity and neither is total equity a Granger cause to total assets.
Endnotes

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iii Yet the financial risk that arises from uncertainty can be managed. Indeed, much of what distinguishes modern economies from those of the past is the new ability to identify risk, to measure it, to appreciate its consequences, and then to take action accordingly, such as transferring or mitigating the risk (The Essentials of Risk Management by Michel Crouhy, Dan Galai and Robert Mark).

iv Edward I. Altman, Anthony Saunders, Credit risk measurement: Developments over the last 20 years, Journal of Banking & Finance, 21 (1998) 1721-1742. Among these forces have been: (i) a worldwide structural increase in the number of bankruptcies, (ii) a trend towards disintermediation by the highest quality and largest borrowers, (iii) more competitive margins on loans, (iv) a declining value of real assets (and thus collateral) in many markets and (v) a dramatic growth of off-balance sheet instruments with inherent default risk exposure (see, e.g. McKinsey, 1993), including credit risk derivatives.

v Panos Angelopoulos and Panos Mourdoukoutas, Banking Risk Management in a Globalizing Economy page 2 to 15, Greenwood Publishing Group, 2001, USA.

vi (Panos Angelopoulos and Panos Mourdoukoutas 2001)

vii Likelihood of default

viii The exposure of the bank at the time of default

ix The inverse of the recovery rate

x Edward I. Altman, Anthony Saunders, Credit risk measurement: Developments over the last 20 years, Journal of Banking & Finance, 21 (1998) 1721-1742. Among these forces have been: (i) a worldwide structural increase in the number of bankruptcies, (ii) a trend towards disintermediation by the highest quality and largest borrowers, (iii) more competitive margins on loans, (iv) a declining value of real assets (and thus collateral) in many markets and (v) a dramatic growth of off-balance sheet instruments with inherent default risk exposure (see, e.g. McKinsey, 1993), including credit risk derivatives.

xi Over-The-Counter and off-exchange trading is to trade financial instruments such as stocks, bonds, commodities, or derivatives directly between two parties. It is contrasted with exchange trading, which occurs via facilities constructed for purpose of trading.
The office of the Comptroller of the Currency (OCC) charters, regulates, and supervises all national banks. It also supervises the federal branches and agencies of foreign banks. www.occ.treas.gov

Clearly, banks which are better managed and have stronger balance sheets are better placed to cope with general risks, but if general risks present a significant threat to the banking system it may well be that no bank can be assigned an FSR at the upper end of the scale. For example, in the case of Lebanon, no bank is rated higher than D because general risks include that of a severe devaluation and that the postcivil war reconstruction could stall. In those circumstances, even well managed banks with currently sound financial ratios may face difficulties. In some Asian countries devastated by the region’s financial crisis – Indonesia and Thailand for example – the objective insolvency of all banks in the system is recognised by their financial strength ratings being E or E+. New Straits Times (Malaysia), February 24, 2000: Risk Watch system for better risk management in banking industry. (Leading Asian Financial Magazine).


The name is translated as the Imperial Bank of China (IBC) in Cheng (2003).

Principle-Agent problems are conflicts of interest and moral hazard issues that arise when a principal hires an agent to perform specific duties that are in the best interest of the principal but may be costly, or not in the best interests of the agent. The principal-agent problem develops when a principal creates an environment in which an agent has incentives to align its interests with those of the principal, typically through incentives. Principals create incentives for the agent to act as the principal wants because the principal faces information asymmetry and risk with regards to whether the agent has effectively completed a contract. (http://www.investopedia.com/terms/p/principal-agent-problem.asp)

Cheng Bao refers to a contract between Government, the owner of enterprise, and the individual agent who is supposed to be responsible for the management of enterprises and pays a fixed amount of profit to the government.


Financial institutions include large commercial banks, joint-stock commercial banks, city commercial banks, rural commercial banks and foreign banks. CBRC accessed on 02-04-2014 at http://www.cbrc.gov.cn/chinese/home/docViewPage/110009.html

Financial institutions include large commercial banks, joint-stock commercial banks, city commercial banks, rural commercial banks and foreign banks. CBRC accessed on 02-04-2014 at http://www.cbrc.gov.cn/chinese/home/docViewPage/110009.html

Financial institutions include large commercial banks, joint-stock commercial banks, city commercial banks, rural commercial banks and foreign banks. CBRC accessed on 02-04-2014 at http://www.cbrc.gov.cn/chinese/home/docViewPage/110009.html


Financial institutions include large commercial banks, joint-stock commercial banks, city commercial banks, rural commercial banks and foreign banks. CBRC accessed on 02-04-2014 at http://www.cbrc.gov.cn/chinese/home/docViewPage/110009.html


xxviii China Cinda Asset Management Co., Ltd. accessed on 26-11-2014
http://www.cinda.com.cn/Channel/160465

xxix China Orient Asset Management Corporation (accessed on 26-11-2014)

xl Great Wall Asset Management Corporation accessed on 26-11-2014
http://www.gwamcc.com/ComProfile.aspx

xli China Huarong Asset Management Co., Ltd. accessed on 26-11-2014

xlii According to the annual reports of the five banks in 2011

<table>
<thead>
<tr>
<th>Bank name</th>
<th>Total employees</th>
<th>Employees in risk management department</th>
<th>Estimates percentage of senior managers in risk department</th>
<th>Number of senior managers</th>
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<td>289,951</td>
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<td>725</td>
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<td>11,697</td>
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<td>585</td>
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<td>41,602</td>
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<tr>
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<td>408,859</td>
<td>25,716</td>
<td>5%</td>
<td>1286</td>
</tr>
<tr>
<td>Communication bank of China</td>
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<td>1,803</td>
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<tr>
<td>Total</td>
<td>1,565,798</td>
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<td></td>
<td>4,766</td>
</tr>
</tbody>
</table>


xliv The People’s Bank of China, LPR of no longer than 6 months, 6 months to 1 year, 1 to 3 years, 3 to 5 years and more than 5 years.

xlv The People’s Bank of China

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