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**Master programme in Economic Growth,**

**Innovation and Spatial Dynamics**

**Financial Development and Economic Growth:**

**Evidence from China in 1978-2009**

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*Abstract:* This thesis examines the relationship between financial development and economic growth. By reviewing previous theories and empirical studies about financial development and economic growth and financial development process in China, I assumed that there is a positive relationship between financial development and economic growth in China case. Then I use time series annual data from 1978 to 2009 to set up a short-term model and long-term model. By running causality test and regression, I find that in the short term, if financial sectors in China develop well and provide more monetary services for economic activities, it will promote Chinese economic growth. At the same time, if Chinese economy develops very well, financial sectors will get benefit from the good economic environment. But if banks provide too much loan, the economic growth rate will slow down. In the long term, there is not really obvious positive effect between economic growth and financial development in China case as expected. But efficient bank loans are helpful for promoting economic growth.

*Key words:* Financial Development, Economic Growth, China, Time Series analysis

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# Financial Development and Economic Growth:

## Evidence from China in 1978-2009

### 1. Introduction

#### 1.1 Background and Purpose

China did a very remarkable economic transformation since open and reform policy in 1978. This transformation results in a high GDP growth rate in the last 30 years. At the same time, financial system in China has experience a series of reform for over three decades. Financial development in China is also noticeable. There are a lot of studies about the relationship between financial development and economic growth. Some studies find that there is a positive relationship between financial development and economic growth. However, Allen et al. (2005) claimed that although financial system in China has experienced a great development, as one of the fastest growing economies, financial mechanisms are still relatively weaker, which makes China a puzzle.

The purpose of this thesis is to investigate if the development of financial system in China helped economic growth in the last 30 years and also if the remarkable economic growth in China has affect on financial development. In my empirical study, I use per capita GDP to indicate economic growth; three variables to indicate financial development, financial deepening (M2/GDP), total loans (credit funds of financial institutions) and interest rate (one year's saving interest rate). So this thesis is going to answer following questions:

- Is there any relationship between financial development and economic growth in China case
- If there is, from which aspects? Financial deepening (M2/GDP), total loans or interest rate?

#### 1.2 Outline of thesis

Chapter 1 gives a general introduction of my thesis, including background, purpose and delimitation.

Chapter 2 gives a theoretical analyzing for my study by reviewing previous theories and empirical studies. I firstly reviewed economic growth theory and financial development theory respectively, and then I discussed the role of financial development in economic growth and the role of economic growth in financial development, in the end, I reviewed previous empirical studies about the relationship between financial development and economic growth.

Chapter 3 states financial development in China from two perspectives, financial system and financial policy. From financial system perspective, I divided the whole financial development process into four stages to discuss its development. From financial policy perspective, I choose three main aspects, loan policy, interest rate policy and free entrance policy to discuss.

Chapter 4 is empirical study. I use yearly data from 1978 to 2009 to examine my null hypothesis. I use per capita GDP to indicate economic growth; M2/GDP, total loans and interest rate to indicate financial development. By running short run model and long run model, I get the result and also present policy suggestions.

Chapter 5 concludes my thesis.

### **1.3 Delimitation**

There are two limitations in my thesis.

Firstly, financial development is a very board term. It includes development of financial institutions, financial markets, financial assets, financial policies and so forth. My empirical study mainly focuses on development of financial institutions. I did not examine other aspects of financial development such as stock market or capital market, because of accessibility of data and measureable of other aspects of financial development.

Secondly, the data that I use in empirical study is time series data. But I only collected 32 years data since lacking of enough data before 1978 in China. The sample size is small which may affect results. In addition, all initial time series are non stationary. I take first difference of every series in order to avoid spurious regression. By taking first difference, some information may be lost.

## **2. Literature Review and Theoretical Analysis**

### **2.1 Overview of Economic Growth Theory**

#### **2.1.1 Classical growth theory**

The classical economic growth theory's main representatives are Adam Smith, Ricardo David and Allyn Young. Those theories mainly focus on analyzing determinant factors of economic growth. They stated that economic growth depends on how much surplus of production will be use on investment, and not all economic activities can provide surplus of production. Adam Smith (1776) divided labor into two categories, productive labor and unproductive labor. He also examined the role of division of labor in economic growth. He claimed two important factors for the

growth of national wealth, the ratio of productive labor in total labor and the increase of labor productivity because of division of labor. International trade is a good example for explaining the benefit of labor division, especially when transaction cost and transport cost is very low. Adam Smith and some other scholars later emphasized that key factors for rapid economic growth are international trade, low transport cost and well-functioning market system.

### 2.1.2 Harrod-Domar growth model

Harrod-Domar growth model is based on saving and investment. Harrod (1939) and Domar (1946) claimed that increasing investment not only promote total demand which lead to increase of national income, but also promote total supply which lead to increase of productivity. The increase of productivity bring more national income, more income will shift into more investment again. Hence, economic growth is function of marginal savings rate and capital-output ratio. Both of them emphasized the key role of capital accumulation in economic growth. They also analyzed the necessity and feasibility of government intervention and the macro-economic control, promoting economic growth by controlling the amount of saving, introduce foreign capital and improve capital-output ratio,

### 2.1.3 Neoclassical growth theory

Neoclassical growth theory described a perfect competition economy. In neoclassical growth theory, there is a strong positive relationship between financial development and the efficiency of investment. Capital flows from surplus unit to deficit unit, promoting development of industry. Financial market collects money and provides financial support for innovative enterprises, bringing technological change and promoting economic growth.

### 2.1.4 New growth theory

New growth theory emphasized that the main driver for economic growth in the long run is creativity instead of capital accumulation mentioned by previous theories. Paul Romer (1986) is the lead developer of new growth theory. He claimed that human capital (such as scientists and engineers) and institutions (such as patent law) drive technical renovation and improve living standard. Investment on knowledge will get a stable, even increasing return rate. Developing countries can achieve technology innovation by imitate existing developed technology in developed countries. However, Basu and Weil (1998) thought that low capital accumulation is an obstruction for developing countries to introduce advanced technology from developed countries. If developing countries can raise capital accumulation by increasing the amount of saving, they will experience a rapid economic growth period.

## **2.2 Overview of Financial Development Theory**

In this chapter, I will overview financial development theory chronologically, especially focus on the relationship between financial development and economic

growth.

### 2.2.1 Before 1960s, early theories

Joseph Schumpeter (1939) might be the first one who contributed to economic growth and financial development theory. According to Joseph Schumpeter (1939), banking and entrepreneur are two key factors in economic growth process. Entrepreneur leads to technological innovation which can promote economic growth; banking can evaluate and financing for technological innovation made by entrepreneurs. Hence, Schumpeter (1939) pointed out financial intermediaries could affect marginal productivity of capital by emphasizing the importance of financial intermediaries on evaluation the investment. After that, seldom study examined this topic until the middle of 1950. John Gurley and Edward Shaw (1955, 1960) emphasized that the importance of financial intermediaries on economic growth. They claimed that financial intermediaries increased the amount of money available for investment by encouraging saving and provide loan. It means that the positive effect of financial development on economic growth realized by high saving and high capital productivity.

Alexander Gerschenkron (1962) based on Schumpeter (1939)'s theory, contributed to financial and economic growth theory. By analyzing the development of Russia and Germany, Gerschenkron found that the lower level of the productive forces could lead to the higher productivity growth rate. And banks played an important role in this catch up process, especially when there is an intimate relationship between banker and entrepreneur. Rondo Cameron et al. (1967, 1972) proved Gerschenkron's theory by researching other countries cases, for example, the England, Japan, Italy and Spain in the 18<sup>th</sup> century.

Instead, H.T. Patrick (1966) paid more attention on the causality between financial development and economic growth. He defined two models, named demand following and supply leading. In the case of demand following, financial development is a result of the development of real sector. The real sector's need for financial service lead to the emerging of financial intermediaries and financial instruments. In the case of supplying leading, financial development leads over the economic growth and promote the economic growth. It can be said that the supply of financial service generates the demand of financial service. Patrick maintained that in the early stage of economic development, the financial supply leading is more possible, and this usually happened in developing countries. However, in the late stage of economic growth, the financial sector has already developed, so the demand following is more possible, and this usually happened in some more developed economies.

Rondo Cameron (1967) provided more details about the relationship between financial development and economic growth in successful industrialization process. He believed that the financial system may lead to the economic growth and be led by economic growth at the same time. But he emphasized that the key role of the quality

and efficiency of financial service. He also concluded that some features of financial system, especially bank sector. Firstly, financial intermediary is a funding mechanism. It collects money from risk averse savers and conducts to investors who are risk-love. Secondly, financial intermediary encourages the investors by decreasing the borrowing cost. A developing financial sector should decrease the rate difference between different clients, different area and so forth. Thirdly, financial institution created the possibility for efficient allocation of capital in the early stage of industrialization. In the end, he emphasized the important role of bank in promoting technical progress.

### 2.2.2 Mckinnon-Shaw's financial theory

Mckinnon-Shaw school of financial theory mainly focuses on financial repression. They thought that financial repression was not good for long-run economic growth because financial repression decreased the scale of capital available for investment. In the next paragraph, I am going to give a brief review about what is financial repression and why some developing countries applied financial repression.

Financial repression can be understood as a very broader term. Here, it refers to the government intervene on financial activities and artificially low interest rates and exchange rates. When the government set the upper limit for saving interest rate and loan interest rate, the interest rate can not reflect the true relation between supply and demand for capital. In some developing countries which have high inflation rate, when the nominal interest rate goes up, the real interest rate is very low even could be negative. In this situation, individuals do not want to save money in banks and the borrowers need money from bank. This leads to demand exceeds supply, so the capital will flow into some state-owned company or other privileged organizations by rationing. The corruption will appear and the large amount of medium and small businesses can not get money. Financial repression is not good for long term economic growth. However, in some developing countries, the government applies financial repression policies when the government can not impose enough taxes. Fry (1995) stated that financial sectors can help the government get enough taxes. The reserve against deposit, government bonds and the interest rate ceiling are helpful for the government to raise money for public works projects.

There are four effects of financial repression on economic growth according to Shaw. The first is income effect. Because of the high inflation rate in developing counties which are applied financial repression, people and enterprises will decrease the saving in banks in order to avoid the inflation, so there is not enough capital which can be loaned and invested. High efficiency enterprises may not get loan and some low efficiency own-stated companies can get the investment instead. This slows down the economic growth in developing counties. The second is savings effect. In some developing countries, the financial repression, the high inflation rate and the low interest rate decrease the saving willingness of individuals. They prefer to increase consumer spending or shift money to overseas in order to avoid inflation. The third is



investment effect. Under the financial repression strategy, investments in some traditional sectors are limited. Take agriculture as an example, the development in agriculture slows down, which leads to the increasing import demand for agricultural products. Hence, the economies of financial repression countries have to base on foreign countries. The fourth is employment effect. Under the financial repression strategy, the repression on traditional sectors results in the labor move from rural area to urban area. There are too many labors in urban area so some of them are unemployment.

R.J.Mckinnon and E.S.Shaw (1973) criticized the financial repression view. They thought interest rate liberalization is helpful for economic growth in the long run. They believed that the policies and measures which related to financial repression should be abandoned. They analyzed how financial development influenced economic growth by improve the investment efficiency and encouraging saving. They emphasized some of financial policies had negative effects on the positive relationship between financial development and economic growth. In some developing countries, the government controlled the allocation of financial resources by limiting financial market competition. The interest rate was controlled under the market level and the capital was shifted to some priority sectors. However, they claimed that by doing this, the interest rate was very low which lead to the lower saving level. Also, the low interest rate led to excess demand of loan. With the low efficiency of loan, the marginal productivity of capital will be low. These effects could lead to a slow economic growth. So both of them agreed with financial liberalization, free the interest rate to market level in order to promoting saving and expanding the scale of resources for investment.

After Mckinnon and Shaw, there were a lot of studies, for example, Kapur (1976), Galbis (1977), Mathieson (1980) and Fry (1980). They developed the macro economy models. In these models, the government implements the financial repression by controlling the saving interest rate under the market level instead of controlling the loan interest rate. The nominal demand for money is decided by nominal interest rate and inflation. A high inflation rate leads to low nominal demand for money. The value of asset and liability in bank shrink. In this way, the available amount of loan which can be used on investment will decline. The inflation inhibit the economic growth because people prefer keep non-productive assets which can avoid inflation (such as money) to invest money on productive assets by saving money in banks.

Kapur and Mathieson (1980) came up with a new model of financial repression: even there is no interest-rate ceiling, the government also can get the same result with there is interest-rate ceiling by controlling the required reserve ratio. It means that in a fix inflation rate, raise the required reserve ratio can decline the amount of loan and lower the required reserve ratio can expand lending activities. In the theoretical frame of Kapur-Mathieson, there is a developing economy which is labor redundance, by using Harrod-Domar's production model:  $Y = \sigma K$ , of which

$Y$  is actual output;  $K$  is the total amount of fixed capital and operating capital;  $\sigma$  is the ratio of output and capital, which is a constant.

In this model, only the scale of investment instead of the quality of investment ( $\Delta K$ ) can be affected by financial sector. Fry and Galbis (1980) extended this theoretical framework, making the real interest rate related to the scale of investment. By improving the average efficiency of investment, the real interest rate also related to  $\sigma$ , which is the ratio of output and capital.

In all Mckinnon-Shaw school models, the result of free market equilibrium can promote economic growth. They all suggested that abandon the interest-rate ceiling, give up planned loan, lower the required reserve ratio and make sure the competitive environment for financial sector.

### 2.2.3 1980s, Structuralism and Post Keynesianism

Different countries got different results after carrying out financial liberalization policies. Some of them did not get the good result, so there were some criticisms about the Mckinnon-Shaw's theory.

The first kind of criticism is from Structuralism, for example, Buffie (1984), Taylor (1983) and Van Vijnbergen (1982, 1983). They brought up two viewpoints, one of which was focus on the developing countries. They stated that in some developing countries, informal financial market played a key role in economic growth, instead Mckinnon and Shaw claimed that the informal financial market is low efficient. Because firstly, financial liberalization could lead to the relocation of capital, for example, flow from informal financial market to formal financial market. This relocation could reduce the amount of capital which can be used on investment. Take the required reserve ratio as an example, the formal financial market need to have a fix level of required reserve ratio but the informal financial market do not need. Secondly, informal financial market can get more information about the borrower. In some rural areas, the lender and borrower have tight contact.

The second kind of criticism is from Post Keynesianism. They (Stiglitz and Weiss, 1981) claimed that even after the financial liberalization, the financial market is still imperfect since there is adverse selection and moral hazard. This could easily result in financing to high risk project. Grabel (1995) stated that the result could be inefficient credit allocation, financial crisis and low economic growth rate. And Dfaz Alejandro (1985), Sundararajan and Balino (1991) proved this viewpoint by researching the financial liberalization process in Chile, Argentina, Uruguay, Turkey and Phillipine. Some of them paid attention on micro-side. For example, Stiglitz and Weiss (1981) believed that if the market interest rate is higher than clean rate, then it will attract unqualified borrower to enter into the market and invest high risk project, which increase the risk of default. This could lead to that banks keep the interest rate under the market cleaning rate so not every project can get investment except several large

scale projects.

#### 2.2.4 1990s, financial development and endogenous economic growth

Since 1990s, an ever increasing number of studies focused on if financial development can explain the keeping growing of per capita GDP. Most of them used AK model. Bencivenga and Smith (1991) found that the existence of financial intermediary guide asset portfolio go to high risk but high productivity direction, which promote economic growth. Financial intermediary also make it possible that individuals reduce their risk while meeting the liquidity needs. The allocation of capital is more efficient.

Greenwood and Jovanovic (1990) developed another model which both financial intermediary and economic growth are endogenous. They found that there is positive relationship between financial development and economic growth. From one side, financial intermediaries improved the efficiency of investment as I mentioned before. From another side, economic growth helped financial market update to a new structure.

Berthelemy and Varoudakis (1996) used learning by doing point of view to analyze. They assumed that financial sectors had positive influence on promoting the development of real sectors, such as primary industry, and then real sectors developed and had more surplus money, so they will have more saving in banks, which also have positive influence on financial development.

### 2.3 The Role of Financial Development in Economic Growth

Marco Pagano (1993) based on the model of endogenous growth to build up a model which explained how financial development affects on economic growth clearly.

We assume that the total output is a linear function of the total capital, then

$$Y = AK \quad (3.1),$$

of which, Y is the total output, K is the total capital, A is the coefficient.

In order to give a clear analysis, we also assume that the population is fixed; there is only one product in economy; this only one product can be used on investment or consumption; if this product be used on investment, then the ratio of depreciation is  $\delta$ , so the total investment  $I_t$  can be written as:

$$I_t = K_{t+1} - (1 - \delta)K_t \quad (3.2),$$

of which,  $I_t$  is the investment in t period,  $K_{t+1}$  and  $K_t$  is the capital in t+1 and t period, respectively,  $\delta$  is the ratio of depreciation.

In a closed two-sector economy without government control, the equilibrium is when the total saving equals the total investment, that is to say,  $S_t = I_t$ . We assume that the  $(1 - \theta)$  of  $S_t$ , the adjustment process which made by financial intermediaries can be

written as:

$$\theta * S_t = I_t \quad (3.3)$$

of which,  $S_t$  is the amount of saving in t period,  $I_t$  is the amount of investment in t period,  $\theta$  is a constant.

And then we use  $g_{t+1}$  refers to economic growth rate in t+1 period, so:

$$g_{t+1} = Y_{t+1}/Y_t - 1 \quad (3.4)$$

combine the equation (3.1), (3.2), (3.3), (3.4) we get:

$$g = A * (I/Y) - \delta = A\theta S - \delta \quad (3.5),$$

from the equation (3.5), we can see that the growth rate  $g$  is affected by  $A$ ,  $\theta$  and  $S$ .

In conclusion, according to this model, the economic growth can be influenced by three factors. They are marginal productivity of capita ( $A$ ), the ratio of saving transforming into investment ( $\theta$ ) and the saving interest rate ( $S$ ). In the next part, I am going to analyze these three factors one by one.

Firstly, financial development can promote economic growth by increasing the ratio of savings transforming into investment, that is to say, more proportion of savings can be loaned. The financial sector's main function is transforming individual savings into investment. However, when the financial intermediaries is transforming savings into investment, they need to absorb some resources, for example, 1 dollar saving can only bring less than 1 dollar investment. The difference between saving and investment ( $1 - \theta$  as I mentioned before) goes into the profit of bank or the commission for stockbroker. The amount resource which is absorbed by financial sectors related to the efficiency of financial sector. A efficient financial market can reduce the transaction cost, that is to say, decline the  $(1 - \theta)$ . So the development of financial institutions and the perfection of financial markets could improve the efficiency of resource allocation and reduce the absorbed resource, which can decline the  $(1 - \theta)$  and increase  $g$  depending on the equation (3.5). By doing this, financial development can promote economic growth.

Secondly, financial development can promote economic growth by improving the capital efficiency. Financial sectors another main function is allocate resources into high marginal efficiency of capital project. This can be easily achieved in three ways, namely, evaluate the investment project by collecting useful information; encourage personal investment go into high efficiency project by spreading the risk; promote the technology innovation. Depending on the equation (3.5), this function can improve  $g$  by improving  $A$ . That is to say, financial development can promote economic growth by improving the capital efficiency.

Thirdly, financial development can affect economic growth by affecting the amount of saving. But it is unknown that if the effect is positive or negative. Now I am going to take a closer look at this effect from two perspectives. From the spread risk perspective, financial market can help people share the yield risk, such as the risk

comes from the fluctuating of stock yields. However, the lower of yield risk's influence on the saving ratio or economic growth is unknown. If the coefficient of risk aversion is less than 1, then the influence will be positive, and vice versa. It is uncertain whether financial development improves the efficiency of resource allocation. For example, when financial intermediaries transform money into high marginal efficiency of capital project, it could promote economic growth. However, at the same time, this could decrease the saving ratio. So a part of positive effect will be offset. In some studies, such as Levine (1991) assumed the saving ratio is a constant, or the coefficient of risk aversion is less than 1. These kinds of research excluded the uncertain influence of spreading risk on the ratio of saving. From the interest rate mechanism perspective, the increasing of interest rates does not have a certain influence on the ratio of saving. As I mentioned in chapter two, the financial repression not only increasing the transaction cost but also inhibiting individual's saving motive. So the saving ratio is inhibited under financial repression policy, therefore the economic growth slows down. But when the financial repression policy is abandoned and the interest rate increase, we can not make sure its influence on the saving ratio. For example, in a consumption-income model, the effect of interest rate is decided by income effect and substitution effect (of a price change) at the same time. The rising of interest rate will lead to the income effect, which make people spend more money on consumption and less money on saving. But at the same time, the rising of interest rate will lead to the price decrease in the future, so people begin to replace immediate consumption with long-term consumption, then the saving ratio increase. These two contrary effects decided the total effect of increasing interest rate together. So the interest rate effect is uncertain.

## **2.4 The Role of Economic Growth in Financial Development**

Chapter 3.1 analyzed the role of financial development in economic growth. But why does the financial market appear? Which factors lead to the development of financial sector? That is what I am going to analyze in this chapter. Based on Greenwood and Smith (1997) and Levine (1993)'s model, the financial intermediaries and financial market developed with the growth of individual average income. The financial intermediaries have running costs. With the development of economy, the expansion of investment scale and the competition of different financial intermediaries, the cost of running financial intermediaries are declining, which could encourage individuals to participate the financial activities.

Greenwood and Smith (1997) regarded the cost of individuals participate the financial activities as lost. Only when the profit is greater than the lost, the individuals attend the financial activities. They designed three financial structures, namely, no financial intermediaries and financial market, only financial intermediaries and only financial market. In the early stage of economic growth, per capita GDP is very low, individuals do not have enough money to pay for the cost of financial intermediaries and financial market, so the financial system will not appear. Or there is only few individuals participate the financial activities, so the lost is greater than the profit. In

this situation, individual lack of motivation to participate the financial activities, so the relevant financial services do not exist. With the development of economy, an increasing number of individuals participates the financial activities, so the financial system developed. Simple financial system will develop into more complicated system with the increasing of per capita income and GDP. More and more financial services will appear such as project evaluation, personal investment and financing, stock market and insurance. Also, the economic growth can provide a good environment for the stable development of financial sector. That is how financial developed with the growth of economy.

## **2.5 Previous Empirical Studies about Financial Development and Economic Growth**

Goldsmith (1969) is the first one who studied the relationship between financial development and economic growth on the empirical perspective. He used the proportion of total assets of financial intermediaries and yearly GNP to measure financial development. The hypothesis is that the size of a financial system has positive relationship with the supply and quality of financial intermediaries. His sample was from 35 countries from 1860 to 1963. He found that there is a positive relationship between financial development and economic growth. But he did not examine the causality between financial development and economic growth. He only focused on the development of bank industry.

Fritz (1984) used Philippine as an example, did causality tests by using quarterly data of 1969 to 1981. He got the result that in the early stage of economic growth, financial deepening lead to economic growth. And in the late stage of economic growth, with the increasing demand of financial service, economic growth lead to financial development.

Jung (1986) did causality test by using yearly data of 56 counties. He used two different indexes to measure a country's financial development level, one is  $M_0/M_1$ , another one is  $M_2/GDP$ , of which  $M_0$  refers to narrow money (includes bank reserves in some countries, such as the U.K.) ;  $M_1$ , which does not include bank reserves;  $M_2$  is a boarder term of money than  $M_1$ , including money and other alternative capital. Usually economists use  $M_2$  when they need to measure the amount of money in circulation and try to explain different economic monetary conditions. His result showed that the supply leading is more common than the demand following for developing countries, which proved the importance of financial development in developing countries. However, the situation in developed country is contrary.

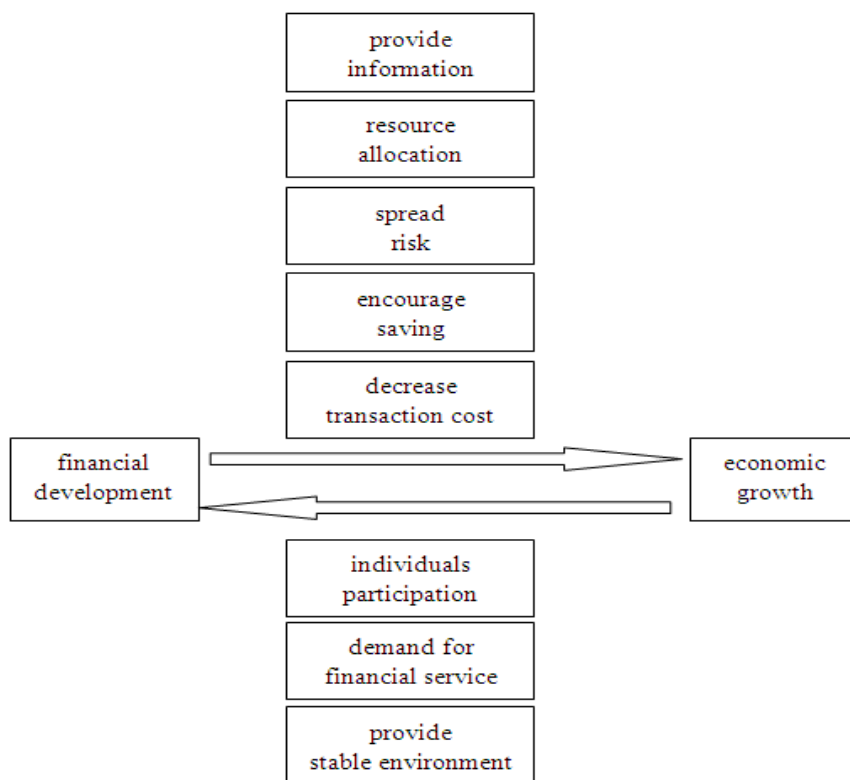
Kind and Levine (1993) developed Goldsmith (1969)'s theory. He used 80 countries sample during 1960 to 1989 to examine if financial development level can predict capital accumulation, the raise of productivity and long-run economic growth. They found that financial market promotes capital accumulation and economic growth by rising saving interest rate and encourage technology innovation.

As the theory development, financial development models were added in endogenous growth and financial institution factors. Use different ways to include the role of financial intermediaries. Pasano (1993) extended the basic AK model by adding a variable which can measure the role of financial intermediaries. Levine (1997) found the role of financial intermediaries in economic growth. Financial intermediaries can encourage saving, allocating resources, promote transactions, decrease risk and control firms.

Odedokun (1996) analyzed 71 developing countries in different periods. His result also supported financial development lead to economic growth hypothesis. He concluded that financial intermediaries promoted economic growth in around 85 percent countries; financial intermediaries' role in economic growth is as important as other factors, like export expansion and capital formation rate; the positive effect mainly exist in developing countries.

Philip Arestis and Panicos Demetriades (1997) using time series data analyzed the difference relationship between different countries. They found that the causality is different between Germany and the US. In Germany, only financial development affects GDP and the growth of GDP does not have significant effect on financial development. However, in the US, there is not enough evidence to show that financial development lead to the growth of GDP. But there are enough evidences to prove that the growth of GDP do affect the development of bank industry and capital market.

Graph 2.1 the relationship between financial development and economic growth



Source: drawn by the authors

In the end of chapter 2, I use a graph to conclude the relationship between financial development and economic growth.

### **3. Financial Development in China**

Financial development mainly includes the development of financial assets, financial institutes and financial market. Wu, Xianman (1994) divided financial development in China into four areas in his book *Financial Development in China*, namely, increase of financial assets, development of financial institutions, growth of financial market and the openness of financial system. Financial development can be thought is the dynamic process which is integrated by these four areas. In this chapter, based on Wu, xianman (1994)'s work, I am going to analyze financial development in China from two perspectives, financial system development and financial policy development.

#### **3.1 Development Process of Financial System**

The reform of the economic system brought substantive changes for Chinese financial system. In planned economy period, the profits of state-owned enterprises will all be turned over to the Ministry of Finance in China, and then Ministry of Finance allocated capital to state-owned enterprises depending on the budget. However, since 1985, the state does not provide state-owned enterprises capital from national budget, so banks loan became the main source of capital. Bank became a core industry in Chinese financial system, so in the following part of my thesis, I will mainly focus on bank to do my study.

First of all, I will give a brief review of the development of bank system in China. In the last 20 years, banking industry has experienced a very rapid development. According to statistic data from China Banking Regulatory Commission (CBRC), by the end of March, 2011, total assets of banking institutions in China exceeded 100 trillion Yuan and total liabilities amounted to 95 trillion Yuan. The development of Chinese bank system has experienced several stages as following.

##### **3.1.1 1979-1993: Break “single bank structure”, build up “Two-tier banking system”**

Before the reform and open policy, there was only one bank in China, People's Bank of China. It played the role of Central Bank as well as the only institution for savings and loans. (Nicholas R.Lardy, 2003). Since 1979, Agricultural Bank of China, Bank of China, China Construction Bank and Industrial and Commercial Bank of China were set up one after another. The “single bank structure” was ended. In September of 1983, the State Council made the decision that People's Bank of China will specialize in financial management, formulating and implementing monetary policy, will not provide loan and saving services for business enterprises and individuals any more. From that time, the “Two-tier banking system” formulated in China, which includes a Central bank (People's Bank of China) and four state-owned banks (Agricultural Bank



of China, Bank of China, China Construction Bank and Industrial and Commercial Bank of China).

From 1984, the State approved the establishment of some new bank institutions and non-bank financial institutions, such as China Trust Commercial Bank, urban credit cooperation and financial companies. Since then, those four state-owned banks became the tool for applying government financial policies and other banks or non-bank financial institutions are more flexible. Monetary and credit policy was still planned by government. Chinese government allocated credit quota for every banks and directed banks to loan to enterprises.

### 3.1.2 1994-1997: Commercialization of state-owned banks and Central bank independence

In 1994, the Chinese State established three policy banks, China Development Bank, The Export-Import Bank of China and Agricultural Development Bank of China, in order to take over policy loan services from four state-owned banks. At the same time, encouraging those four state-owned banks transform to commercial banks which be more independent and be responsible for theirs own profit and loss.

In 1995, the State issued *Law of the People's Bank of China*, letting People's Bank of China carry out central bank's tasks independently and manage and supervise financial institutions under the direct leadership of the State Council, not guided by government institutions or other institutions.

### 3.1.3 1998-2001: Dispose non-performing loan

Since the Southeast Asian financial crisis in 1997, a large number of non-performing loans of banking sector aroused the attention of Chinese government authorities. According to the statistic number from Standard & Poor, by the end of 1997, non-performing loan of Chinese banking sectors accounted for 24 percent of total loan. This large number of non-performing loan was closely related with state-owned enterprises. Because state-owned enterprises and banks are all led by Chinese State, around 70 percent of bank loan went into state-owned enterprises. With the increasing number of state-owned enterprises which was running under deficit, the amount of non-performing loan of four state-owned banks raised. In 1998, Chinese government injected 270 billion Yuan into the four state-owned commercial banks in order to enrich banks' own capital. In 1999, Chinese government established four Asset Management Corporations to purchase four state-owned banks' non-performing loan. These four Asset Management Corporations planned recover money from enterprises by selling their assets in 10 years. Those non-performing loan could not be recovered will be all cancelled by Chinese government.

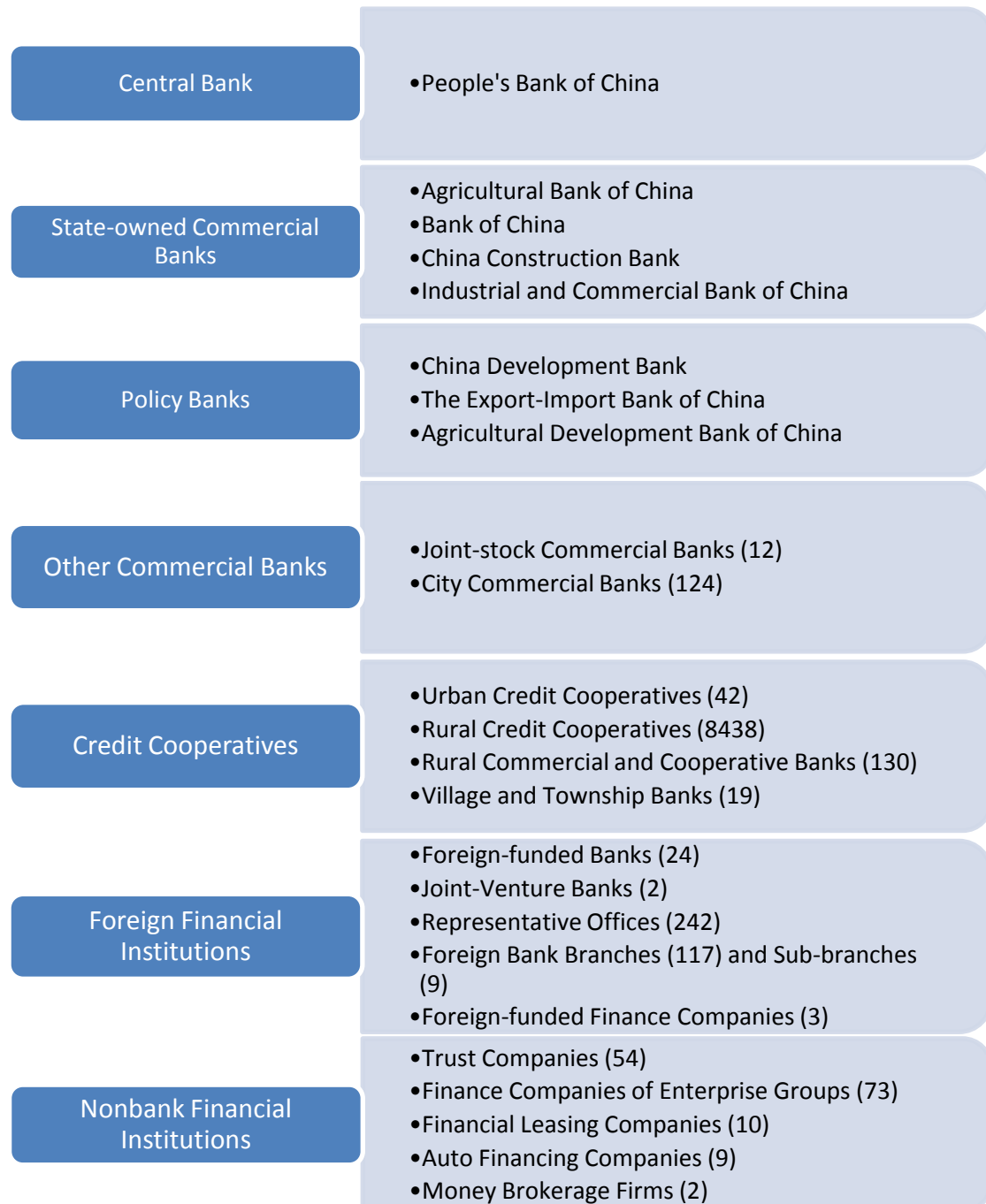
### 3.1.4 2002-now: The open-up of financial industry

After China became a member of WTO, bank industry became more open. Foreign

banks were granted the right to operate RMB business in thirteen cities. More and more foreign capital flows into Chinese bank sectors. On 26<sup>th</sup> of August, 2004, Bank of China Ltd was set up. On the same year September 17<sup>th</sup>, China Construction Bank Ltd was officially established. Some other commercial banks became joint-equity enterprises closely follow after.

In the end of Chapter 3.1, I use a graph to sum up the structure of Chinese bank sector.

Graph 3.1 Structure of Chinese bank sector



Source: China Banking Regulatory Commission 2007 Annual Report

## 3.2 Development Process of Financial Policy

By reviewing the development process of financial system in chapter 3.1, it can be easily seen that Chinese financial system is a state-owned bank led system. The focus of Chinese government financial policies is building up a wide range and well-developed financial system. Generally speaking, before 1992, government financial policies were mainly about financial repression. Chinese government adopted a series of policies to keep monopoly role of state-owned banks. These policies include limiting the entry of new banks, controlling other non-bank financial institutions such as insurance companies and credit cooperatives, controlling alternative financial resources which may compete with bank loans such as stock and corporate bond. The main goal of adopting financial repression is maintaining economic growth at the early stage of economic reform. The reason of Chinese government applied financial repression is similar as be analyzed in chapter 2.2.2, financial repression can help government maintain revenue when one economy is experiencing transformation. After 1992, financial policy shifted from financial repression to financial liberalization gradually. According to statistic data from Almanac of China's Finance and Banking, the proportion of state-owned banks' total assets decreased from 83.85% at the end of 1993 to 50.9% at the end of 2009; the proportion of state-owned banks' total loans decreased from 73.49% at the end of 1993 to 51% at the end of 2009. Although the proportion of state-owned banks' total assets and total loans are decreasing, state-owned banks still play a dominant role now. In the next part, I will analyze the development process of Chinese financial policies based on Williamson (1998)'s study.

### 3.2.1 Loan policy

From the founding of New China (People's Republic of China) to economy reform, Chinese authority fully controlled credit funds. Only Central Bank had right to use savings. Loans quota was divided to other banks by Central Bank. After the reform and open-up policy, financial policy began to reform also. Since 1980, the fully controlled of loan policy began to loose. After Central Bank divided funds to head office of other banks, other banks could decided how to use funds independently. In 1998, inflation rate was high in China. Chinese authority took back the loose loan policy which implemented after 1980. Central Bank not only responsible for division money to other banks' head office, but also supervise province offices and city offices. Central Bank applied loan quota system. Loans which lend from other specialized banks in all regions must be strictly within the limits of distribution. In 1996, Chinese government abandoned loan quota system for some financial institutions except four state-owned commercial banks. In January of 1998, Central Bank abandoned loan control policy for four state-owned commercial banks. All financial institutions could be responsible for their own savings and loans independently. Central Bank only was responsible for indirect adjustments.

### 3.2.2 Interest rate policy

In a very long period of past, Chinese authority strictly controlled interest rate. In 1995, Chinese government brought up basic ideas about losing the control of interest rates and leaving them to market forces. On 1st of June, 1996, People's Bank of China abandoned the interbank market interest rate ceiling and let inter-bank market decide interest rate. Central Bank only was responsible for indirect adjustments. This is first step for liberalization of interest rate. In March of 1998, reform for rediscount rate and the discount rate applies. In September of the same year, Chinese government lost control for policy banks' financial bonds market interest rates. In October of the same year, commercial banks and urban credit cooperatives could extent maximum floating degree of loan interest rate which focuses on small enterprises, from 10% to 20%, and rural credit cooperatives could extent from 40% to 50%. In 1999, this extensive maximum floating degree of loan interest rate also could be used on medium and large enterprises. In October of 1999, long-term saving interest rates began to be reformed. On 21st of September, 2000, government reformed exchange rate management system, unlocking foreign currency loan interest rate. In 2003, government unlocked foreign currency saving interest rate. In the following years, People's Bank of China goes on losing different kinds of controls and limitations on interest rate. However, the interest rate liberalization still not completely realize until now. There is ceiling for saving interest rate, bottom line for loan interest rate and so forth. The Chinese interest rate reform still has a long way to go.

### 3.2.3 Free entrance policy

China authority has a strictly control on entrance of domestic financial institutions. If one financial institution wants to enter into market, it needs to be authorized by government. Besides, four state-owned commercial banks play a dominant role in all financial institutions until now, so even other financial institutions enter into market, they still can not compete with state-owned banks.

Comparatively speaking, foreign financial institutions are easier to go into Chinese market. From 1982 to 1985, Chinese authority began to approve foreign financial institutions set up business branches in special economic zones gradually (such as Shenzhen economic zone). They could deal in all kinds of foreign exchange business. This indicates first step for financial institutions free entrance in China. In September of 1990, the State Council of China approved Shanghai became the first city for introducing foreign financial institutions except economic zones. In 1992, the State Council of China approved other several cities also, Dalian, Qingdao, Guangzhou and so forth. In the same year, insurance market opened for foreign insurance companies in Shanghai. In 1995, the first joint venture investment bank, China Construction Bank and Morgan Stanley joint venture International Capital Corporation Limited, was established. In the end of 1996, Chinese government began to approve foreign financial institutions engaged in RMB business in Shanghai. In 1997, nine foreign financial institutions were approved in Shanghai. On 9<sup>th</sup> of July, 2003, QFII system (Qualified Foreign Institutional Investors) officially started in China, indicating Chinese capital market officially open to foreign investment

## 4. Empirical Analysis

### 4.1 Hypothetical Model

#### 4.1.1 Null hypothesis

China did a very successful economic transformation since reform and open-up policy in 1978. The growth of GDP keeps 9% in average since 1978. At the same time, by reviewing financial development process in China in Chapter 3, we can see that financial industry has grown fast. Is there any relationship between Chinese economic growth and financial development? If there is a positive relationship, from which aspects that financial development can influence economic growth and from which aspects that economic growth can influence financial development? What should Chinese government do in order to promote both economic growth and financial development? There are few studies since lack of enough data. So, I am going to build some models to examine these questions.

From Chapter 2 Literature Review and Theoretical Analysis, it can be conclude that there is a positive relationship between financial development and economic growth. Generally speaking, financial development affects economic growth by five ways, provide information, allocation resource, spread risk, encourage saving and decrease transaction cost; and economic growth affects financial development by three ways, increase individuals' participation, increase demand for financial services and provide stable economic environment for financial sectors.

By reviewing previous empirical studies, we can also see that there is a positive relationship between financial development and economic growth in some developed countries as well as developing countries. Hence, I assume that there is a positive relationship between financial development and economic growth in China.

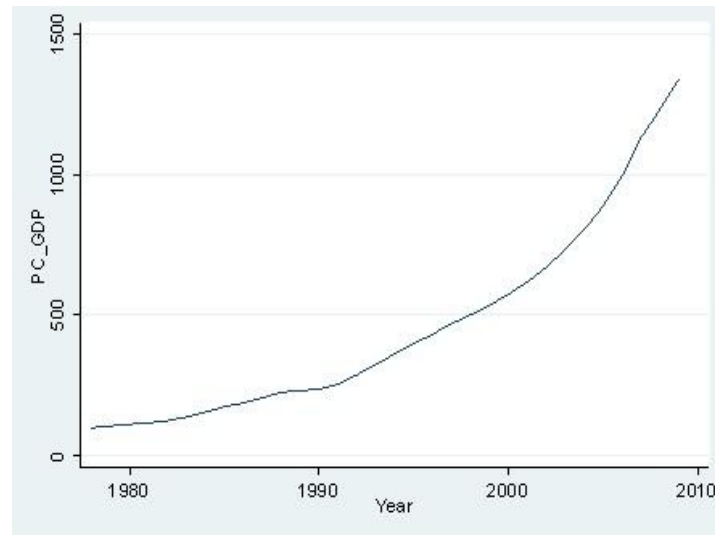
I will use quantitative method to examine if my assumption is true. I collect data from 1978 to 2009 and use econometrics to run some tests and regression in order to get the results. I build a Vector Autoregression model (VAR) model as well as a long-run model to examine the null hypothesis, which is here is a positive relationship between financial development and economic growth in China. The software I am going to use is Stata.

#### 4.1.2 Data and description of variables

In this paper, I use the real per capita GDP to measure economic growth. Real GDP can be calculated as nominal GDP divided by GDP deflator (1978=100). And real per capita GDP can be calculated as real total GDP divided by population. According to Heston (1994), per capita GDP are more precise than total GDP since the error of estimating GDP can be offset by the error of estimating population.

The data is from Lund University databases. Real GDP is collected from China Statistical Yearbook, category named *indices of gross domestic product of China (1978=100)*. Population data is also collected from China Statistical Yearbook, category named *population*. And then per capita GDP is calculated as real total GDP divided by population. In the following, I will use PC\_GDP to indicate per capita GDP.

Graph 4.1 line graph of per capita GDP



Graph 4.1 shows overall trend of per capita GDP is increase.

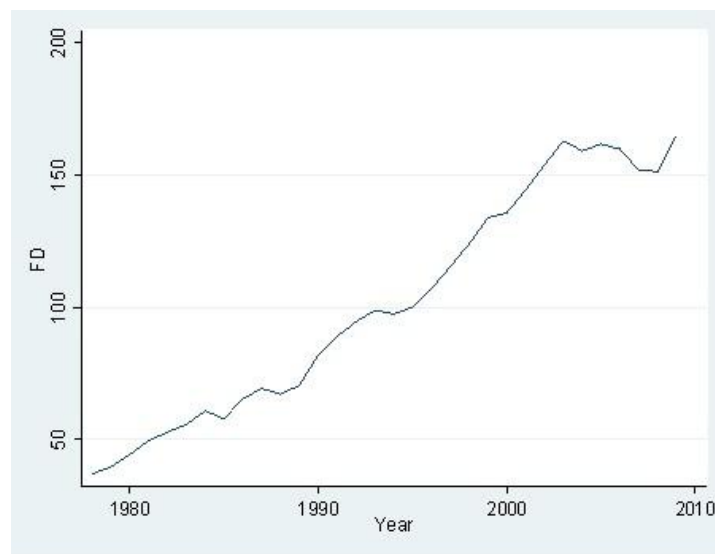
There are three main functions of financial intermediaries, namely, payment system or transaction services for economic activity, increasing the efficiency of resource allocation and accelerating the formation of capital. So I am going to use 3 variables to indicate every function of financial intermediaries. Maswana (2006) suggested three indexes to measure financial development: financial deepening ( $M3/GDP$ ), total loans to private sectors from banks and proportion of total loans extended to the entire economy. Based on China's situation and accessible to Chinese data, I am going to choose three variables to measure Chinese financial development as following.

Firstly, the basic function of financial intermediaries is providing payment system for economic activity and decrease transaction cost. De Gregorio and Guidotti (1995) claimed that monetary aggregates can indicate financial development. They stated that main abilities of financial institutions are providing liquidity or transaction services and collecting money from people who want to save then providing money for people who want to borrow. Goldsmith (1969) proposed that using financial interrelations ratio (FIR) to measure the development of financial. The equation is  $FIR = F/W$ . F indicates the total amount of financial market at a single point in time. W indicated the total amount of national wealth. However, Goldsmith's measurement is usually used on studying the changing of financial structure. I am going to study the development of financial sector, so this measurement is not the best. Mckinnon (1973) claimed that using  $M2/GDP$  to measure financial deepening, of which  $M_2$  is a boarder term of

money including money and other alternative capital. Sims (1972), King and Levine (1993) and Cole (1995) used this measurement, M2/GDP or M3/GDP to measure the development of financial. In this paper, I will use M2/GDP instead of M3/GDP to study since M2 is more accessible in China than M3.

M2 data is from book *Almanac of China's Finance and Banking*, which edited by People's Bank of China. GDP is from Lund University databases, China Statistical Yearbook, category named *gross domestic product of China*. I will use FD to indicate M2/GDP (financial deepening)

Graph 4.2 line graph of M2/GDP.



Graph 4.2 shows overall trend of M2/GDP is increase before around 2003, although in some years it decrease a litter. After 2003 it begins to fall but go up again in the end.

Secondly, financial institutions can increase the efficiency of resource allocation and accelerate the formation of capital. This function mainly achieved by providing loan to enterprises. Since the open and reform policy in 1978, the main capital source for enterprises is from bank loan, especially state-owned enterprises. From this perspective, financial institutions play an important role in development of enterprises and economic growth. King and Levine (1993) claimed that the efficiency of private enterprises and public sector are different, so we should divide into loans to private enterprises and loans to public sector to study. In Beck (2004)'s research, he used private credit to measure loans from financial institutions' influence on economic growth. However, in China situation, the economic system is different from western country. Even after the reform in 1978, Chins has still experienced a long period of planned economy before it shifted to real market economy. Loans from banks mostly went to state-owned enterprises, which play an important role in economic growth. In this paper, I will use the total loans. I will use LOAN to indicate total loans.

The data is from Lund University databases, China Statistical Yearbook, category

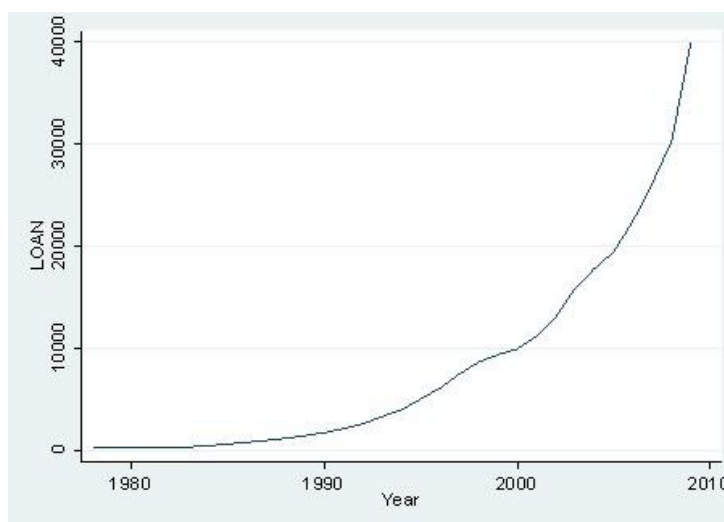
named *Balance Sheet of Credit Funds of Financial Institutions (Funds Uses)*, including short-term loans, Medium & long-term Loans, trusted loans and other loans. Table 4.1 shows the structure of total loans which cataloged by China Statistical Yearbook.

Table 4.1 Structure of total loans

Short-term Loans	Loans to Industrial Sector
	Loans to Commercial Sector
	Loans to Construction Sector
	Loans to Agricultural Sector
	Loans to Township Enterprises
	Loans to Enterprises with Foreign Funds
	Loans to Private Enterprises and Self-employed Individuals
	Other Short-term Loans
Medium&Long-term Loans	no detail
Trusted Loans	no detail
Other Loans	no detail

Source, China Statistical Yearbook

Graph 4.3 line graph of total loans.



Graph 4.3 shows overall trend of total loans is increase, especially after 1998, the increase becomes very sharp.

Thirdly, interest rates as the price of financial assets also need to be considered as the measurement of financial development. Mckinnon and shaw (1973) claimed that the process of financial development is the process of interest rate liberalization. The interest rate control can be eliminated gradually, and also the interest rate difference between loan and saving become lower with the financial deepening process. This can promote people saving money and also promote investment, which could lead to economic growth. In China, interest rate is strictly controlled by government policy. According to chapter 3.2, we can see that the interest rate control is getting weaker



and weaker in recent years. In this paper, I will also use interest rate as an indicator of financial development.

I choose one year's saving interest rate as sum time deposit, which is published by Central Bank in China. Interest rate data is from book *Almanac of China's Finance and Banking*, which edited by People's Bank of China. I will use RATE to indicate interest rate.

Graph 4.4 line graph of interest rate



From graph 4.4 we can see that interest rate grows first and then fluctuates during period 1978 to 1995. And then begin to decline sharply. According to Chapter 3.2, we can know that in 1995, Chinese government brought up basic ideas about losing the control of interest rates and leaving them to market forces. On 1st of June, 1996, People's Bank of China abandoned the interbank market interest rate ceiling and let inter-bank market decide interest rate. Since then, Chinese Central Bank began to lose the interest rate control gradually.

To conclude, I use per capita GDP to indicate economic growth; M2/GDP, the amount of total loans and one year's saving interest rate as sum time deposit to indicate financial development.

Table 4.2 Data Description 1

Variable	Obs	Mean	Std. Dev.	Min	Max
PC_GDP	32	458.6031	352.1159	100	1337.6
FD	32	101.699	43.15508	36.93879	164.6653
LOAN	32	8251.184	10172.72	189.04	39968.5
RATE	32	5.6325	2.984419	1.98	11.11

Table 4.2 gives a general overview of all variables. We can see from the table that there are 32 observations which are from the year 1978 to 2009. The PC\_GDP, FD and RATE are all showed in percentage. The LOAN is calculated in billion yuan. However, the value range of each variable is pretty different, for example, the mean of LOAN is

8251.184 and the mean of RATE is 5.6325. So I take logarithm to all of them. Take logarithm also help to interpret them in terms of growth.

Table 4.3 Data Description 2

Variable	Obs	Mean	Std. Dev.	Min	Max
log_PC_GDP	32	5.839555	.7869349	4.60517	7.198632
log_FD	32	4.522838	.469119	3.609262	5.103915
log_LOAN	32	8.003927	1.670764	5.241959	10.59585
log_RATE	32	1.574432	.5852872	.6830968	2.407845

Table 4.3 is an overview of all variables which were taken logarithm, of which, log\_PC\_GDP is the logarithm of per capita GDP, log\_FD is the logarithm of M2/GDP, log\_LOAN the logarithm of the amount of loan, log\_RATE the logarithm of one year's saving interest rate as sum time deposit.

## 4.2 Data Analysis

### 4.2.1 Stationary test

Based on the previous discussion about financial development and economic growth, I set up a model which contains 4 variables, namely, PC\_GDP, FD, LOAN and RATE to exam empirical relationship between financial development and economic growth, of which PC\_GDP means per capita GDP; FD indicates financial deepening; LOAN is the total loan from financial intermediaries; RATE is one year's saving interest rate as sum time deposit.

The time series data is stationary means that this time series has constant mean and variance over time. It is important that we test our time series sample's stationarity before we do regression since it could be spurious regression. Spurious regression could lead to high correlations between variables which actually do not have any real relationship (Granger and Newbold: 1974). Based on graphs in the chapter 4.1.2, we can see that those four time series data probably are non-stationary. So we need a formal test to make sure their stationarity.

In this paper, I will use Augmented Dickey-Fuller (ADF) test to test my sample's stationarity.

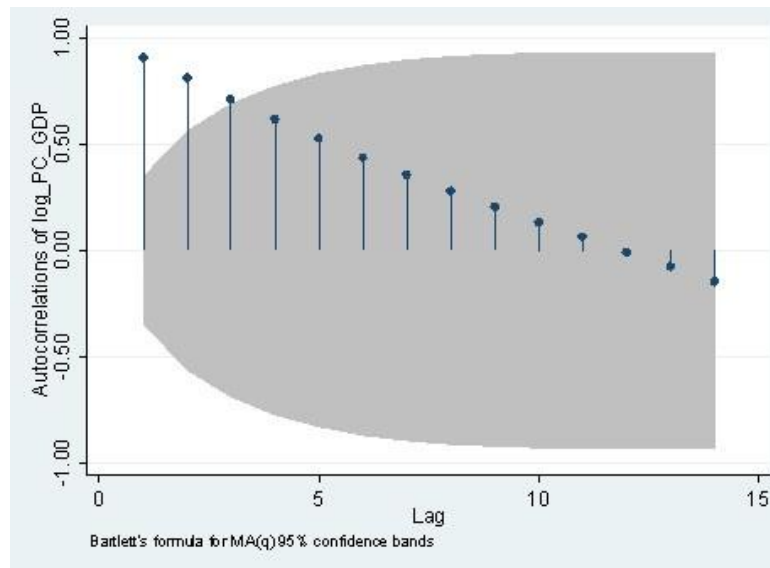
The process of ADF test is

- Run ADF test with suitable lags
- Compare test statistic value with critical value, if test statistic value is less than critical value, reject the null hypothesis.

The null hypothesis is  $H_0: \rho=1 \Leftrightarrow H_0: \gamma=0 = \text{Unit Root}$ . If we reject  $H_0$  the time series is stationary.

Test log\_PC\_GDP

Graph 4.5 AC of log\_PC\_GDP



Run the autocorrelation graph of log\_PC\_GDP and get graph 4.5. It can be seen that the first three points are out of the shadow which suggests three lags. So I initially select 3 lags to do ADF test.

Table 4.4 ADF test on log\_PC\_GDP 1

D. log_PC_GDP	Coef.	Std. Err.	t	P> t
log_PC_GDP				
L1.	-.5123462	.1677339	-3.05	0.006
LD.	.9145337	.1752562	5.22	0.000
L2D.	-.1696573	.2265098	-0.75	0.462
L3D.	.3408025	.2096263	1.63	0.118
_trend	.042793	.0139466	3.07	0.006
_cons	2.277771	.7264981	3.14	0.005

From table 4.4, we can see that the p-value of L3D is 0.118, which is not significant at the 5% level. So I delete the third lag and run the ADF test with only 2 lags, but still with trend and constant since they are significant at the 5% level.

Table 4.5 ADF test on log\_PC\_GDP 2

D. log_PC_GDP	Coef.	Std. Err.	t	P> t
log_PC_GDP				
L1.	-.4191767	.1381638	-3.03	0.006
LD.	.7679887	.1535686	5.00	0.000
L2D.	-.0009074	.2173971	-0.00	0.997
_trend	.0352772	.0114833	3.07	0.005
_cons	1.883632	.6041971	3.12	0.005

From table 4.5, we can see that the p-value of L2D is 0.997, which is not significant at the 5% level. So I delete it and run the ADF test again, with only 1 lag.

Table 4.6 ADF test on log\_PC\_GDP 3

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-4.312	-4.334	-3.580	-3.228

Mackinnon approximate p-value for Z(t) = 0.0030

D. log_PC_GDP	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
log_PC_GDP					
L1.	-.3946495	.0915196	-4.31	0.000	-.5827707 - .2065282
LD.	.7433749	.1362022	5.46	0.000	.4634073 1.023343
_trend	.033123	.0076352	4.34	0.000	.0174286 .0488173
_cons	1.778655	.4042773	4.40	0.000	.9476514 2.609659

From table 4.6, it can be seen that the p-values are all approximately equal to 0 (which of some could be 0.00001 but stata only keep 3 numbers after dot, so here is approximately equal to 0), which are all significant at the 1% level. Then we turn to take a closer look at Test Statistic. If this Test Statistic value less than 1% Critical Value, we reject the null hypothesis and the series is stationary. From this table, we can see that the Test Statistic is -4.312, which is more than 1% Critical Value, -4.334. So we can not reject the null hypothesis and this series is nonstationary at 1% significant level. However, the 5% Critical Value is larger than the Test Statistic value, so this series is stationary at 5% significant level.

In the next part, I will run the ADF test for the other three variables following the same steps.

Table 4.7 ADF test on log\_FD

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-2.481	-3.709	-2.983	-2.623

From this table 4.7, we can see that the Test Statistic is -2.481, which is more than 5% Critical Value, -2.983. So we can not reject the null hypothesis and this series (log\_FD) is nonstationary at 5% significant level.

Table 4.8 ADF test on log\_LOAN

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-0.865	-3.716	-2.986	-2.624

From this table 4.8, we can see that the Test Statistic is -0.865, which is more than 5% Critical Value, -2.986. So we can not reject the null hypothesis and this series

(log\_LOAN) is nonstationary at 5% significant level.

Table 4.9 ADF test on log\_RATE

	Test Statistic	Interpolated dickey-fuller		
		1% critical value	5% critical value	10% critical value
z(t)	-1.151	-3.716	-2.986	-2.624

From this table 4.9, we can see that the Test Statistic is -1.151, which is more than 5% Critical Value, -2.986. So we can not reject the null hypothesis and this series (log\_RATE) is nonstationary at 5% significant level.

According to the ADF test to all variables, we can know that none of them are stationary series at 1% significant level. Except the log\_PC\_GDP, the rest of the series are also nonstationary at 5% significant level. Since we only have 32 observations and the series log\_PC\_GDP's stationarity is blur (stationary at 5% significant level but nonstationary at 1% significant level), it is hard to decide its stationarity. In order to get a more precise result and easy to interpret, we see all of them are nonstationary.

#### 4.2.2 Cointegration test

The general rule is that non-stationary time series should not be use in regression model. However, there is an exception. If two series  $y_t$  and  $x_t$  are related so that

$$e_t = y_t - \beta_1 - \beta_2 x_t \quad (4.1)$$

is a stationary I(0) process. Then we can say that  $y_t$  and  $x_t$  are cointegrated. It means that  $y_t$  and  $x_t$  have similar trend and never diverge too far from each other. And it is possible to interpret  $y_t$  and  $x_t$  have a long-run equilibrium relationship. So here I am going to run cointegration test to see if these time series are cointegrated. If they are, I will use a Vector Error Correction (VEC) model to examine long-term relationship. If they are not, I will take first difference of all time series and run regression of first difference to examine long-term relationship.

Johansen (1991) generalized the testing procedure for more than 1 cointegration relationships. However, Johansen test works better in large samples than small samples since it converges slowly. In my sample, I only have 32 years data. So instead of choosing Johansen test, I chose Engle and Granger test.

The process of Engle and Granger test is

- Run test regression of x and y, save the residuals
  - With a) no constant, no trend
  - b) constant, no trend
  - c) constant and trend
- Test whether residuals are stationary by using ADF test
- Compare Test Statistic from computer output with appropriate Engle-Granger critical

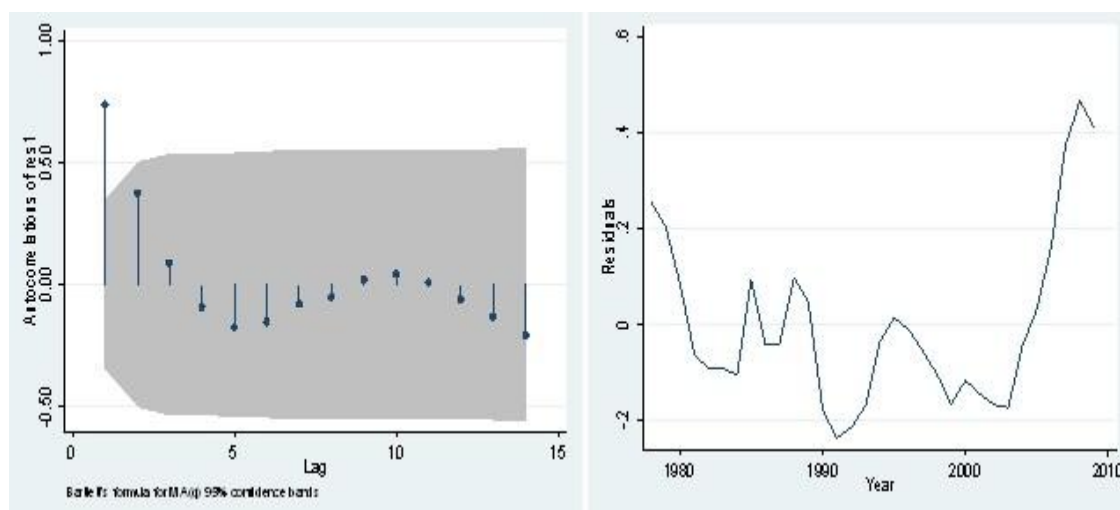
values in *Principles of Econometrics, Carter-Hill, page 339*

The null hypothesis is  $H_0$ : No cointegration among the variables

Since I only want to exam the relationships between economic growth and financial development, that is to say, the correlation between log\_PC\_GDP and the other three variables, I will only do cointegration test for log\_PC\_GDP and log\_FD, log\_PC\_GDP and log\_LOAN, log\_PC\_GDP and log\_RATE, respectively.

Cointegration test for log\_PC\_GDP and log\_FD

Graph 4.6 Residual of log\_PC\_GDP and log\_FD



From graph 4.6, left one, we can see that the computer output suggests one lag and from the right one, we can see that the line of residual is without trend and constant. So I run ADF test of residual (named res1) with one lag and no trend, no constant.

Table 4.10 ADF Test on Residual of log\_PC\_GDP and log\_FD

	Test Statistic	Interpolated Dickey-Fuller		
		1% Critical Value	5% Critical Value	10% Critical Value
$z(t)$	-2.164	-2.652	-1.950	-1.602

From table 4.10, it can be seen that the Test Statistic is -2.164. And from *Principles of Econometrics, Carter-Hill, page 339*, the critical value for the cointegration test without trend and constant at 5% significant level is -2.76. So the Test Statistic is  $-2.164 > -2.76$ . We can not reject the null hypothesis. So there is no cointegration between log\_PC\_GDP and log\_FD at 5% significant level.

Cointegration test for log\_PC\_GDP and log\_LOAN

Graph 4.7 shows that we need two lags and without trend and constant.

Graph 4.7 Residual of log\_PC\_GDP and log\_LOAN

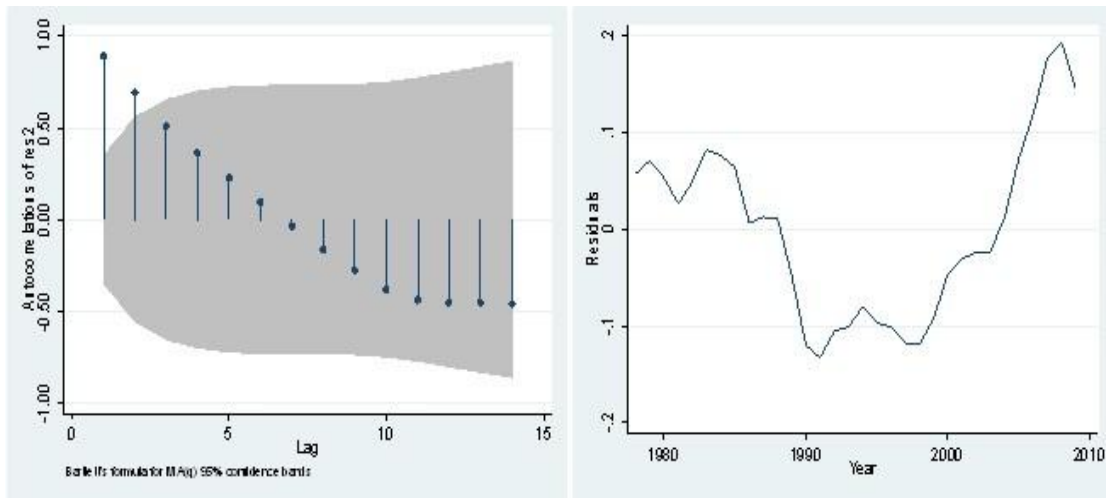


Table 4.11 ADF Test on Residual of log\_PC\_GDP and log\_LOAN 1

	Test Statistic	Interpolated Dickey-Fuller		
		1% Critical Value	5% Critical Value	10% Critical Value
$z(t)$	-1.176	-2.654	-1.950	-1.602

From table 4.11, we can see that the L2D is not significant at 5% significant level. So I delete lag 2 and run ADF test again with only one lag.

Cointegration test for log\_PC\_GDP and log\_RATE

Table 4.12 ADF Test on Residual of log\_PC\_GDP and log\_LOAN 2

	Test Statistic	Interpolated Dickey-Fuller		
		1% Critical value	5% Critical value	10% Critical value
$z(t)$	-1.897	-2.652	-1.950	-1.602

From table 4.12, we can see that the Test Statistic is -1.897. And from *Principles of Econometrics, Carter-Hill, page 339*, the critical value for the cointegration test without trend and constant at 5% significant level is -2.76. So the Test Statistic is -1.897 > critical value which is -2.76. We can not reject the null hypothesis. So I conclude that there is no cointegration between log\_PC\_GDP and log\_LOAN at 5% significant level.

Graph 4.8 shows that we need two lags. And it seems have trend. So I will run ADF test with 2 lags and with trend.

Graph 4.8 Residual of log\_PC\_GDP and log\_RATE

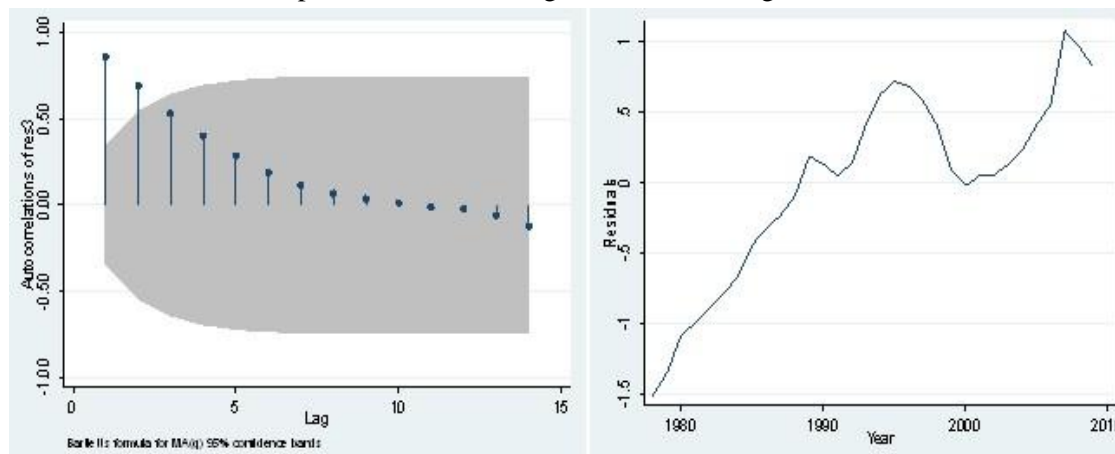


Table 4.13 ADF Test on Residual of log\_PC\_GDP and log\_RATE 1

D.res3	Coef.	Std. Err.	t	P> t
res3				
L1.	-.1764423	.0906305	-1.95	0.063
LD.	.4164407	.187961	2.22	0.036
L2D.	-.0091614	.1987821	-0.05	0.964
_trend	.0074924	.0061067	1.23	0.232
_cons	-.081651	.110273	-0.74	0.466

From table 4.13, we can see that the trend and constant is not significant at 5% significant level. So I delete trend and constant and run ADF test again.

Table 4.14 ADF Test on Residual of log\_PC\_GDP and log\_RATE 2

D.res3	Coef.	Std. Err.	t	P> t
res3				
L1.	-.0783387	.0523187	-1.50	0.146
LD.	.4612435	.1849631	2.49	0.019
L2D.	.0153616	.1851851	0.08	0.935

From table 4.14, we can see that the L2D is not significant at 5% significant level. So I delete lag 2 and run ADF test again with only one lag.

Table 4.15 ADF Test on Residual of log\_PC\_GDP and log\_RATE 3

Test statistic	Interpolated Dickey-Fuller			
	1% critical value	5% critical value	10% critical value	
z(t)	-1.908	-2.652	-1.950	-1.602

From table 4.15, we can see that the Test Statistic is -1.908. And from *Principles of Econometrics, Carter-Hill, page 339*, the critical value for the cointegration test without trend and constant at 5% significant level is -2.76. So the Test Statistic is -1.908 > critical value which is -2.76. We can not reject the null hypothesis. So I conclude that there is no cointegration between log\_PC\_GDP and log\_RATE at 5% significant level. To conclude, there are no cointegration between log\_PC\_GDP and log\_FD,



log\_PC\_GDP and log\_LOAN, log\_PC\_GDP and log\_RATE, respectively. So we have to change those nonstationary series into stationary series in order to run the regression. And I am going to get the stationary series by taking the first difference.

#### 4.2.3 First Difference Stationary

$$\Delta Y_t = (\rho - 1)Y_{t-1} + u_t = \delta Y_{t-1} + u_t$$

, of which  $\Delta Y_t = Y_t - Y_{t-1}$ . The  $H_0: \delta = 0$ . If we can not reject the  $H_0$ , the  $\Delta Y_t$  is stationary. So we can say that  $Y_t$  is stationary after taking the first difference. We call it integrated of order 1.

According to the ADF test to all variables, we know that they are non-stationary. So I will generate series of their first differences and check if their first differences are stationary by using the same ADF test as in chapter 4.2.1.

Table 4.16 Stationarity of four series' first difference

Variables	Test Statistic	5% Critical Value	10% Critical Value	Stationarity
D.log_PC_GDP	-3.941	-2.986	-2.624	stationary
D.log_FD	-4.399	-2.986	-2.624	stationary
D.log_LOAN	-2.799	-2.986	-2.624	stationary
D.log_RATE	-3.440	-2.986	-2.624	stationary

Table 4.16 is the result of first differenced series stationarity test. It can be seen that all series' test statistic value are less than 10% critical value. Besides, except series D.log\_LOAN, all series' test statistic value are less than 5% critical value.

To conclude, all variables' first difference are stationary at 10% significant level. And except d\_log\_LOAN, the other three are also stationary at 5% significant level. So we can run the regression with those series' first difference in the next step.

### 4.3 Short-run Model

#### 4.3.1 Set up VAR Model

Since all variables first differences are stationary, I am going to set up a Vector Autoregression model (VAR). First, I will make use of the Akaike (AIC) and Schwarz information criteria (SBIC) to decide the number of lags in this VAR model.

Table 4.17 lag suggestions

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	155.906				1.5e-10	-11.2523	-11.1952	-11.0603
1	185.121	58.429	16	0.000	5.8e-11*	-12.2312	-11.9457*	-11.2713*
2	199.353	28.465	16	0.028	7.3e-11	-12.1002	-11.5865	-10.3724
3	217.056	35.407	16	0.003	8.1e-11	-12.2264	-11.4843	-9.73072
4	234.731	35.349*	16	0.004	1.2e-10	-12.3505*	-11.38	-9.08687

From table 4.17 we can see that AIC and SBIC gives different suggestions. AIC suggests 4 lags and SBIC suggests 1 lag. Number of observations has different effects on the value of AIC and SBIC. If N (number of observations) is greater than 100, SBIC

will suggest more lags than AIC, vice versa. In this model, there are only 32 years data so SBIC suggests less lag than AIC. Since my observations are only 32, I choose one lag as SBIC suggests.

#### 4.3.2 Estimation and interpretation of VAR-Model

Table 4.18 VAR-Model

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
d_L06_PC_GDP						
d_L06_PC_GDP L1.	1.004685	.1714039	5.86	0.000	.66874	1.340631
d_log_FD						
d_log_FD L1.	.3069793	.0918266	3.34	0.001	.1270025	.4869562
d_log_LOAN						
d_log_LOAN L1.	-.1443111	.0669502	-2.16	0.031	-.275531	-.0130912
d_log_RATE						
d_log_RATE L1.	-.0086474	.016119	-0.54	0.592	-.0402401	.0229453
_cons	.0103609	.0158587	0.65	0.514	-.0207217	.0414434
d_log_FD						
d_L06_PC_GDP						
d_L06_PC_GDP L1.	-1.773321	.3496416	-5.07	0.000	-2.458606	-1.088036
d_log_FD						
d_log_FD L1.	-.4132588	.1873143	-2.21	0.027	-.7803882	-.0461295
d_log_LOAN						
d_log_LOAN L1.	.2306104	.1365696	1.69	0.091	-.0370611	.498282
d_log_RATE						
d_log_RATE L1.	.0051073	.0328807	0.16	0.877	-.0593376	.0695523
_cons	.1763796	.0323498	5.45	0.000	.1129753	.239784
d_log_LOAN						
d_L06_PC_GDP						
d_L06_PC_GDP L1.	.2931261	.4636364	0.63	0.527	-.6155846	1.201837
d_log_FD						
d_log_FD L1.	-.1230999	.248385	-0.50	0.620	-.6099256	.3637258
d_log_LOAN						
d_log_LOAN L1.	.5035936	.1810958	2.78	0.005	.1486522	.8585349
d_log_RATE						
d_log_RATE L1.	.0098799	.0436009	0.23	0.821	-.0755763	.095336
_cons	.0712499	.0428969	1.66	0.097	-.0128264	.1553262
d_log_RATE						
d_L06_PC_GDP						
d_L06_PC_GDP L1.	3.049517	1.916971	1.59	0.112	-.7076768	6.806712
d_log_FD						
d_log_FD L1.	.6141642	1.026983	0.60	0.550	-1.398686	2.627015
d_log_LOAN						
d_log_LOAN L1.	-.5218399	.7487667	-0.70	0.486	-1.989396	.9457159
d_log_RATE						
d_log_RATE L1.	.3759527	.180274	2.09	0.037	.0226222	.7292832
_cons	-.2125431	.1773632	-1.20	0.231	-.5601685	.1350824

From table 4.18, it can be seen that  $d\_log\_PC\_GDP$  significantly depends on L1 of its own, L1 of  $d\_log\_FD$  and L1 of  $d\_log\_LOAN$ . The coefficients are approximately 1.005, 0.307 and -0.144, respectively. What's more,  $d\_log\_FD$  significantly depends on  $d\_log\_PC\_GDP$ . The coefficient is 0.293.

Based on SBIC's suggestion in table 4.17, I set up a VAR model with 1 lag and run Granger causality test. According to theories which were stated previous, I expect that there is granger causality between  $d\_log\_PC\_GDP$  and the other three variables.

Table 4.19 Granger Causality Test

## Granger causality wald tests

Equation	Excluded	chi2	df	Prob > chi2
$d\_LOG\_PC\_GDP$	$d\_log\_FD$	11.176	1	0.001
$d\_LOG\_PC\_GDP$	$d\_log\_LOAN$	4.6462	1	0.031
$d\_LOG\_PC\_GDP$	$d\_log\_RATE$	.2878	1	0.592
$d\_LOG\_PC\_GDP$	ALL	14.969	3	0.002
$d\_log\_FD$	$d\_LOG\_PC\_GDP$	25.723	1	0.000
$d\_log\_FD$	$d\_log\_LOAN$	2.8513	1	0.091
$d\_log\_FD$	$d\_log\_RATE$	.02413	1	0.877
$d\_log\_FD$	ALL	26.489	3	0.000
$d\_log\_LOAN$	$d\_LOG\_PC\_GDP$	.39972	1	0.527
$d\_log\_LOAN$	$d\_log\_FD$	.24562	1	0.620
$d\_log\_LOAN$	$d\_log\_RATE$	.05135	1	0.821
$d\_log\_LOAN$	ALL	2.2434	3	0.523
$d\_log\_RATE$	$d\_LOG\_PC\_GDP$	2.5306	1	0.112
$d\_log\_RATE$	$d\_log\_FD$	.35764	1	0.550
$d\_log\_RATE$	$d\_log\_LOAN$	.48571	1	0.486
$d\_log\_RATE$	ALL	2.9021	3	0.407

From table 4.19, we can know the granger causality among variables. I use table 4.20 to conclude the granger causality among these variables.

Table 4.20 Granger Causality Test Result

Causality
$d\_log\_PC\_GDP \Leftrightarrow d\_log\_FD$
$d\_log\_PC\_GDP \leq d\_log\_LOAN$
$d\_log\_PC\_GDP \not\leq d\_log\_RATE$

Now I set up an equation, which indicates the causality test result:

$$\Delta GDP = 0.01 + 1.005 * \Delta GDP_{t-1} + 0.307 * \Delta \text{Financial deepening}_{t-1} - 0.144 * \Delta \text{Loan}_{t-1} + e$$

According to this equation and table 4.20, I get following conclusions.

- There is a bi-directional causality between the growth rate of per capita GDP and financial deepening.
- The growth rate of loan affect the growth rate of GDP, but the growth rate of GDP has no influence on the growth rate of loan.
- There is no causality between the growth rate of per capita GDP and rate.
- The last year's growth rate of financial deepening has positive effect on this year's growth rate of per capita GDP, the elastic is 0.307.
- The last year's growth rate of loan has negative effect on this year's growth rate of per capita GDP, the elastic is 0.144
- The last year's growth rate of per capita GDP has positive effect on this year's growth rate of financial deepening, the elastic is 0.293.

To sum up, in the short term, if financial sectors in China develop well and provide more monetary services for economic activities, it will promote Chinese economic growth. At the same time, if Chinese economy develops very well, financial sectors will get benefit from the good economic environment. But if banks provide too much loan, the economic growth rate will slow down.

#### 4.3.3 Testing short-run model

##### 1. Testing residuals for normality

The normally distributed residuals are important because if we are able to assume the errors are normally distributed, then dependent variable  $y$  will also be a normally distributed random variable. If the errors are not normally distributed, then the least squares estimators are approximately normally distributed in large samples. So, when the sample is not large enough, the normally distributed residuals are important. I will use Jarque-Bera test for my model.

The process of normality test

- regress d\_LOG\_PC\_GDP d\_log\_FD d\_log\_LOAN d\_log\_RATE
- predict y\_hat
- predict res, residuals
- summarize res, detail

The null hypothesis is  $H_0$ : the series is normally distributed

From table 4.21, It can be seen that  $N=31$ , Skewness=-0.5284, Kurtosis=4.6673.  
 $JB = (N/6) * (S^2 + ((K-3)^2)/4) = 5.0337 < \text{Critical value}, 5.99$ . So we can not reject the null hypothesis. The series is normally distributed

Table 4.21 JB Test

Residuals				
	<b>Percentiles</b>	<b>Smallest</b>		
1%	-.0578458	-.0578458		
5%	-.0300376	-.0300376		
10%	-.0212707	-.0235985	Obs	31
25%	-.0090558	-.0212707	Sum of wgt.	31
50%	.0022654		Mean	-3.38e-11
		<b>Largest</b>	Std. Dev.	.0189601
75%	.0096009	.0213923		
90%	.0213923	.0232448	Variance	.0003595
95%	.036792	.036792	Skewness	-.5283985
99%	.0392658	.0392658	Kurtosis	4.667288

## 2. Testing residuals for autocorrelation

Table 4.22 LM Test

### Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	14.2768	16	0.57810
2	24.6909	16	0.07546

H0: no autocorrelation at lag order

It can be seen from table 4.22, we can't reject the null hypothesis at 5% level of significance for 1 lag since prob is  $0.5781 > 0.05$ . So there is no autocorrelation in the model.

## 4.4 Long-run model

Chapter 4.3 shows the short-run relationship between per capita GDP and M2/GDP, the amount of loan and interest rate. Now I am going to find out the long-run relationship between these four variables. I will run the regression of first difference ( $\Delta$ ) since I have already tested these four variables' first difference series and they are all stationary.

The regression output as follows:

$$\Delta \log\_PC\_GDP = 0.099 - 0.313\Delta \log\_FD$$

0.000

$$\Delta \log\_PC\_GDP = 0.063 + 0.121\Delta \log\_LOAN$$

0.136

$$\Delta \log\_PC\_GDP = 0.084 + 0.024\Delta \log\_RATE$$

0.276

$$\Delta \log\_PC\_GDP = 0.071 - 0.354\Delta \log\_FD + 0.171\Delta \log\_LOAN - 0.006\Delta \log\_RATE$$

0.000                      0.011                      0.720

$$\Delta \log\_FD = 0.1426 - 1.128\Delta \log\_PC\_GDP$$

0.000

$$\Delta \log\_LOAN = 0.121 + 0.618 \Delta \log\_PC\_GDP$$

0.136

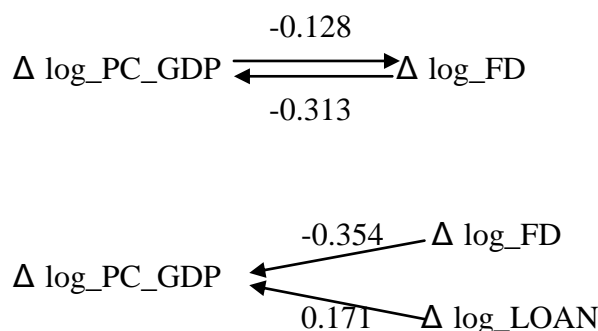
$$\Delta \log\_RATE = -0.155 + 1.713 \Delta \log\_PC\_GDP$$

0.276

The coefficient indicates the degree of influence. Take the first equation as an example, when  $\Delta \log\_FD$  increase one unit, the  $\Delta \log\_PC\_GDP$  will increase -0.313 unit. And the number 0.000 under the coefficient is the p-value of regression. In this situation (first equation), the p-value is 0.000, less than 0.05. So we can say that it is significant in 5% significant level.

In order to make it clear, I use graph 4.9 to conclude the relationship among these variables.

Graph 4.9 Conclusion of the relationship among variables.



To sum up, in the long term, there is not really obvious positive effect between economic growth and financial development in China case as expected. But efficient bank loans are helpful for promoting economic growth.

## 4.5 Discussion and suggestions

### 4.5.1 Discuss about results

Based on previous theories and empirical studies, I assumed that there is a positive relationship between financial development and economic growth in China.

After analyzing data, I got the results that in the short term, if financial sectors in China develop well and provide more monetary services for economic activities, it will promote Chinese economic growth. At the same time, if Chinese economy develops very well, financial sectors will get benefit from the good economic environment. This result accords with previous theories and empirical studies in Chapter 2. However, in the long term, there is not really obvious positive effect between economic growth and financial development in China case as expected. I am going to discuss possible reasons in the following part.

## 1. Liberalization interest rate

The empirical study of China found that there is no relationship between interest rate and economic growth. In my opinion, most possible reason is that Chinese government has intervention on interest rate.

As discussed in chapter 3.2.2, Chinese authority strictly controlled interest rate until 1995, in which Chinese government first time brought up ideas about losing the control of interest rates. From that time, interest rate liberalization in China began to implement gradually. Central Bank abandoned the interbank market interest rate ceiling and let inter-bank market decide interest rate firstly, then reform rediscount rate and the discount rate applies, reformed exchange rate management system, unlocking foreign currency loan interest rate and so forth. However, the interest rate liberalization still not completely realize until now. There is ceiling for saving interest rate, bottom line for loan interest rate and so forth. The Chinese interest rate reform still has a long way to go.

## 2. Loan problems

From empirical study results, we can see that loans play an important role in long-run economic growth. However, in the short term, if banks provide too much loan, economic growth rate will slow down. This result is contrary with previous studies and theoretical analysis in chapter 2. But it is not surprising that it happened on China case because the unique financial and loan system in China. Now I am going to discuss from two perspectives.

Firstly, the financial system in China started to develop because Chinese government needs a tool to control national financial resources. Hence, the main goal of financial sectors is supporting state-owned departments. Especially People's Bank of China and other four state-owned commercial banks, they are responsible for policy loans and economy stability. It worked well in the early stage of open and reform period because Chinese market at that time was not mature and need to be protected. However, in recent years, as Chinese market developed, the low efficiency of bank loans to state-owned sectors began to unfold. A large proportion of policy loans flows to state-owned enterprises, which some of them are not running well and low efficiency. This leads to large amount of non-performing loans. That is why negative relationship is found in empirical study of China.

Secondly, state-owned banks play a dominant role in credit market. This dominant role is supported by Chinese government, so state-owned banks do not have much motivation to find and evaluate high efficiency investment projects. Some private enterprises or foreign enterprises run well but can not get loans from state-owned banks because of some limited policies. After reform and open-up policy, the proportion of state-owned enterprises are decreasing and the proportion of collectively-owned enterprise, private enterprises or foreign enterprises are increasing. The non state-owned enterprises also have higher growth rate. However, bank loans

division does not change with the development of non state-owned enterprises. On the contrary, with the worse and worse economic condition of state-own enterprises, state-owned banks provide larger proportion of loans to them. According to the report from Beijing university economic center (2000), from 1984 to 1996, the proportion of state-own enterprises decreased from 69.08 to 31 percent. But the proportion of bank loans for state-own enterprises increased from 54.05 to 73.41 percent.

### 3. Other financial institutions

From the results, we can see that well-run financial sectors can promote economic growth in China in the short run or vice versa. But in the long run, there is no obvious positive relationship between them. That is probably because other new emerging financial institutions and non financial institutions are playing a more and more important role in Chinese economic growth.

In this thesis, I only analyzed bank system, which is most important in financial system until now. But stock market, insurance companies, foreign financial institutions and some other new emerging financial institutions are entering into market. These financial institutions are going to have a very strong competitive in the future and play a key role in Chinese economic growth. In addition, capital market also contributed a lot to Chinese economic growth over the last decade. It is considered that this contribution will be larger in the further. Because with the development of social security system and social welfare, individuals' saving will decrease, also with the change of people's opinion, most people will choose other ways to manage their money, such as fund, stock or other alternative investment. The amount of savings in banks will decrease, so banks will lose the dominant role in financial market.

#### 4.5.2 Policy Implications

Based on the results and discussion, I list following policy implications.

Firstly, Chinese government should go on deepening the reform of financial system. Although Chinese bank sectors have experienced a large reform in the last decade, Chinese government still needs to go on making effort to improve the existing banking system and optimize their structure. The four state-owned banks need to shift from policy-lead to market-led. If they can make interest rate and decide loans themselves, they will have more motivations to change business processes and maximum profit. Besides, financial institutions in rural place need to be developed and financial sectors need to be varied. People who live in rural place do not have too many choices to manage their money except saving them in banks, mostly four state-owned banks. Some other financial institutions need to be developed in rural areas, also in some urban areas, rural credit cooperatives, credit banks, financial trust investment agencies, financial companies, foreign financial institutions and so forth. Different financial institutions will form a highly competitive environment and every financial institution can get benefit from it since they need to update their



management, business process, structure and so forth from time to time in order to keep competitive forces.

Secondly, Chinese government needs to pay attention on stock market, insurance companies and some other new emerging financial markets. After reform and open-up policy implemented, the amount of some kinds of financial assets, such as stocks and bonds, increased very fast. However, because of traditional planned economy and government intervention, the stock market in China did not develop very fast. Capital market plays an increasing important role in resource allocation and technology innovation, which should be paid attention on by Chinese government.

Thirdly, Chinese government needs to provide a good policy environment for small businesses, making sure they can get enough capital and resource for investing and developing. Small businesses are very important for promoting innovation and economic growth now, but most of them can not easily get bank loans and some of them close down because lack of capital.

## **5. Conclusion**

This thesis examined the relationship between financial development and economic growth in China. I used time series annual data in China from 1979 to 2009 to build a short-term model and long-term model. I used per capita GDP to indicate economic growth; three variables to indicate financial development, financial deepening ( $M2/GDP$ ), total loans (credit funds of financial institutions) and interest rate (one year's saving interest rate). By running short-term model and long-term model, I got following results:

- In the short term, if financial sectors in China develop well and provide more monetary services for economic activities, it will promote Chinese economic growth. At the same time, if Chinese economy develops very well, financial sectors will get benefit from the good economic environment. But if banks provide too much loan, the economic growth rate will slow down.
- In the long term, there is not really obvious positive effect between economic growth and financial development in China case as expected. But efficient bank loans are helpful for promoting economic growth.

The possible reasons for the result, as discussed in chapter 4.5, are that Chinese government has intervention on interest rate and bank loans; a large proportion of policy loans flows to state-owned enterprises, which some of them are not running well and low efficiency; state-owned banks are all guided by policy, which make them are not high efficiency; other new emerging financial institutions and non financial institutions are playing a more and more important role in Chinese economic growth.

Based on the results, I listed some policy implications. Firstly, Chinese government

should go on deepening the reform of financial system. Secondly, Chinese government needs to pay attention on stock market, insurance companies and some other new emerging financial markets. Thirdly, Chinese government needs to provide a good policy environment for small businesses, making sure they can get enough capital and resource for investing and developing.

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