

**THE RELATIONSHIP BETWEEN FINANCIAL DEVELOPMENT
AND ECONOMIC GROWTH IN CHINA: THEORY, EMPIRICAL
EVIDENCE AND POLICY IMPLICATIONS**

By

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The candidate confirms that the work submitted is his/her own and that appropriate credit has been given where reference has been made to the work of others.

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ABSTRACT

China began its current economic reform in the late 1970s. Since initiating its reforms, China has restructured its banking sector from the old Soviet-style and monopoly banking system. Meanwhile, since China launched its equity market in the early 1990s, selling new stocks and bonds appeared to be another significant channel for enterprises to raise investment funds.

This thesis investigates the influence of financial development on economic growth in China mainly by examining the banking sector and stock market performance. This study employs a consolidated dataset covering 30 provinces for 18 years to conduct the panel technique. Meanwhile, a monthly dataset of 10 years has also been established to explore Granger-causality tests of the financial development and economic growth linkages.

The main findings of the research are that at first China's economic growth is driven by the quickly accumulated capital stock attributed to the rapid increase of fixed assets investment while the contribution of labour input to GDP growth is statistically modest. Secondly, on aggregated level, the Granger-causality estimated result does not support the hypothesis that China's banking sector has been playing a leading role in the process of economic growth. Meanwhile, based on the introduction of five banking sector indicators, the panel estimation result indicated that China's banking sector has not statistically generated any contribution to the economic development. Thirdly, the Granger-causality estimated results concluded that economic growth is the Granger-cause of the stock market capitalisation while no causality relationship exists between stock market development and economic growth when in term of market liquidity and volatility. The causality relationship was finally testified on the basis of investigating the whole financial market, in which circumstance the estimated result further confirmed that financial development is the effect rather than cause of China's economic growth.

Overall, the thesis presents enough evidence to support the argument that the financial sector development has been acting the demand-following role in economic growth process in the context of China.

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Chapter 1: Introduction

1.1 Purpose of the thesis

China initiated its current economic reform in the late 1970s with a sense of price liberalisation, enterprises reform and financial sector reform. Prior to the implementation of these reforms, the Chinese economy had functioned with the Soviet-style administrative-command model. The reforms set in motion by Deng Xiaoping introduced dramatic change: the country moved from the administrative-command model to a market-socialist model. Throughout the virtually three decades of reform, China's economy appears to be a dual-track economy consisting of (1) small and medium-scale private-owned enterprises that operate on the basis of market principles and are not particularly favoured by state policy and (2) large scale corporatised state-owned enterprises that remain subject to political directives and support.

Since initiating its reforms, China has been forced to restructure its banking sector from the old Soviet-style and monopoly banking system. Originally credit allocation was highly tied to state economic plans, however, as the current state-owned commercial banks remain the property of the state, but subject to the reforms, they now grant loans in keeping with the objectives of the contemporary government and party officials. This gives preferential treatment to state enterprises. Meanwhile, since China launched its equity market in the early 1990s, selling new stocks and bonds has emerged as another substantial channel for enterprises to raise investment funds. Throughout the development of the last decade, China's stock market has been strongly characterised by central-planned initiatives though the reform has gradually been undertaken by adopting the trial-and-error approach.

Having implemented the reform for nearly three decades, China has obtained extraordinary achievements in both economic growth and social development. The purpose of this research is to investigate the relationship between financial intermediation and economic growth in China, by examining the influence of both the banking sector development and stock market expansion. The study aims to identify

whether the financial sector development is acting as the supply-leading factor or the demand-following effect. In other words, this study is about identifying how the development of financial intermediaries contributes to the economic growth in the context of China.

Since the early 1970s, the relationship between financial intermediation and economic growth has been extensively studied in two stages. Before 1990s, a number of researchers such as Goldsmith (1969), McKinnon (1973) and Shaw (1973), among many others, produced considerable evidence that financial development correlates with growth. However, their work has been found to lack analytical evidence. After 1990s, the link between financial development and growth has been investigated on the basis of the endogenous growth model, where the performance of financial intermediaries is treated as an endogenous determinant within the growth model. Progressively empirical studies, generally based on the cross-country panel analysis, provide evidence of the effect of financial development on growth and of the corollary.

Although a positive correlation between growth and indicators of financial development was largely discovered in both cross-country/section study and panel analysis, the financial/real causal relationship had not been explicitly identified in the early empirical study. Since Patrick (1966) introduced the now common terms – ‘supply-leading’ and ‘demand-following’ finance, the attention has been increasingly placed on observing the direction of causality based on different data sample according to individual research criteria of data selection.

The existing empirical studies on financial-growth nexus largely concentrate on cross-country analysis, including both developed countries and developing countries (see, for instance, King and Levine, 1993a, b and c; Murinde and Eng, 1994; Fernandez and Galetovic, 1994; De Gregorio and Guidotti, 1995; Neusser and Kugler, 1996; Al-Yousif, 2002). In addition, the direction of causality between financial development and economic growth has also been extensively examined by using firm-level and/or industrial-level data of cross-country (for example, among many others, Jayaratne and Strahan 1995, Rajan and Zingales 1996, Demirguc-Kunt and Maksimovic, 1996; Demetriades and Hussein, 1996, Ram 1999, Morris et al. 2001).

However, this issue remains empirically controversial: the empirical results have not yet offered any clear-cut answer upon this issue, but rather the direction of causality seems to vary from study to study (and from country to country).

Nevertheless, it is surprising to notice that China is seldom included to the cross-country empirical studies data sample partly due to the unobservable or missing data. The statistical analysis on financial-growth nexus been applied to China very recently (Aziz and Duenwld, 2002; Boyreau-Debray, 2003). It is worthwhile applying the panel analysis technique – cross-region and time-serial to a single country China based on certain criteria. Moreover, despite the short history of China's stock market development, the Granger-causality of stock market expansion and economic growth is also employed. Consequently, the researcher is able to obtain a more accurate picture of how financial intermediaries in China – banking sector and stock market – influence the real sector growth; the corresponding policy implications will be drawn based on the estimated findings.

1.2 Structure of thesis

The thesis contains nine chapters. In general, the current chapter briefly provides the background and purpose of this thesis. The literature review is covered in Chapter 2. From Chapter 3 to Chapter 8, the empirical research of this paper is illustrated in detail, including the policy implications. Chapter 9 provides the conclusion for the entire research. Specifically, the rest of the thesis will be organised as follows.

Chapter 2 reviews the literature on the theoretical and empirical evidence on the relationship between financial development and economic growth. The chapter starts from a discussion of the four *a priori* possibilities concerning the causal relationship between financial development and economic growth. The theoretical framework surveys the literatures on the interaction between the real and the financial sectors from three perspectives – micro level analysis, AK model (endogenous growth) interpretation and functional approach; while the empirical evidence mainly reviews the statistical result by using both cross-country estimation and Granger-causality examination. Meanwhile, the illustration is emphasised on the domestic financial

liberalisation while leaving the external financial liberalisation untouched. Additionally, given that the establishment and fast expansion of stock markets is a pervasive phenomenon occurring within the financial de-repression process in many less developed countries (LDCs), the role of stock market in domestic financial liberalisation will be examined.

Chapter 3 introduces the background information of China's financial sector reform, including the banking sector reform and stock market development, followed by a brief survey on China's economic reform in terms of price liberalisation and enterprises corporatisation. Chapter 4 presents the methodology employed in this study with the analysis of the Error Correction Model (ECM), panel data analysis and Granger-causality analysis. In addition, data description section provides detailed information on each variable employed in this research.

Chapter 5 to 7 present the empirical result upon the finance-growth nexus hypothesis testing in a methodology-oriented way. Particularly, Chapter 5 analyses China's economic growth pattern on national aggregated level in both long-term and short-term by exploring the benefit of ECM. In Chapter 6, panel data technique is first applied to examine the economic growth pattern where the influence of structural shift (sectoral change) will also be taken into consideration. Then the impact of banking sector development is demonstrated concentrating on banking sector development gauged by five indicators. The empirical estimation is not only conducted on cross-province and time-serial data, but also on eight sub-regional panel datasets. Chapter 7 examines the impact of financial market on economic growth by using Granger-causality technique. The analysis is first conducted on the annual aggregated level data by focusing on credit market. This is followed by the analysis on another important financial intermediary component – stock market development upon economic growth by using monthly data on national level.

The policy implications are exhibited in Chapter 8, followed by a conclusion chapter summarising the theoretical studies and empirical findings while a future research agenda is also suggested in Chapter 9.

Chapter 2: Financial development and economic growth: literature review – theoretical background and empirical evidence

2.1 Introduction

Classical economists in nineteenth century ignored financial intermediation as an important element in explaining economic growth until Bagehot (1873). For the first time, he gives explicit examples of how money market developments in England could make capital flow across the country in search of the highest rate of return. Further in his exposition, Bagehot becomes even more explicit about the connection between financial development (and trade) and economic growth. “The ‘loanable capital’ lay idle in the banks till some trade started into prosperity, and then was lent in order to develop that trade; that trade caused other secondary developments; those secondary developments enabled more loanable capital to be lent; and that lending caused a tertiary development of trade; and so on through society.” (Bagehot, 1873, Chapter VI, p.52)

Although Bagehot’s argument on the connection between finance and economic growth is explicit, it did not take centre stage in the thinking of classical economies (Sinha, 2001). It was Schumpeter (1911) who put the role of financial intermediation at the centre of economic development. It is the first time that Schumpeter articulates statements about how financial transactions take central stage in economic growth.

Four sections are included in this chapter. Apart from the introduction section, Section 2.2 surveys the four *a priori* possibilities concerning the causal relationship between financial development and economic growth. The theoretical background for the real/financial relationship, including the earlier controversial arguments over this topic, the prevailing AK model (much used in endogenous growth theory) demonstration and the most recent functional approach is illustrated in Section 2.3. Section 2.4 provides the empirical evidence on the real/financial nexus from two aspects: country case study and statistical analysis. In the latter aspect, cross-country estimation (including panel analysis) and Granger-causality are illustrated thoroughly. Section 2.5 demonstrates the importance of stock market development in the domestic

financial liberalisation process with substantial empirical evidence. The summary of this chapter is given in Section 2.7, after highlighting the research space (including the applicability of those existing research methods) for this research in Section 2.6.

2.2 The causal relationship of financial-growth nexus

According to Graff's survey (2001), there are four *a priori* possibilities concerning the causal relationship between financial development and economic growth.

- i) Financial development and economic growth are not causally related. There is no significant impact of one on the other. The observable correlation between them is the result of a historical phenomenon: economies grew, and so did the financial sector, but the two each follow their own logic. Modern economic growth was governed by real factors, whereas financial development was rooted in the history of financial institutions.
- ii) Financial development follows economic growth. Economic growth causes financial institutions to change and develop, consequently encouraging the financial markets to grow. Financial development is thus demand-driven. As the growing scale of economic activities requires more and more capital (liquid and fixed), institutional raising and pooling of funds for industry provides a vital alternative channel for starting up enterprises apart from relying on individual fortunes. Additionally, it is also an important complementarity for retained profits for business and economic expansion. The present diversity of financial system within a country stems from the fact that various institutional arrangements can equally well fulfil the two basic functions of any financial system: transferring savers' deposit to investors, and selecting the most appropriate uses for investible funds.
- iii) Financial development determines economic growth. The line of causation runs from financial development to real development, which can be interpreted in the following two aspects: (1) financial development is a precondition for economic growth. As can be shown historically and on the purely theoretical

grounds, inadequate financial systems are major impediments to economic growth. This view is held by most economic historians that have investigated the financial development of the now developed countries. Meanwhile, theoretical economists give the rationales for the assumption that well functioning monetary and banking system and capital markets are crucial for economic growth. (2) Provided that no impediment exists in the real factors for economic growth, sophisticated financial systems can generate high and sustained rates of economic growth. The proponents of this view stress that the banking systems ability to create money and channel it into productive and innovative projects, which eventually promoting the growth of entire state economy.

- iv) Financial development may be an impediment to economic growth on occasions. This view conceives the financial system as inherently unstable. Though the line of causation still runs from financial development to real development, the focus lies on potentially destabilising effects of financial overtrading and crises rather than on the smooth functioning of the financial system.

2.3 The way financial development affects growth – theoretical framework

Economists in studying the theories of economic growth in 1950s, such as Solow-Swan model, developed by Robert Solow (1956) and Trevor Swan (1956), included no role for financial intermediation. For all practical purposes, the economies were seen to be well approximated by a one-good model, where there no independent investment function was taken into account. Thus, Solow-Swan model implicitly assumed the (financial) capital market works very well such that all intended savings flow into investment without any problem. In these circumstances, the growth model that dominated had only two elements in productions: capital and labour. However, when researchers talked about capital, it was understood to be physical capital. Neither financial capital nor human capital played any role. Economists understood right after the development of Solow-Swan model that the model could not explain large parts of economic growth, which was so-called ‘Solow Residuals’. For instance,

Arrow argues that the increases in per capita income cannot be explained by increases in the capital-labour ratio. Romer (1986) incorporates Arrow's idea into a so-called 'new growth theory' macroeconomic model. Nevertheless, financial activities have not been seriously included in the growth model until the late 1980s and early 1990s.

2.3.1 Earlier literature on real/financial relationship

By concentrating less on the macroeconomic aspects, Gertler (1988) reviews the traditional literature on real/financial interaction and describes the micro models of financial intermediation and how these financial arrangements eliminate at least part of the negative consequences of the positive information and transaction costs.

2.3.1.1 The traditional literature

The financial system did not have an explicit central role in Keynes's theory of output determination. In the *General Theory*, Keynes mentions the importance of financial consideration in the theory of investment behaviour, which was termed as 'state of confidence', including the borrower's belief about prospective yields from investment projects and lender's confidence in financing borrowers. Keynes concludes that the collapse in confidence of either lenders or borrowers was sufficient to trigger an economic downturn in investment and economic activity.

Following the *General Theory*, the macroeconomics literature largely ignored the potential link between output behaviour and the performance of credit market. They shifted the emphasis from the overall financial market to money as the financial variable most relevant to aggregate economic behaviour. The models in these papers demonstrated how the demand and supply of real money balances could determine the real interest rate, thus influencing the aggregate output¹. Although considerable debate arose over the empirical significance of the linkage between money and real activity, the emphases were focused on either the importance of 'real factor' such as multiplier/accelerator mechanism and fiscal policy, or providing support for the importance of monetary mechanism.

¹ Those models also tended to include some form of real balance effect so that the real amount of money balances influences the level of aggregate demand directly.

Staying in line with the 'debt-deflation' theory, another contemporary economist, Irving Fisher (1933), argued that the severity of economic downturn resulted from poorly performing financial markets. In Fisher's view, it was the high leverage of the borrowing sector that made the economy initially so vulnerable. Based on his empirical result, Fisher points out that the contraction in net worth of borrowers because of the deflation induced the borrowers to cut back on current expenditures and future commitments, thus sending the economy further down, continuing the spiral of falling output and deflation.

The research done by Friedman and Schwartz (1963) on the relationship between money and output provided evidence for the central importance of money in the Great Depression – the exogenous fall in money supply directly leads to the fall in output and prices. From the view of endogenous money, the fall in money supply arose from a combination of fall in the demand to hold money, following fall in prices, output, and banks response to loan defaults. Nevertheless, it has been argued that their study was rather a monetarist case but deemphasised the significance of all other aspects of the financial system. Furthermore, the commercial banks were the only financial institution to attract attention from macroeconomists as a component of their liabilities entered the money supply.

Similarly, Mishkin (1978) analysed the data from Great Depression and provided the evidence for financial performance to the business cycle propagation mechanism, which supported the presence of Fisher's 'debt-deflation' theory. Specifically, Mishkin found that the rise in consumer real indebtedness resulting from declining incomes and deflation induced consumers to lower spending on durables and housing, which in turn magnified the decline.

Gurley and Shaw (1955) started a new strand of work toward the overall interaction between financial structure and real activity, where the distinctive feature lied on the emphasis of financial intermediaries and particularly the role of the intermediaries in the credit supply process as opposed to the money supply process. Meanwhile, they also criticised the exclusive focus on money, the volume of which was regarded as given, in Keynesians and Monetarists model in analysing the real/financial connection.

Gurley and Shaw noted that in the early stage of financial development, commercial banks are typically the only major form of financial intermediation providing both transactions and lending services. According to Tobin (1964), a bank is a financial institution whose liabilities (that is bank deposits) are treated as money. In that case, banks can provide loans to finance investment, and then money is created. In these circumstances, the money stock is a useful proxy for financial activity since the supply of money (a major component of commercial bank liabilities) is closely related to the overall level of financial intermediaries. However, they also argued that the exclusive focus on money became less justified and the importance of money diminished as the intermediary system evolved and non-bank lending institution with non-monetary liabilities.

According to Gurley and Shaw, the economy's overall 'financial capacity' is more relevant to the level of aggregate output rather than money stock is. 'Financial capacity' refers to the measure of borrower's ability to absorb debt without having to reduce current expenditure or future spending commitment. By helping overcome the impediments to the flow of funds between savers and investors, financial intermediaries made it possible for certain class of borrowers to obtain both greater quantity of credits and better credit terms, to which extent it is believed that the financial intermediaries performed important services to economy behaviour.

Shortly after Gurley and Shaw (1955) emphasized the importance of the financial system, Modigliani and Miller (MM) (1958) derived the formal proposition that real economic decisions were independent of financial structure. The MM theorem was attractive because it provided researchers with a rigorous justification for abstracting from the complications induced by financial consideration based on a range of highly restricted assumptions such as absence of uncertainty, bankruptcy risk and the assumptions on nature of tax system. For instance, Hall and Jorgenson (1967) used MM theorem as a convenient rationale for ignoring capital market considerations when solving the firm's investment choice problem. For similar reasons, financial variables started disappearing from empirical investment models. Furthermore, the methodological revolution in the 1970s also helped shift the attention away from financial factors. To shift the obstacle posed by the emphasis on individual optimisation in developing macroeconomic models, Brock and Mirman (1972)

developed the stochastic competitive equilibrium growth model suggesting that financial structure was irrelevant.

2.3.1.2 Micro level analysis

Since Akerlof (1969) used 'lemon' problem to illustrate the asymmetric information between buyers and sellers about product quality can cause a market failure, the basic idea of 'lemon' problem had been largely applied to the financial market inefficiencies that might distort the economic behaviour. Jaffee and Russell (1976) explained how unobserved differences in the perceived 'quality' of borrower can induce credit rationing. Later on, Stiglitz and Weiss (1981) exploit the informational asymmetries to motivate a form of credit rationing where the market denies funds to borrowers with characteristics identical to those receiving loans. The key unobserved factor is the potential risk of borrower's projects. Based on their assumption, a rise in interest rate lowers the average borrower quality as it drops out the relatively safe project first. After a certain point, the further increases of interest rate may lower the lender's expected return, making the loan supply curve bend backwards.

Many papers explored the asymmetric information problem initiated by Jaffee and Russell and by Stiglitz and Weiss. A very influential study done by Mankiw (1986) analysed a credit market destroyed by lemon problem and showed how a small rise in the riskless interest rate can lead to a large reduction in lending, even probably resulting in a market collapse. This result occurs because the increase in the riskless rate forces up the loan rate, which reduces the average quality of borrowers.

Apart from emphasising how the 'lemon problem' affects the debt market, many researchers also expanded this topic into equity market. Myers and Majluf (1984) and Greenwald, Stiglitz and Weiss (1984) discuss how asymmetric information about the value of a firm's existing assets can restrict its ability to issue new shares. Outside lenders must discern whether the share issue is a legitimate effort to either obtain new financing or diversifying risk, or is instead simply an attempt to pass off bad assets. This problem may lower the price the firm can obtain for its equity, and in extreme cases, make it prohibitive to issue new shares. Evidence for this phenomenon is that a

firm's announcement of a new issue typically leads to a significant decline in its market value.

In these circumstances, Fama (1985) states that the bank credit is vital for certain classes of borrowers, especially when equity finance is not available as the perfect substitute. He argues that this feature of bank lending arises because of the comparative advantage banks develop in gathering information about borrowers. This advantage implies that in many situations, intermediation is the most efficient way to minimise informational distortions.

Diamond (1984) also provides an example of how it is possible to formally explain intermediary-like institutions. Since it is difficult or costly for lender's to observe the returns to borrower's projects, in order to economise monitoring costs, Diamond argues that it is optimal for a competitive financial institution to channel funds between savers and borrowers. To avoid duplication of monitoring costs, it is clearly efficient for the institution to perform as a 'delegated monitor' of borrowers, on behalf of depositors.

Following Diamond's path, a number of studies had been undertaken towards the link between intermediation and real activities (see Boyd and Prescott, 1986; Moore, 1987; Morgan, 1987). In particular, Eckstein and Sinai (1986) argue that financial mechanism is important for predicting business fluctuations. Scheinkman and Weiss (1986) provide an early example of the new approach that demonstrates how borrowing constraints can increase the variability of consumption, output and employment. The paper considers an environment where two representative individuals face negatively correlated productivity risks. In a frictionless environment, the individuals can directly insure these risks by lending and borrowing, in which circumstances the individual risks do not induce aggregate fluctuation. In a setting where these markets do not exist, the individuals must self-insure by adjusting consumption, saving, and labour supply. Scheinkman and Weiss demonstrate how this behaviour at the individual level leads to cycles in aggregate activity. Williamson (1987) incorporates his model of intermediation and credit rationing into a simple business cycle framework to study the interaction between financial and real variables. Productivity disturbances, in the form of mean-preserving spreads to project returns,

change default possibilities, thereby affecting the degree of credit rationing and the level of investment and output.

2.3.2 The AK growth model

2.3.2.1 Model specification

There are several growth models which take into account financial markets, intermediaries and financial functions. By performing certain functions financial markets eliminate some types of market frictions and thus influence economic growth. For example, Aghion and Howitt (1992) develop a model in which financial system affects steady-state growth by changing the rate of technological innovation. They found that both the average growth rate and the variance of the growth rate are increasing functions of the size of technological innovations. Rebelo (1991) states that financial system affects the rate of capital formation and thereby influencing the steady-state growth.

To capture the potential effects of financial development on growth, most recent economists prefer to start with the simplest endogenous growth model – the ‘AK’ model, where aggregate output is a linear function of the aggregate capital stock:

$$Y_t = AK_t \quad (2.1)$$

This production function comes from one of two underlying framework (Pagano, 1993). One is a competitive economy with external economies as in Romer (1989), where each firm faces a technology with constant returns to scale but productivity is an increasing function of the aggregate capital stock K_t . For instance, consider an economy with N identical firms, each producing output $y_t = Bk_t^\alpha$ with its capital stock k_t . Suppose that B is regarded as a parameter by individual firms but actually responds to the average capital stock according to $B = Ak_t^{1-\alpha}$. Then aggregate output, $Y_t = Ny_t$, is give by Eq.2.1. Alternatively, the AK model can be derived assuming that K_t is a composite of physical and human capital as in Lucas (1988), the two types of capital being reproducible with identical technologies.

For simplicity, assume that the population is stationary and that the economy produces a single good that can be invested or consumed – and, if invested, depreciates at the rate δ . Then gross investment equals

$$I_t = K_{t+1} - (1 - \delta)K_t \quad (2.2)$$

In a closed economy with no government, capital market equilibrium requires that gross savings S_t equals gross investment I_t . It is convenient to assume that a proportion $1 - \phi$ of the flow of saving is lost in the process of financial intermediation:

$$\phi S_t = I_t \quad (2.3)$$

From Eq.2.1, the growth rate at time $t + 1$ is $g_{t+1} = Y_{t+1}/Y_t - 1 = K_{t+1}/K_t - 1$. Using Eq.2.2 and dropping the time indices, the steady-state growth rate can be written as

$$g = A \frac{I}{Y} - \delta = A\phi s - \delta \quad (2.4)$$

which is achieved on the basis of capital market equilibrium condition Eq.2.3. The gross saving rate S/Y is denoted by s .

Eq.2.4 briefly reveals how financial development can affect growth: it can raise the proportion of saving funnelled to investment, ϕ ; it may increase the marginal productivity of capital, A ; and it can influence the private saving rate, s .

2.3.2.2 Funnelling savings to firms

In the process of transforming savings into investment, financial intermediaries absorb resources, so that one unit of money saved by households generates less than one unit worth of investment due to the fraction ϕ in Eq.2.3. The remaining fraction $1 - \phi$ goes into banks as the spread between lending and borrowing rates, and to securities brokers and dealers as commissions, fees and etc.

This absorption of resources by the financial sector is primarily a reward for services supplied, but it may also reflect the X-inefficiency of the intermediaries and their market power (Pagano, 1993). In addition, Roubini and Sala-i-Martin (1991, 1992) note that the financial intermediaries activities are also burdened by taxation (in form

of high reserve requirements, transaction taxes, etc.) and by restrictive regulations. Moreover, financial repression and lack of competition may widen the margins charged by financial intermediaries, thereby hampering the economic growth. Hence, the growth rate g can be enhanced if financial development reduces the leakage of resources, i.e. raises ϕ in Eq.4.

2.3.2.3 Improving capital allocation

In the AK model, financial intermediaries increase the productivity of capital, A , thereby promoting growth in two ways: (i) collecting information to evaluate alternative investment projects; and (ii) inducing individuals to invest in riskier but more productive projects by providing risk sharing.

The informational role of financial intermediaries has been linked to productivity growth by Greenwood and Jovanovic (1990), in whose model firms may be faced with two investment options: a safe but low-yield project or a risky but high-yield one. Unlike individual investors, financial intermediaries are regarded that with their large portfolios and their professional knowledge and judgement, they can diversify the risk and choose the most appropriate investment project. Thus, savings channelled through financial intermediaries are allocated more efficiently, and the higher productivity of capital results in higher growth.

Financial intermediaries also enable investors to share risks. This risk sharing role is not performed only by insurance markets but also by banks and securities markets, which allow individuals to share the uninsurable risks. In the absence of banks, households can monitor liquidity shocks only by investing productive assets that can be promptly liquidated, thus often forgoing investment that are more productive but also more illiquid. Diamond and Dybvig (1983) argue that this inefficiency can be considerably reduced by banks which pool the liquidity risk of depositors and invest most of their funds in more illiquid and more productive projects. This argument has been later incorporated into an endogenous growth model by Bencivenga and Smith (1991), which shows that banks increase the productivity of investment both by directing funds to illiquid, high-yield project and by reducing the investment waste

due to premature liquidation. Consequently, this productivity gain leads to faster growth.

Alternatively, as another vital form of financial intermediaries, security markets provide an important venue for individuals to share liquidity risk. Levine (1991) point out that individuals defence liquidity shocks by selling shares on the stock market rather than withdrawing money from the bank, while the stock market also allows agents to reduce risk by portfolio diversification. This twofold insurance function increases individuals' willingness to invest in less liquid but more productive projects. As a result, setting up a sophisticated stock market raises the productivity of investment and the growth rate.

2.3.2.4 Influencing the saving rate

Financial development can also affect growth by altering the saving rate s , while the sign of the relationship between savings and economic growth is ambiguous, as it has been noticed that the development of financial intermediaries may reduce savings, and thereby growth. By distinguishing the endowment shocks and rate-of-return risk, Pagano (1993) stresses that households would gain better insurance against endowment shocks (such as health hazards) and reduce rate-of-return risk (such as that due to the volatility of stock returns) by better diversification as the financial markets develop, while the effect of each case on household's saving behaviour is ambiguous.

As long as the household face with constant relative risk aversion, the introduction of insurance markets would certainly reduce the need for precautionary saving to counter the first type of risk². As a result, in an endogenous growth model, it appears that the fall in saving rate lowers the growth rate, providing one occasion in which financial development can hinder the growth. An analogous result is also achieved by Devereux and Smith (1991) by examining the countries share endowment risk via international capital markets. Additionally, they also demonstrate that if the risk aversion coefficient is above 1, the response of saving to diversifying portfolios through securities markets to reduce the second type of risk is negative; and positive otherwise.

² Pagano (1993) points out that this result is based on the consumer's utility function having a positive third derivative, which is a condition to satisfy the utility functions with constant relative risk aversion.

Correspondingly, the response of growth to the existence of securities markets is ambiguous.

Using an overlapping generations model with three-period-lived households, Jappelli and Pagano (1992) indicate that binding liquidity constrains increase the saving rate, because young people cannot dissave as much as they would like. From Eq.2.1, this increase in the aggregate saving rate s translates into faster growth g . By the same token, liberalisation of the consumer credit or mortgage market leads to a reduction in saving and growth, which provides another instance of financial market development tending to reduce growth.

2.3.3 Functional approach

In general, the feature of financial intermediaries within different stages of financial development can be displayed as Table 2.1. The costs of acquiring information and making transactions create incentives for the emergence of financial markets and institutions. If there is perfect competition, all traders are price takers, as in Arrow (1964)-Debreu (1959) model, there is no need for a financial system that expends resources researching projects, monitoring managers, or designing arrangements to ease risk management and facilitate transactions³. Hence, there would be no role of financial intermediation in economic growth under conditions of perfect competition. However, due to the existence of informational asymmetry, financial markets and institutions may arise to modernise the problems created by information and transactions frictions, by serving one primary function: they facilitate the allocation of resources, across space and time, in an uncertain environment (Merton and Bodie, 1995).

The theoretical underpinnings of the relationship between financial development and growth can be traced back to Schumpeter (1911) and most recently, Goldsmith (1969), McKinnon (1973) and Shaw (1973). Schumpeter (1911) used the relationship between the banker and entrepreneur to illustrate the importance of the financial system in choosing and adopting new technologies; while McKinnon (1973) and Shaw (1973) highlighted the importance of financial system in promoting the use of better

³ For specific analysis, see Levine 1996.

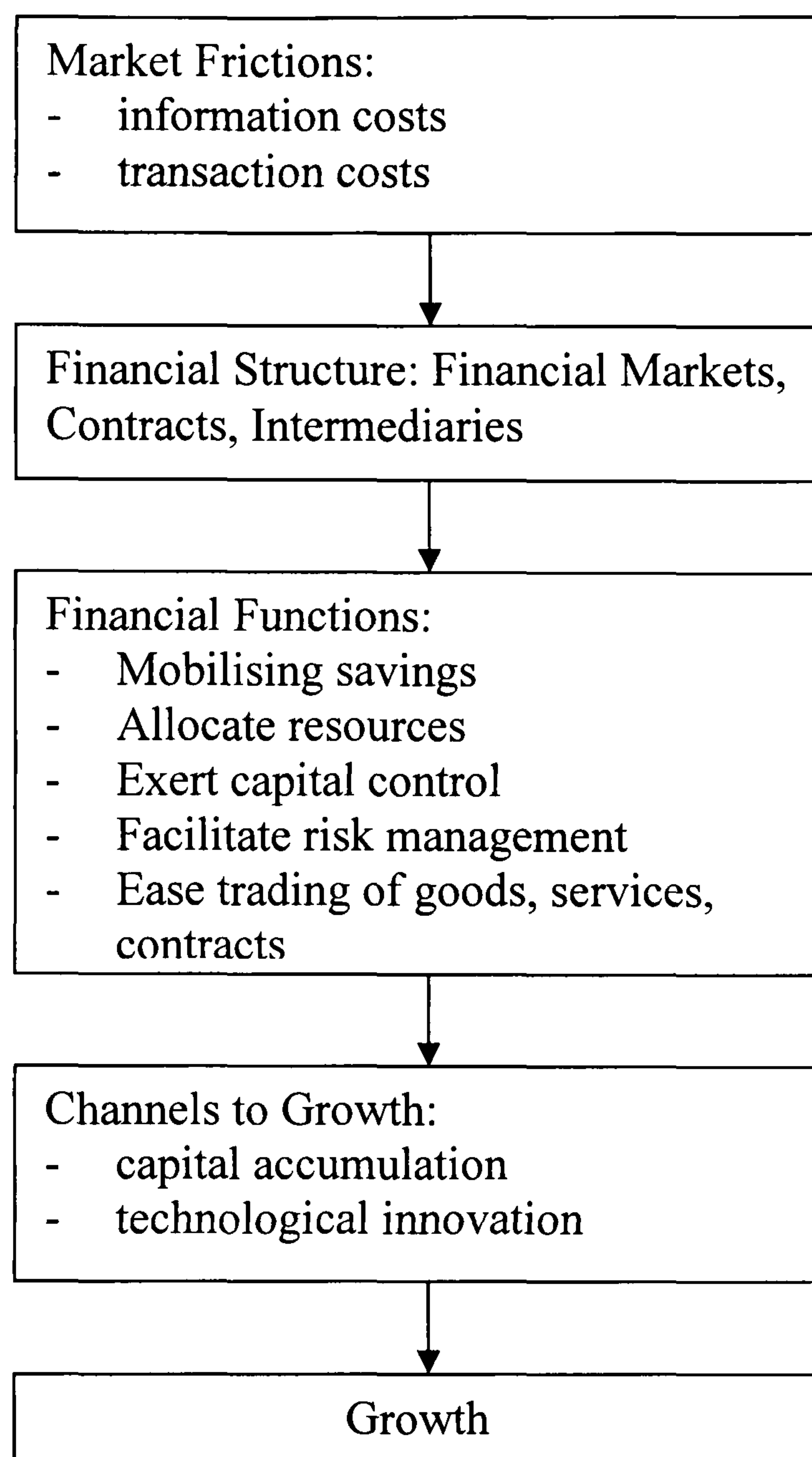
Table 2.1: Financial intermediation and the stages of financial development

Stage of financial development	Financial intermediaries
Completely underdeveloped	No intermediaries, investment comes from investor's own savings and retained earnings
Financial backward	Informal financial institutions such as credit unions
Early stage of development	Banking institutions dominated by state banks, often controlled by the government priority projects or sectors
Medium stage of development (Financially more developed)	Commercial banking system supplemented by bond and stock markets
High stage of development (Financially most developed)	Fully developed banking system (including commercial and investment banking) and capital markets (including debt, equity, and money markets)

Source: Gills et al., 1992; Lardy, 1998; McKinnon, 1973 and 1993; Stiglitz, 1993.

agricultural techniques. However, neither of them incorporated all of the functions into their stories of financial development.

Levine (1996) considers models which take the process as a whole, that is, which describe the macroeconomic consequences of the existence and the development of the financial structure as a whole and not of each particular financial instrument or market separately. The overview by Levine consists in large part of description of so-called functional approach. The functional approach focuses on the relationship between quality of functions performed by financial sector and economic growth. In principle, these functions are the same for different countries and do not change over time. However, the quality and type of financial structure significantly differ across countries. While focusing on functions, this approach does not diminish the role of institutions. Indeed, the functional approach highlights the importance of examining an under-researched topic: the relationship between financial structure – the mix of financial instruments, markets and institutions – and the provision of financial services. This approach concentrates on the financial system as a whole, and not on some particular institution, like commercial bank or instrument, like money. Figure 2.1 best illustrates the framework of functional approach (Levine, 1996).

Figure 2.1: A functional approach to finance and growth

Source: Levine, 1996, p.691.

Specifically, the primary function of financial intermediaries can be interpreted in the following four perspectives: mobilising savings, acquiring information and allocating resources, diversifying and pooling of risks, and monitoring managers and exert corporate control. Meanwhile, the linkage with economic growth is also presented in each perspective.

i) Mobilising savings

Individual investors are usually too small to have sufficient funds to fund large indivisible projects. In this circumstance, financial intermediations allow individual small savers to access large investment projects through the mechanism of fund pooling. On the other hand side, without access to multiple investors, many production processes would be constrained to economically inefficient scales (Sirri

and Tufano 1995; Levine, 1996). Furthermore, mobilisation involves the creation of small denomination instruments, which provide opportunities for households to hold diversified portfolios, invest in efficient scale firms, and to increase asset liquidity (Levine, 1996). By enhancing risk diversification, liquidity, and the size of feasible firms, therefore, mobilisation improves resource allocation (Sirri and Tufano 1995).

In a financially underdeveloped society, savers tend to have little inclination to place funds in financial assets, even if they have access to them. The wealth may be held in cash, or invested in non-productive assets such as gold (Tong, 2002). The objective of mobilisation of savings therefore is to provide incentives for savers to use their savings productively. These incentives include interests, dividends, and profits provided by both bank and non-bank financial institutions. In financially backward societies this may be done largely by informal mechanisms. At a more advanced state of financial development, mobilisation may be achieved through formal financial intermediaries. In the most financially sophisticated societies, mobilisation may be achieved directly, by investing in bonds, stocks, or other capital market instruments.

Mobilising the savings of many disparate savers is costly, however. The process of mobilisation involves (a) overcoming the transaction costs associated with collecting savings from different individuals and (b) overcoming the informational asymmetries associated with making savers feel comfortable in relinquishing control of their savings (Levine, 1996). In light of the transaction and information costs associated with mobilising savings from many agents, numerous financial arrangements may arise to alleviate these frictions and facilitate pooling. Specifically, mobilisation may involve multiple bilateral contracts between productive units raising capital and agents with surplus resources. The joint stock company in which many individuals invest in a new legal entity, the firm, represents a prime example of multiple bilateral mobilisations. To economise on the transactions and information costs associated with multiple bilateral contracts, pooling may also occur through intermediaries as discussed above, where thousands of investors entrust their wealth to intermediaries that invest in hundreds of firms (Sirri and Tufano, 1995).

Besides the direct effect of better savings mobilisation on capital accumulation, better savings mobilisation can also boost technological innovation and thereby encouraging

growth (McKinnon, 1973; Shaw, 1973). Putting it into an agricultural context, McKinnon states that the accessing the external financial resources is likely to be the virtual possibility for poor farmer to finance his investment for new technology adoption in a rather shorter time. “Without this access, the constraint of self-finance sharply biases investment strategy toward marginal variations within the traditional technology.” (McKinnon, 1973, p.13)

ii) Acquiring information and allocating resources

It is difficult and costly to evaluate firms, managers, and market conditions as discussed by Carosso (1970). Individual savers may not have the time, capacity, or means to collect information on a wide range of enterprises, managers, and economic conditions. Savers will be reluctant to invest in activities about which there is little reliable information. Consequently, high information costs may keep capital from flowing to its highest value use. Information acquisition costs create incentives for financial intermediaries to emerge (Diamond, 1984; Boyd and Prescott, 1986).

Consider investments in firms. Large research, legal, and organizational costs are involved. These costs can include evaluating the firm, coordinating financing for the firm if more than one investor is involved, and monitoring managers. Without intermediaries, each investor must pay all these cost. As a result, the costs might be prohibitive for any single investor. In response to this information cost structure, however, groups of individuals may form (or join or use) financial intermediaries to economise on the costs of acquiring and processing information about investments. Instead of each individual acquiring evaluation skills and then conducting evaluations, an intermediary—such as a bank, mutual fund, or pension fund—could perform these tasks for a group of investors and lower the costs per investor. So, by researching many firms and allocating credit to the best ones, intermediaries can improve the allocation of society's resources.

Economising on information acquisition costs facilitates the acquisition of information about investment opportunities and thereby improves resource allocation. Essentially, financial intermediaries act as middlemen between those who have funds but do not want to invest by themselves and those who do not have funds but want to make the investment. They provide indirect means of transferring funds from savers to

borrowers or investors. Without financial intermediaries or with the inefficient intermediaries, a substantial waste of the investment resource may be caused by this ‘missing link’.

The ability to acquire and process information may have important growth implications. Since many firms and entrepreneurs will ask for capital, financial intermediaries and markets that are better at selecting the most promising firms and managers will induce a more efficient allocation of capital and faster growth (Greenwood and Jovanovic, 1990). Apart from identifying the best production technologies, financial intermediaries may also boost the rate of technological innovation by identifying those entrepreneurs with the best chances of successfully initiating new goods and production processes (King and Levine, 1993c).

iii) Diversifying and pooling of risks

Financial intermediaries help diversify risk for small investors. Large projects carry large risks. It is difficult for small investors to invest in large risky investment projects by themselves. Financial intermediaries allow them to pool risks. They can form portfolios of large risky investment. The portfolios themselves would be insulated against high risk if they diversify. It allows the small investors to access this avenue without high risk. The major risk considered here is liquidity risk.

According to Levine (1996), liquidity is “the ease and speed with which agents can convert assets into purchasing power at agreed prices” (*ibid*, p.692). Hence, real estate is less liquid than equities, and equities traded domestically are typically more liquid than those traded abroad. Liquidity risk arises due to the uncertainties associated with converting assets into a medium of exchange. Informational asymmetries and transaction costs may inhibit liquidity and intensify liquidity risk. These frictions create incentives for the emergence of financial markets and institutions that can enhance liquidity. Liquid capital markets, therefore, are markets where it is relatively inexpensive to trade financial instruments and where there is little uncertainty about the timing and settlement of those trades. Within liquid capital markets, savers can hold liquid assets—like equity, bonds, or demand deposits—that they can quickly and easily sell if they seek access to their savings. Simultaneously, capital markets

transform these liquid financial instruments into long-term capital investments in illiquid production processes. In another words, the financial intermediaries mitigates liquidity risk that primarily causes the industrial revolution, which consequently leads to the economic growth (Hicks, 1969).

Economists have modelled the emergence of financial markets in response to liquidity risk and examined how these financial markets affect economic growth. For instance, in Levine (1991), savers receiving shocks can sell their equity claims on the profits of the illiquid production technology to others. Market participants do not verify whether other agents received shocks or not; participants simply trade in impersonal stock exchanges. Thus, with liquid stock markets, equity holders can readily sell their shares, while firms have permanent access to the capital invested by the initial shareholders. By facilitating trade, stock markets reduce liquidity risk. As stock market transaction costs fall, more investment occurs in the illiquid, high-return project. If illiquid projects enjoy sufficiently large externalities, then greater stock market liquidity induces faster steady-state growth.

Apart from the stock market, financial intermediaries such as banks may also enhance liquidity and reduce liquidity risk. In Diamond and Dybvig's (1983) seminal model of liquidity, it assumes that it is prohibitively costly to observe shocks to individuals, so it is impossible to write incentive compatible state-contingent insurance contracts. In this circumstance, banks can offer complete insurance to savers against liquidity risk while simultaneously facilitating long-run investments in high return projects through providing demand deposits and choosing an appropriate mixture of liquid and illiquid investments (Levine, 1996). Banks replicate the equilibrium allocation of capital that exists with observable shocks. By eliminating liquidity risk, banks can increase investment in the high-return, illiquid asset and accelerate growth (Bencivenga and Smith, 1991).

iv) Monitoring managers and exerting corporate control

Financial intermediaries arise not only to reduce the costs of acquiring information ex ante, but also to mitigate the information acquisition and enforcement costs of monitoring firm managers and exerting corporate control after financing the activity.

For example, firm owners will create financial arrangements that induce firm managers to manage the firm in the best interests of the owners. Meanwhile, outside creditors—banks, equity and bond holders—that do not manage firms on a day-to-day basis will create financial arrangements to compel inside owners and managers to run firms in accordance with the interests of outside creditors. The absence of financial arrangements that enhance corporate control may impede the mobilisation of savings from disparate households and thereby keep capital from flowing to profitable investments, which is pervasively known as the problem of adverse selection in banking (Stiglitz and Weiss, 1983).

Before the money is loaned out, outsider lenders must verify the accuracy of information being provided by the insider borrowers. However, insiders have incentives to misrepresent project returns to outsiders while it is socially inefficient for outsiders to monitor in all circumstances. Verification costs imply that outsiders would rather constrain firms from borrowing to expand investment because it is perceived that higher leverage implies greater risk of default and higher verification expenditures by lenders. Thus, outsiders are able to hand over all monitor responsibilities to financial institutions as depositors and only obtain the agreed interest payment in whatever outcomes. As a result, financial intermediaries such as collateral and financial contracts tend to lower monitoring and enforcement costs hence reduce impediments to efficient investment (Williamson 1987b; Bemanke and Gertler 1989, 1990; Thadden 1995; Levine, 1996). Furthermore, if borrowers must obtain funds from many outsiders, financial intermediaries can economise on monitoring costs (Levine, 1996). The financial intermediary mobilises the savings of many individuals and lends these resources to project owners. This "delegated monitor" arrangement economizes on aggregate monitoring costs because a borrower is only monitored by the intermediary, not all individual savers (Diamond, 1984).

Besides financial institutions as banks, stock markets may also have the capability of promoting corporate control (Jensen and Meckling, 1976). For example, public trading of shares in stock markets that efficiently reflect information about firms allows owners to link managerial compensation to stock prices. Linking stock performance to manager compensation helps align the interests of managers with those of owners (Diamond and Verrecchia 1982; and Jensen and Murphy 1990).

Similarly, if takeovers are easier in well-developed stock markets and if managers of under-performing firms are fired following a takeover, then better stock markets can promote better corporate control by easing takeovers of poorly managed firms. The threat of a takeover will help align managerial incentives with those of the owners (Scharfstein, 1988; Stein, 1988).

However, arguments are also voiced against the importance of the stock markets in corporate control. Stiglitz (1985) makes three additional arguments about takeovers. First, if an acquiring firm expends lots of resources obtaining information, the results of this research will be observed by other market participants when the acquiring firm bids for shares. This will induce others to bid for shares, so that the price rises. The firm that expended resources obtaining information must, therefore, pay a higher price than it would have to pay if 'free-riding' firms could not observe its bid. Thus, the rapid public dissemination of costly information will reduce incentives for obtaining information and making effective takeover bids. Second, there is a public good nature to takeovers that may decrease the incentives for takeovers. If the takeover succeeds, and the share price rises, then those original equity holders that did not sell make a big profit without expending resources. This creates an incentive for existing shareholders to not sell if they think the value of the firm will rise following the takeover. Thus, value-increasing takeovers may fail because the acquiring firm will have to pay a high price, which will reduce incentives for researching firms in the hopes of taking over them. Third, current managers often can take strategic actions to discourage takeovers and maintain their positions. This argues against an important role for liquid stock markets in promoting sound corporate governance.

Moreover, it has been doubted whether the improvement in stock markets is able to speed up economic growth since the resource allocation may be hurt during the process of takeover (Shleifer and Summers 1988; Morck *et al.*, 1990). A takeover typically involves a change in management. Existing implicit contracts between former managers and workers, suppliers, and other stakeholders in the firms do not bind new owners and managers to the same extent that they bound the original managers. Thus, a takeover allows new owners and managers to break implicit agreements and transfer wealth from firm stakeholders to themselves. While new owners may profit, there may be deterioration in the efficiency of resource allocation.

Thus, overall welfare may fall. Levine (1996) summarises that the hostile takeovers are inevitable in the well-functioning equity markets, which may lead to a fall in the efficiency of resource allocation.

2.4 The way financial development affects economic growth – empirical evidence

Various empirical works can be found on the identification of the relationship between financial development and economic growth, particularly country-case study and econometrical statistics are two major approaches adopted by researchers. The empirical work in early stage was mainly conducted with case study method. As the econometric techniques being used improved gradually, more and more evidence has been provided through the statistical analysis. In this section, the most existing empirical evidences on relationship between “real” and “finance” are reviewed in the following two major categories: country-case studies and statistical analysis, where the latter one contains two aspects – cross-country correlation analysis (including panel estimation) and Granger-causality analysis.

2.4.1 Country-case studies⁴

Country-case studies provide a rich complement to cross-country comparisons. For example, Cameron et al. (1967) scrutinised the historical relationship between banking development and the early stages of industrialisation for England (1750-1844), Scotland (1750-1845), France (1800-1870), Belgium (1800-1875), Germany (1815-1870), Russia (1860-1914), and Japan (1868-1914). The researchers carefully examine the legal, economic, and financial linkages between banks and industry during the industrialisation of these seven countries. Particularly, the studies provide a detailed description of the evolution of the financial system during a period of rapid economic development. Finally, the conclusion has been drawn that the banking system plays a positive, growth-inducing role, especially in Scotland and Japan.

⁴ This section is mainly derived from the idea of Levine (1996).

However, the most damning criticism of country-case studies is that “it relies heavily on subjective evaluations of banking system performance and fails to systematically control for other elements determining economic development” (Levine, 1996, p.37). Meanwhile, what is the actual reason for Scotland’s rapid growth and whether Scottish banking can explain its faster economic growth than England did during 1750-1845 are two most debated issues. During this period, Scotland began with per capita income of less than one-half of England’s, while by 1845, per capita income was about the same. Analyses of this phenomenon differ. Cameron (1967) asserts that the dominant factor affecting Scotland’s potentialities for economic development is the important political event – Union of 1707 which made Scotland an integral part of United Kingdom. Thus, the outstanding performance of Scotland’s superior banking system – comparatively stable over this period, suffering fewer and less panics than elsewhere in the UK – can help explain its rapid growth. Some analysts suggest that taking the advantage of rich natural resources, a well-educated work force, access to British colonial markets, and starting from a much lower level of income per capita than England, Scotland undoubtedly enjoyed a period of rapid convergence toward England’s income per capita level. Other researchers, Pollard and Ziegler (1992) for example, remain sceptic on the premise that Scotland had a well-functioning financial system but put much more emphasis on the deficiencies in the Scottish system.

The relationship between financial development and economic growth has also been carefully examined for many other countries. For example, Haber (1991, 1996) compares industrial and capital market development in Brazil, Mexico and the United States between 1830 and 1930. He finds that the differences in capital market development had a significant influence on the rate of industrial growth. Specifically, Haber recognises that even though financial liberalisation occurred in both Brazil and Mexico which gave more firms easier access to external finance, the liberalisation procedure was much more mild in Mexico than in Brazil and consequently, the decline in concentration and the increase in economic growth was much weaker in Mexico than it was in Brazil. Thus, Haber (1996) concludes that less developed capital markets is a crucial obstacle to the economic growth in the nineteenth century.

As summarised by Levine (1996), “the body of country-studies suggests that, while the financial system responds to demands from the non-financial sector,

well-functioning financial systems have, in some cases during some time periods, importantly spurred economic growth” (p.40).

2.4.2 Statistical analysis

2.4.2.1 Cross-country correlation analysis

The early econometric statistic work on this nexus was done by Cameron (1961), who simply concentrated on a single country – France – and noted that economic development was associated with the “Credit Mobilier” (Sinha, 2001).

Although those economists interpret the importance and effect of financial development on growth, they did not include a measure of financial intermediaries as a determinant variable when they conduct their empirical work. It was Goldsmith (1969) who first explored this relationship for many countries simultaneously. Using data on thirty-five countries from 1860 to 1963, he finds that rapid economic growth is often accompanied by rapid financial development. He uses the size of financial intermediation or “financial depth”, measured by the total assets of financial intermediaries divided by the GDP of the corresponding year, as a proxy for financial development.

However, it has been found that there are several drawbacks within Goldsmith’s study. It does not systematically control for other factors influencing economic growth. Economic theory tells us that apart from the size of financial intermediaries, the propensity to save, enhancement of human capital, rate of population growth, fiscal and monetary policy, laws and regulations, are all direct or indirect contributors to the GDP growth. In Goldsmith’s study, it seems that he pays less attention or even neglects the influence of these factors on economic growth. Additionally, Levine (1996) suggests that a 35-country-sample is too limited to capture the characteristic accurately. Meanwhile Goldsmith does not examine whether financial development is associated with productivity growth and capital accumulation. Summing up all these critiques, a general conclusion can be drawn that Goldsmith’s contribution is important but incomplete.

After Goldsmith, there has been a flourishing body of empirical work aiming at testing the sign and magnitude of financial depth on economic growth based on cross-country analysis. The basic equation tested has the following form:

$$y_i = \beta_0 + \beta_1 FD_i + \beta_2 X_i + e_i$$

where y_i is the rate of growth of country i , FD_i is an indicator of financial depth, X_i is a set of control variables, and e_i is the error term.

Several indicators of financial depth have been proposed in the literature and different indicators will proxy different aspects of the financial system. Initially, the indicators were based on monetary aggregates, such as M1 or M2, mainly because these aggregates are widely available. However, they may be a poor proxy for financial development since they are more related to the ability of the financial system to provide transaction services than to the ability to channel funds from savers to borrowers (Khan and Senhadji, 2000). Indeed, economies with underdeveloped financial systems may have a high ratio of money to GDP, as money is used as a store of value in the absence of other more attractive alternatives. Consequently, researchers have shifted from narrower monetary measures (M1 and M2) to broader definition, such as M3, which is generally referred to as liquid liabilities of the banking system.

Some economists, however, argue that M3/GDP is not appropriate measures of financial development (see, for instance, Juttner, 1994; Levine and Zervos, 1998). In particular, Levine and Zervos (1998) argue that M3/GDP only measures financial depth and “does not measure whether the liabilities are those of banks, the central bank or other financial intermediaries, nor does this financial depth measure identify where the financial system allocates capital” (p.542). In other words, they suggest that increases in M3/GDP are not necessarily associated with increases in credit, and credit is clearly one of the aspects of financial development that might generate economic growth. More recently, credit to the private sector has been favoured as an alternative measure of financial intermediation. The main advantage of this indicator is that, by excluding credit to the public sector, it measures more accurately the role of financial intermediaries in channelling funds to the private sector.

The pioneering empirical study on financial-growth nexus is done by King and Levine (1993a, b and c). They systematically control for other factors affecting long-run growth, examine the capital accumulation and productivity growth channels, construct additional measures of the level of financial development, and analyse whether the level of financial development predicts long-run economic growth, capital accumulation, and productivity growth⁵.

They construct four indicators of level of financial development, which is a refinement of the traditional practice exercised by Goldsmith and able to measure the functioning of the financial system more precisely: a) the size of financial intermediaries, i.e. “financial depth”, measured by liquid liability of the financial system as a percentage of GDP; b) the degree to which the central bank versus commercial banks are allocating credit, using the ratio of bank credit divided by bank credit plus central bank domestic assets; c) share of total credit allocated to private non-financial firms which equals the ratio of credit allocated to private enterprises to total domestic credit; d) the ratio of credit to private non-financial enterprises to GDP. The basic assumption underlying these measures, as demonstrated by Levine (1996), is that “financial systems that allocate more credit to private firms are more engaged in researching firms, exerting corporate control, providing risk management services, mobilising savings, and facilitating transactions than financial system that simply funnel credit to government or state owned enterprises” (p.32).

As far as the measures of economic growth are concerned, King and Levine decompose growth into two components: the rate of physical capital accumulation and everything else, and then three indicators has been presented as follows: (1) the average rate of real per capita GDP growth; (2) the average rate of growth in the per capita capital stock; (3) total productivity growth, which defined as real per capita GDP growth minus the real per capita physical capital stock times a production function parameter that takes a experimental value of 0.3.

By studying eighty countries over the period from 1960 to 1989, King and Levine (1993b) find that there is strongly positive relationship between each of the four financial development indicators and the three growth indicators, long-run real per

⁵ See Levine, 1996.

capita growth rates, capital accumulation and productivity growth, thereby they conclude, “the data are consistent with the view that financial services stimulate economic growth by increasing the rate of capital accumulation and by improving the efficiency with which economies use that capital” (1993b, p.735). Furthermore, to examine whether finance simply follow growth, their research paper suggests that the initial level of financial development, taking the value of financial depth in 1960, is a good predictor of subsequent rates of economic growth, physical capital accumulation and economic efficiency improvements over the next thirty years. The similar result has also been obtained by Murinde and Eng (1994), Neusser and Kugler (1996), Al-Yousif (2002).

Using firm-level and industrial-level data for a broad cross-country and data on individual states of the United States, a number of research works present evidence consistent with the view that the level of financial development significantly affects the rate of economic growth (see, for example, Jayaratne and Strahan 1995; Rajan and Zingales 1996; Demirguc-Kunt and Maksimovic, 1996)⁶. More specifically, Beck *et al.* (2001) indicate that with higher levels of overall financial-sector development, economies grow faster, industries depending heavily on external finance expand at faster rates, new firms form more easily, firms’ access to external financing is easier, and firms grow more rapidly in economies.

The criticism on King and Levine’s finding comes out almost immediately after their papers were published. Fernandez and Galetovic (1994) point out that if the King and Levine’s observation sample is split between OECD and non-OECD countries, the positive correlations become insignificant for OECD countries. Then they added more countries and divided the sample into three groups based on per capita income at the start of the sample period, and consequently, the results show as the initial income falls, the correlations become larger and more significant⁷.

However, there are still numerous economists who insist that finance is a relatively unimportant factor in economic development. For example, Lucas (1988) asserts that the role of financial development in economic growth is “over-stressed” by most

⁶ See Levine, 1996.

⁷ See Sinha, 2001.

economists⁸. Similarly, Dornbusch and Reygue (1989) question the evidence in support of the financial-led growth paradigm is “episodic” and a “vast exaggeration”⁹. Furthermore, it has been noticed that some scholars of development economics do not even mention or discuss financial system when interpreting their views¹⁰.

Another well-known exception is documented by De Gregorio and Guidotti (1995), showing that the correlations become negative when the sample is restricted only to Latin America countries. This finding is in line with the fact that in the 1970s, the banks in Latin America became active but imprudent lenders and as a result, the over-expanding banking sector activities contributed to a more vulnerable and fragile economic system. Not surprisingly, excessive expansion of banking sector in a poor regulatory environment hides the true character of financial development but “this type of fragility is not accounted for by the variables considered by King and Levine” (Sinha, 2001, p.67).

It is also worth mentioning in the cross-country analysis that in most recent years, with the development of econometric techniques, more and more empirical studies on real/financial correlation have been conducted by taking the advantage of panel techniques including two major approaches. The generally adopted approach is using the difference panel estimator (see, for example, Rousseau and Wachtel, 2000). Using difference panel estimator has two vital advantages: (a) differences the growth regression equation to remove the bias created by unobserved country-specific effects and (b) instruments the differenced values of the original regressors by using lagged values of the original regressors to eliminate the potential parameter inconsistency arising from simultaneity bias (Beck and Levine, 2002). However, Alonso-Borrego and Arellano (1996) argue that the instruments in the difference panel estimator are frequently weak, which induces biases in finite samples and poor precision asymptotically.

To reduce the potential biases and imprecision associated with the difference estimator, the second major approach is introduced by Beck and Levine (2002). They use an estimator that combines in a system the regression in differences with the

⁸ See Levine, 1996.

⁹ See Habibullah, 1999.

¹⁰ See Meir and Seers 1984; Levine, 1996.

regression in levels. The instruments for the regression in differences are the same as those used by Rousseau and Wachtel (2000). The instruments for the regression in levels are the lagged differences of the corresponding variables. These instruments are introduced based on the following additional assumptions: though there may be correlation between the levels of the explanatory variables and the country-specific effect, there is no correlation between the differences of these variables and the country-specific effect.

2.4.2.2 Granger-causality analysis

In 1966, based on lessons from the Japanese industrialisation experience, Hugh Patrick introduced the now common terms – “supply-leading” and “demand-following” finance. He postulated that in the early stages of development, financial expansion, through the creation of financial institutions and the supply of their financial asset promotes economic growth, thus playing a “supply-leading” role in economic development. In more advanced stages of development, demand for a greater variety of financial assets to better accommodate the needs of both savers and investors leads to the creation of new financial institutions and a greater array of financial assets, which is termed as “demand-following” phenomenon. In this stage, the financial system develops in response to the demand for financial services. Patrick’s seminal work has given rise to a great deal of investigation into the role of financial sector, particularly the “financial-led” growth hypothesis derived from the “supply-leading” phenomenon “has been popular among governments in several developing countries as a means to promoting development” (Habibullah, 1999, p.279).

Although a positive correlation between growth and indicators of financial development was largely discovered in both cross-country/section study and panel analysis, an interpretative problem emerged: does the causal relationship run from financial development to growth, the reverse, or both ways? In other words, whether the financial intermediaries act the “supply-leading” role or “demand-following” one had not yet been distinguished by any empirical studies. This unresolved problem remained untouched until the first attempt taken by Gupta (1984). Afterwards, numerous researchers have applied the similar methods to observing the causality

issue based on different data sample according to their individual criteria of data selection. However, this issue remains empirically controversial: the empirical results have not yet offered any clear-cut answer upon this issue, but rather the direction of causality seems varying from country to country.

As Gupta (1984) interprets it in his book *Financial and Economic Growth in Developing Countries*, the causality between these two variables cannot be described as simply as either the economic growth was the result of financial development (i.e. supply-leading phenomenon in Patrick's terminology) or the other way around (i.e. demand-following in Patrick's terminology). By conducting the causality test with a relatively small sample covering 14 developing countries, Gupta expands the causality patterns influentially with bidirectional causality: both financial development and economic growth complement each other.

In Gupta's work (1984), the financial variable was approximated by the level of quasi-liquid liabilities (M2), while the economic growth was measured by the industrial production with quarterly data. The author used this type of time frequency to overcome the shortage and the lack of regular annual data during a long time span in developing countries. Gupta's empirical analyses, although considered as an important step in causality testing, is seen to study the money effects on industrial production more than financial aspects of economic growth. Moreover, the growth measure used seems to suffer from an approximation bias since the industrial production represents only a given part of total production (Boulila and Trabilsi, 2002).

Compared to Gupta (1984), the Jung's (1986) study used a vector auto-regressive (VAR) framework to test causality between financial development and growth for a sample of 56 countries (19 of which are industrial, developed countries), having at least 15 annual observations. He found that evidence from less developed countries is in favour of a causal direction running from the financial sector to the real activity. By contrast, developed countries are characterized by a reverse causal direction: the financial services develop as the real activity expands. Nevertheless, although original the usage of a VAR framework in testing Granger causality, the results are valid only in the case of stationary or co-integrated variables. Since variables are computed in

levels, estimates can hardly be expected to be accurate (Demetriades and Hussein, 1996).

Murende and Eng (1994) initiated the studies using co-integration and unit root techniques within a bivariate VAR framework in testing the issue. The country sample used was Singapore with quarterly data spanning the period 1979 to 1990. The evidence presented largely supports a unidirectional causality from financial development to economic growth. The authors consider that such a result is in line with the deliberate financial restructuring policy, implemented by the Government in the 1980s. The reforms achieved in Singapore aimed at developing bank intermediation and enhancing monetization and financial services in order to increase real growth.

Contrary to Murende and Eng (1994), Habibullah (1999) conducted the financial-led growth hypothesis test by using the quarterly data covering the period of 1981Q1 to 1994Q4 of seven Asian developing countries, namely, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka and Thailand. He asserts that depending on each country's stages of development, the causation between finance and economic growth varies rather than simply unidirectional in form of either demand-following or supply-leading. The financial-led growth hypothesis is only supported on the case of Philippines, while demand-following hypothesis – economic growth causes financial development – is found in three countries (Malaysia, Myanmar and Nepal) and the rest three countries (Indonesia, Sri Lanka and Thailand) provide the evidence of bidirectional causality.

Similarly, Demetriades and Hussein (1996) found considerable evidence of bidirectionality between financial development and growth for a set of 16 developing countries during different periods. They concluded that causality patterns have tendency to vary with countries and more specifically with the outcomes of financial reforms implemented. Arestis and Demetriades (1996) tried to distinguish “bank based” from “capital-market-based” financial systems in their causality tests. They divided their twelve countries sample in two subsets of developed and developing countries. The range of the data differs from one country to another but the whole span ranges between 1949 and 1992. Cointegration and causality tests achieved tend

to corroborate that the causal nature of the linkage is highly influenced by country specific financial sector features announced previously by Demetriades and Hussein (1996).

Luintel and Khan (1999) carried out time series tests of the finance and growth relationship in a multivariate VAR framework with co-integration tests. They found that the long run financial intermediation and growth ties are featured by a bi-directional causality for all the countries of the sample. Such outcomes were accounted for by the usage of new approaches and methods in testing this causality and the higher dimensional system.

The outcomes converge to the result that country specific features of the financial sector are likely to account for the differences between the results of the tests. Specifically, results on the causality pattern vary with the success of financial liberalization policies implemented in each country and with the development level of the financial sector generally.

2.5 Domestic Financial Liberalisation and Stock market development

2.5.1 Brief distinction between Domestic FL and External FL

The most important part of the theories of financial development is likely to be the theory of financial repression (FR), while the impact of removing FR is a controversial issue. These seminal theoretical and empirical studies offer an essential rationale for financial liberalisation (FL)¹¹. Correspondingly, the suggestion of implementing FL has been voiced broadly to achieve rapid economic growth.

Most theoretical literatures distinguish Domestic FL and external FL as two stages during the FL process. Domestic FL have included more flexibly managed or fully market-determined interest rates for both creditors and debtors; reduced reliance on public credit programs and interest rate subsidies; and promotion of competition

¹¹ See McKinnon-Shaw model over 'FR hypothesis' and the successors provide a large amount of evidence that FR affects economic growth negatively. For instance, Courakis, 1984; Gelb, 1989; Roubini and Sala-i-Martin, 1992; Demetriades and Luintel, 1996.

among financial institutions by authorising the entry of new institutions, reducing or breaking down barriers between bank and non-bank financial intermediation and allowing the development of new types of financial services with market-based fees and commissions. External FL has been an important component of these programmes, with relaxing constraints on capital flow between home country and abroad and financial sectors being gradually opened to foreign participation in many cases. These two types of financial reform are complementary, in those liberalised domestic financial institutions and, through them, the ultimate borrowers and investors are in a better position to profit from access to global capital, as well as from the transfer of knowledge and technology of financial intermediation from abroad. In addition, foreign competition can help to increase the efficiency of domestic financial markets. Finally, these financial reforms have typically been part of a much broader package of economic stabilisation and pro-market structural reforms.

However, external FL is assumed to be less relevant here given the following two reasons. First, the research in this thesis focuses on analysing how domestic financial sector development influences the economic growth in China's context. Second, although China's capital account has been liberalised gradually, restrictions remain on capital mobility in the form of both outward and inward foreign direct investment. Thus, emphasis here is focused on the debate over the feature and consequence of Domestic FL.

2.5.2 The role of stock market in Domestic FL

A pervasive phenomenon occurring within the financial de-repression process in many less developed countries (LDCs) is the establishment and fast expansion of stock markets. The issuance of equity and the formation of stock markets are determined by some factors both endogenous and exogenous to the process of economic growth (Lauranceson and Chai, 2003). The endogenous factors include an increased need to access external funding to finance large-scale project and a desire to better manage risk (McKinnon, 1973; Jensen and Meckling, 1976; He, 1994). The central of exogenous factors is the role played by government, including the favoured system of corporate governance, whether an effective prudential framework surrounding stock

markets can be installed and whether the banking system is heavily repressed (Stiglitz, 1994; Mayer, 1994; Lauranceson and Chai, 2003).

Some economists of the McKinnon-Shaw school suggest that stock market can be understood as a good complement of credit markets in FL process (see, for example, Levine and Zervos, 1995); while others propose that stock markets have much more significantly positive effect on economic growth whereas credit markets have little influence (see, for example, Atje and Jovanovic, 1993). Je Cho (1986) showed that in order to achieve resource allocation efficiency, credit markets need to be supplemented by a well-functioning equity market. Je Cho (1986) and Levine (1996) even argue that equity finance is superior to banking borrowing and government-guiding finance. This is because equity finance is seen to have efficiency advantages to weaken the rent seeking, adverse selection and moral hazard problems which are inherent in bank borrowing and government-guiding finance. The efficiency of stock market derives from its liquidity and the ability of shareholders to supervise and influence corporate managers through the ‘threat of continual auction’ when managers’ performance are under expected (Manne, 1965)¹².

Moreover, according to Grabel (1998), the increase in financial deepening accompanied by stock market development is likely to decrease financial market volatility by increasing the numbers of both investors and tradable shares, and by encouraging the increased production and distribution of reliable information. But the recent study of stock market in US, UK and Europe indicates that volatility remains even with large number of investors and trades.

The philosophy of stock market shows that a well-functioning stock market should improve both quantity and quality of investments mainly through two precise channels: the pricing mechanism and takeover mechanism. However, the empirical work suggests that neither of these two mechanisms operate perfectly even in developed and relatively mature markets (such as US and UK stock markets) in practice. On the one hand, the actual stock market price does not reflect the fundamental value of the firms partly due to the arbitrary performance of “noise traders”. On the other hand, the takeover mechanism may not work as designed because competitive selection in the

¹² Derived from Grabel, 1998.

market for corporate control takes place much more on the basis of size than performance, and that's why a large unprofitable firm has a greater survival probability than a small sound firm (Singh, 1992). Furthermore, the critique also has been extended to focusing on rewarding managers for their success in conducting financing channels in short-term rather than creating new wealth for the corporate in long-term (Singh, 1995). In these circumstances, the stock markets in LDCs are likely to perform worse since obviously these emerging markets lack well-defined regulation and adequate monitoring. Therefore, some economists argue that those tasks stated above should be fulfilled in credit market by such kind of financial intermediaries as banking institutions dominating the financial system, which is traditionally found in Germany and Japan (Mayer, 1989).

Nevertheless, some LDCs experiences during the last two decades do not support the implications of stock market volatility, since considerable amount of developing country firms have been successfully raising capital from those emerging markets during this period. In order to examine the features of stock market in LDCs, Singh and Hamid (1992) and Singh (1995) study the corporate finance for developing country firms in terms of the financing of corporate growth of net assets. These researches show that large developing country corporations rely heavily on external funds, particularly in form of issuing new shares. This financing pattern is much different from the "pecking order" suggested earlier by economic model: emphasising less on the share issuing but more largely relying on the retained profit.

Through his research, Singh (1995) suggests two essential reasons to explain the heavy reliance on equity finance by the big developing country firms. First, by testing a set of interlinked hypotheses, Singh discovers that unlike the development of US and UK stock market in 19th century, the stock market today in LDCs is not an "evolutionary response" to market forces. By contrast, the expansion of these emerging markets seems much more like a policy-driven progression. In this case, it can be easily explained why these markets are usually found for lack of efficient regulation and supervision: the significant government intervention prevents a sound and legal environment from being set promptly and gradually. The second essential reason is that the cost of equity capital keeps falling during the last two decades. Relatively speaking, as the dramatic rise of interesting rate brought about by FL, the

cost of debt financing relative to that of equity capital is higher. Owing to the rapid development of both internal and external financial market, the share price increases significantly (partly due to the speculative and arbitrary activities) which brings down the cost of equity capital efficiently and makes equity financing a more favourable channel for developing country corporations to raise funds.

In general, although stock market development has found as an important part of the process of Domestic FL in LDCs, Singh (1997) stresses that stock market expansion is not a necessary natural progression of a country's financial development. LDCs would have been better off by reforming and expanding their existing banking-dominated financial system rather than by too much emphasising on the establishment of stock markets during Domestic FL. It is believed so because the volatility of stock market will become more severe in the developing country conditions, which may mislead the fund allocation.

2.5.3 Stock market development and economic growth

Although an increasing amount of empirical estimation suggests that well-functioning banks accelerate economic growth, these studies generally do not simultaneously examine stock market development. Beck and Levine (2002) stress that omitting stock market development makes it difficult to assess whether (1) the positive relationship between bank development and growth holds when controlling for stock market development; (2) banks and market each have an independent impact on economic growth; or (3) overall financial development matters for growth but it is difficult to identify the separate impact of stock markets and banks on economic success.

An influential study by Levine and Zervos (1998) empirically assesses the relationship between growth and both stock markets and banks. Levine and Zervos (1998) find that initial measures of stock market liquidity and banking sector development are both strong predictors of economic growth. To measure bank development, they use bank credit to the private sector as a share of GDP. They use an assortment of stock market development measures, including the overall size of the market (market capitalisation relative to GDP), stock market activity (the value of trades relative to GDP), market liquidity (the value of trades relative to market capitalisation) and market volatility (a

12-month rolling standard deviation of market returns). As a result, their empirical finding indicates that “both stock market liquidity and banking development are positively and robustly correlated with contemporaneous and future rates of economic growth” (*ibid*, p.554). Furthermore, they also draw the conclusion that financial factors are an essential part of the growth process.

However, it has been noticed that statistical and conceptual problems remain in the Levine and Zervos (1998) study (Beck and Levine, 2002). First, while theory stresses the potential relationship between economic growth and the contemporary level of financial development, the fact that they use initial values of stock market and bank development implies an informational loss as well as a potential consistency loss. Second, the ordinary least squares (OLS) approach taken by Levine and Zervos does not account formally for potential simultaneity bias, nor does it control for country fixed effects or the routine use of lagged dependent variables in growth regressions explicitly. To resolve the statistical weaknesses in the Levine and Zervos study (1998), Arestis, Demetriades and Luintel (2001) use quarterly data and apply time series methods to five developed economies and show that while both banking sector and stock market development explain subsequent growth, the effect of banking sector development is substantially larger than that of stock market development.

Moreover, Zhu, Ash and Pollin (2004) stress that the incomplete manner in which Levine and Zervos controlled for outlier in their study (1998) led to the non-robust estimated result towards the influence of stock market liquidity upon GDP growth. The ad hoc choices Levine and Zervos made (based on a scatterplot of residuals approach) were questionable. In particular, Zhu, Ash and Pollin (2004) point out that it is not clear that Japan and India should be treated as outliers according to Levine/Zervos scatter-plot visual figure. Correspondingly, Zhu, Ash and Pollin (2004) re-test the robustness of Levine/Zervos results through additional outlier control techniques. As a result, the alternative control techniques indicate that excluding Japan and India as outliers appears weak. Additionally, the Levine/Zervos results are heavily driven by differences between the high-growth Asian economies and the rest of the world. Nevertheless, it appears that stock market liquidity (measured by turnover) has no statistically observable independent effect on GDP growth either within the Asian Tigers or within the rest of the world (Zhu *et al.*, 2004, p.69).

By controlling the other variables, the resulting evidence from Levine's study (1999) indicates that the importance of banks is determined endogenously; thereby increasing the relative importance of banks has no impact on economic growth. This result implies that the striking importance of bank development could be the result of impediments to the development of equity markets or political intervention. Hence, a relatively large banking sector might provide the evidence of distortions in the performance of market forces, which unlikely to lead to a greater growth.

2.6 Research space for this empirical study

From existing empirical studies, it is apparent that the cross-country analysis (including panel estimation) is the dominant approach which enables the researchers to obtain large amount of observations to guarantee the valid and consistent estimated result. However, it is noticed that China has rarely been taken into account either jointly or alone. Similarly, Granger-causality technique has not often been applied in the context of China either.

Given China's rapid economic growth, also characterised by unbalanced development between coastal and interior area, between south and north region, associated with its gradual financial and economic reform, the real/financial nexus hypothesis testing is worth conducting by using China's statistical data. Though financial reform in China remove a lot unnecessary controls that may hamper economic growth, financial capital mobility across regions remains highly restricted. Particularly, firms are unable to access the credit market in other cities but restrained in the local credit markets. Meanwhile, labour capital distribution is relatively static. Therefore, the entire nation can be treated as a union of 30 relatively independent provinces, in which circumstances the panel techniques is applicable (Chapter 6).

Moreover, the major statistical drawbacks in most current Granger-causality empirical studies lie with the time frequency of observations. Cross-country with annual data is commonly adopted, apart from quarterly data were used occasionally, to guarantee a large enough sample size. In addition, Granger-causality techniques have not yet been

found applying in one single country to testify the real/financial causal relationship. These drawbacks provide a good chance for this research paper to identify the causal direction between financial development and economic growth in the country of China alone by using monthly data. Thereby, the estimated result drawn correspondingly can be regarded as a complementary attempt to the existing empirical studies (Chapter 7).

2.7 Summary

This chapter mainly provided a general background for real/financial relationship from both theoretical and empirical aspects. First of all, four priori possibilities concerning the causal relationship between financial development and economic growth were distinguished – not causally correlated, financial development determines economic growth, financial development follows economic growth and financial development deters economic growth occasionally.

In the theoretical framework section, the theory on real/financial relationship was illustrated by using the micro models of financial intermediation to show how these financial arrangements eliminate at least part of the negative consequences of the positive information and transaction costs. By adopting the idea of ‘lemon’ problem, substantial researches have been undertaken on the question how financial market inefficiencies may distort the economic behaviour.

Among several growth models which take into account financial markets, intermediaries and financial functions, AK model is the prevalent endogenous one to capture the potential effects of financial development on growth. Though financial development indicators have not been explicitly introduced into this model as determinant variables, the effects of financial development on saving rate and productivity of capital were fully examined.

The functional approach asserted by Levine (1996) in one of his influential studies described the macroeconomic consequences of the existence and the development of the financial structure as a whole and not of each particular financial instrument or

market separately. Correspondingly, the primary function of financial intermediaries and its linkage with economic growth were interpreted in the four perspectives: mobilising savings, acquiring information and allocating resources, diversifying and pooling of risks, and monitoring managers and exert corporate control.

This chapter also studied the role of stock market during the domestic FL process. Some economists suggest that stock market can be understood as a good complement of credit markets in domestic FL process, while some of them propose that stock markets have much more significantly positive effect on economic growth than credit markets do. Meanwhile, an increasing research observed that the stock markets in LDCs are likely to perform worse since these emerging markets lack of well-defined regulation and adequate monitoring. Correspondingly, economists suggests that the financing pattern of developing country firms should be emphasising less on the share issuing but more largely relying on the retained profit.

Nevertheless, the existing studies do not provide a set of clear-cut conclusions and this provides a substantial research space to conduct the financial-growth nexus investigation in the context of China. Therefore, in the following chapters, the short-run and long-run economic growth pattern will be discussed in Chapter 5 by exploring error correction model technique. Meanwhile, both the sectoral shift effect and contribution of banking sector development will be detected by establishing a panel analysis framework (based on Cobb-Douglas production function) in Chapter 6. Then the Granger-causality nexus between financial market development and economic growth will be examined Chapter 7.

Chapter 3: Financial sector reform in China: An overview

3.1 Introduction

Financial sector reform in China has focused on the reform and development of banks and non-banking financial institutions (NBFIs). Though stock market development has lagged behind the changes in the real sector, the existence and expansion of China's stock market played an important role within the reform process. Therefore, a general picture on these two aspects is drawn in the following section where the reform and development of China's banking sector is discussed chronologically (Section 3.3). This will be undertaken after a brief survey of China's real sector reform in Section 3.2. The performance and features of China's stock market will be illustrated in Section 3.4. This will be followed by a brief summary for this chapter in Section 3.5.

3.2 China's economic reform

We cannot understand the China's financial reform without an excursion into its economic reform during the past three decades. China began its current economic reform in the late 1970s. Prior to the adoption of these reforms, the Chinese economy strongly resembled the Soviet administrative-command economy, which is characterised as almost complete state ownership, collectivised agriculture, an industry managed by directive plans and priorities set by the Communist Party. China's reform started with a trial-and-error strategy. China did not adopt a big-bang approach to transform the economy; neither did it engage in large scale privatisation, in contrast to other East European socialist economies that have enforced a radical set of changes together with full implementation of a privatisation programme (Liu and Garino, 2001).

After undertaking a market-oriented economic reform for nearly three decades, China has been identified as a "market socialism" economy, which combines market resource allocation with state ownership (Gregory and Stuart, 2004). This section

mainly provides a survey of China's economic reform in respect to price liberalisation and enterprises' corporatisation.

3.2.1 Price liberalisation

China's price reform started at the beginning of the 1980s, with an experimental out-of-plan market for small commodities that proved successful in reducing supply shortages. Meanwhile, state-owned enterprises (SOEs) have been allowed to sell some of their output on free markets whilst an increasingly large fraction of state firms' inputs have been purchased on free markets rather than being allocated by the state. This led to a dual-track system – a mixed plan and market pricing approach. Under the plan track production and prices are frozen at a defined pre-existing level, usually last period's output. A parallel market track is carried out at the margin so that fully free market transactions can take place outside the plan track at market price usually being substantially above the official price.

Under the fixed price system in centrally planned economy stage, prices bear little relation to costs. Hence, the ultimate objective of a firm's operation is to complete the production quota allocated by the state regardless the expenses. From the viewpoint of economic incentives, the key point within such pricing mechanism is that at the margin, decisions are made in the face of market prices. Free-market prices started conveying information of real market demand and supply. Consequently, profits and costs became the essential criteria for firms to make production decision. For a firm's decisions on how much to produce, what inputs to use and what kind of investment to undertake, the state-imposed output quota is irrelevant, as long as that quota is smaller than total output. What matters for such decisions is the price that will be received for any extra output, which is the free-market price (Byrd, 1987).

The Chinese dual-track system both provides the efficiency gains from price liberalisation and protects individual agents from welfare losses because it is designed to be Pareto-improving (Roland, 2000). However, it has been pointed out that the dual-price system enabled illicit profits made by obtaining goods at market prices (McMillan and Naughton, 1992). Buying low and selling high is a normal market activity; but the dual-price system has meant that certain well-connected people can

buy at artificially low prices then seize the exorbitant profit by selling at high market prices.

China has not yet entirely removed its price control. Controls still remain on a list of the more economically significant and strategically important items. Nonetheless China is moving towards greater transparency in pricing these items. Government also issued rules for holding public hearings on pricing policy decisions. Price liberalisation has been pursued gradually. For instance, the National People's Congress in March 2001 highlighted the need to improve price setting mechanisms by breaking industrial monopolies and removing barriers to trade between China's regions. China lifted price controls on 128 items in 2001 as part of preparations to enter the World Trade Organisation and persuade the international trade body to classify it as a market economy.

3.2.2 Enterprises corporatisation

The first two decades of SOE reform applied an incremental approach to reduce the scope of planning, increase managerial authority, and rely more on market forces. However, making the final move from state to private ownership has been the most difficult step to take. Maintaining the state ownership is the key issue for China to remain the property of market-socialist economy, which is based on the argument that SOEs could adopt corporate governance procedures to make them work efficiently in the interest of the owner (the state), just as privately owned capitalist corporations could operate in the interests of private shareholders.

The late 1990s witnessed a more clear SOE policy under the slogan “retain large SOEs and release small ones (*Zhua Da Fang Xiao*)”. Smaller state-owned companies could go to private owners, but the state should continue to own the largest. Instead of simply changing from state to private, the state ownership was to be transformed from direct state supervision and management to state shareholding, i.e. SOEs were to be corporatised. This means that state remains the owner of the majority of shares but management is independent, which aimed at ensuring the corporatised SOEs would operate like corporations in industrialised market economies. To do so, the state should let an independent management make its own decisions, while the common

market principles such as going bankrupt should be also applied to the corporatised SOEs.

However, instead of eliminating the poorly performing firms, the government try to save all firms. Insolvent SOEs can still count on state bailouts. In other words, state intervention remains and soft budget constraint is still implicitly and widely applied. Since it is politically difficult to allow the bankruptcy occurs in a large local enterprise, political pressure on bank authorities remains intense, especially when state ownership dominates in China's current banking sector. In these circumstances, bank credit is preferentially extended to SOEs despite their poor financial conditions. As a result, the Chinese policy that ways can be found to salvage all enterprises has accumulated substantial inventories of Non-performing Loans (NPLs) and held over the resolution of commercialisation of bank lending (Gregory and Stuart, 2004). It also implies that introducing profit as a criterion for success in either corporatised enterprises or banks is doomed to fail as long as the soft budget constraint was retained.

Throughout the reform process, SOEs' investment decision making still suffers from political intervention. Since the approval process takes into account the impact of investment on regional economic development, the implementation of the majority of large investment projects are decided by SOEs' direct political authorities, but not based on market research or rate-of-return considerations. Therefore, it has been stressed that the fundamental nature of investment processes in China has not changed substantially from the pre-reform circumstances despite the impact of nearly three decades of reform (Gregory and Stuart, 2004).

3.3 Development of China's banking sector

Initial reform of banking sector starting in 1978 was characterised by the establishment of the two-tier banking system, with the establishment of the central bank and specialised banks. Later on, a significant development occurred in the non-banking sector – the emergence of the non-banking financial institutions, including rural and urban credit cooperatives, and trust and investment corporations. Commercialisation of state banks, opening the financial sector to foreign competitors,

and development of financial markets have only taken place to a limited degree. Despite twenty years of reform policy, China's banks are still at an early stage of their development. Their main lines of business are traditional deposit-taking, lending and payments. Higher-value banking has not yet emerged, although the booming Chinese economy is increasing the demand for financial services¹. Financial reforms can be described in four chronological stages.

3.3.1 The role of banks and banking before economic reform

During the 30 years (1949 – 1978) after the founding of People's Republic of China, China's economy was operating mainly under a highly centralised and planned management system. All national economic activities had been organised according to mandatory planning. As the private sector was not allowed to exist, all enterprises were state-owned (in urban area) and town-and-village-owned (in rural area) in the Chinese economy, thus, their products had been turned over to the state entirely for the purpose of second allocation conducted by the state. Due to the planned economy system, the amount of available funds and raw materials for each firm was determined by the state plan. Correspondingly, the financial system before reform was characterised by the “all-inclusive Soviet-style mono-bank system” (Tong, 2002, p.53) established in 1950.

The Chinese financial system was originally designed to serve the planning process rather than to perform the functions of a modern financial system. Prior to 1979, the People's Bank of China (PBC) controlled about 93 percent of the total financial assets of the country and handled almost all lending business, including industrial, commercial and rural credits (Yi, 1994, p.19). Some specialised banks did exist. However, they were actually either agents for budgetary grants handed down by the Ministry of Finance or business branches of the PBC. For example, the People's Construction Bank of China, founded in 1954, was in fact the cashier of the Capital Construction Finance Department of the Ministry of Finance; similarly, the Bank of China, established in 1949, was the international business department of the PBC.

¹ Massimo Luppino, December 9th 2002. A summary of the Chinese financial sector, http://www.tidona.com/pubblicazioni/dicembre02_2.htm

The function of the banking system was confined to facilitating the financing of the economic plan. The PBC acted mainly as cashiers, with its functions confined to issue currency and credit, and carrying out the settlements of state-owned enterprises transactions. All deposits of state enterprises had to be held in accounts at the PBC. Credit could only be obtained there. All business transactions between enterprises had to be settled through the PBC according to the state plan. The payment of wages could only be made through a separate wage fund account, the quota of which was stipulated by the state plan and the withdrawal of cash from that account was under the supervision of the bank.

Before the reform period, liquidity in the financial system consisted of two components: cash and bank transfers, which were not mutually convertible. Most transactions in the consumer goods market were conducted primarily in cash, whereas most transactions in the producer goods markets were required to be cleared by bank transfers. The monetary authority used the so-called “cash plan” to control the currency flow and “credit plan” to control the bank transfer flow. Under such a system, the money supply was whatever was required for the implementation of the state’s producing plan. Since most fixed capital investment projects were financed by budget appropriations, the primary objective of the credit plan was to provide working capital to industries and commerce. The volume of total credit was determined by the government’s plans for enterprises production, and the amount of cash injected into the economy was based on the level of wage payments by enterprises, which was also set by the central authorities.

In summary, the issuance of currency and credit was determined by the cabinet – the State Council – and the PBC was not independent, rather, it was only a government agency under the Ministry of Finance and its primary function was to finance the physical plan. The role of the financial system in mobilising savings was very limited, because the primary source of savings was the government and the state-owned enterprises. Meanwhile, the role of financial intermediation in resource allocation was also limited, because most investments were determined and financed by the government budget appropriations, rather than through the banking system. Apart from the banking system, there were no non-bank financial institution and financial markets, and bank deposits were the only financial assets.

3.3.2 Early years of reform: structural changes in the banking system (1978-1984)

Banking reforms introduced by the Chinese authorities since 1978 came earlier than reforms applied to other sectors. In the early years of reform, efforts were focused on the rural areas and in the real sector. Financial sector reform was limited to structural changes in the mono-bank system. Two main roles played by the banking system in China were established. One is the supportive role: the banking system should not hinder enterprises from exercising their legitimate decision making by themselves. The other role is to influence macro-level economic activities.

In 1978, the PBC was formally established as China's central bank, and separated from the Ministry of Finance. In addition, three specialised banks were restored or set up to handle loans to specific sectors. The Bank of China (BOC) was restored to handle transactions related to foreign trade and investment. While the People's Construction Bank of China (PCBC) was set up primarily to serve the construction sector and fixed asset investment. The Agriculture Bank of China (ABC) was established to take over the PBC's rural banking business.

This period also witnessed the start of the development of NBFIs. Successful reform in the rural areas and the proliferation of rural industries dramatically increased the demand for financial services from rural residents. Thus, a network of rural credit cooperatives was set up under the supervision of Agriculture Bank of China (ABC) to provide small-scale rural banking services to rural residents and township and village enterprises. Another type of NBFIs, namely the trust and investment corporations (TICs), appeared. The first TIC, the China International Trust and Investment Corporation (CITIC) was established in 1979 to raise funds from foreign sources to finance domestic projects. CITIC has been the primary source for most international bond borrowing made by China during the 1980s.

This period also experienced important changes in the sources of both savings and investment. On the savings side, the decentralisation of financial resources into the hands of households led to an explosion in saving deposits. On the investment side, bank loans replaced the state budget appropriations as the main source of investment

finance. Following a directive of the State Council in 1979, the main source of investment funds was shifted gradually from state budget to bank loans. Both the PBC and the specialised banks were authorised to grant medium- to long-term loans to state enterprises. As a result, the composition of funds allocated to state-owned industrial enterprises changed rapidly from budget appropriations in 1978 (70 percent) to state bank loans in 1982 (80 percent)².

The changes in the structure of savings and sources of investments highlight the importance of financial intermediaries in resource allocation. However, despite the structural changes described above, the banking system still served the limited purpose of financing the physical plan. PBC was assuming the functions of both a central bank and a commercial bank as it continued to provide working capital loans to state-owned enterprises. Loans were allocated to state-owned enterprises under the credit plan, and neither the project's profitability nor the borrower's repayment ability was taken into consideration in granting loans. And this is the main source of today's non-performing loans. The first stage of China's financial reform did not get rid of the characteristic of highly centralised and planned management. Furthermore, the mechanism of bank monitoring state-owned enterprises was almost non-existent.

3.3.3 Starting financial reform: development of banking and non-banking institutions (1984 – 1991)

The most significant change in this phase was the establishment of a two-tier banking system similar to that in market-oriented economies. In 1984, the People's Bank of China was formally established as the country's central bank by removing its commercial banking activities. A fourth specialised bank, the Industrial and Commercial Bank of China (ICBC) was established to take over the functions of financing industrial and commercial enterprises formerly adopted by the PBC. Thus the transition from the mono-bank system to a two-tier banking system was completed, comprised of a central bank – the PBC, and big four state-owned specialised banks – the ABC, the BOC, the ICBC and the PCBC. They were operating exclusively in their

² See Tong, 2002, p.21.

own specialised area while strictly prohibited from being engaged in cross-area business.

The financial sector diversified further after 1984. During this period, a numbers of non-banking institutions were also been established, such as People's Insurance Company of China (PICC), Rural Credit Cooperatives (RCC). Following the establishment of the ICBC, 1,200 urban credit cooperatives were set up to serve urban individual and collectively owned enterprises. In addition, new non-state commercial banks were established, including the Bank of Communications, CITIC Industrial Bank and China Merchants Bank, which were permitted to compete with state specialised banks in all forms of business. Meanwhile, another two important specialised banks, Bengbu Housing Savings Bank and Yantai Housing Savings Bank, were established in this stage, mainly conducting the housing mortgage. The summary of the reform of banking and non-banking institutions is given in Table 3.1.

Since the State Council decided that the PBC would assume the function of the central bank in September 1983, the role of PBC has been transferred to oversee the overall development and activities of the monetary sector, maintaining economic and currency stability. When the economy overheated and credit was out of control in 1984-85, the Central Bank enforced quarterly credit limits on its branches and on the specialised banks. Many of the administrative controls employed in 1985 include the order to stop offering loans to inefficient enterprises and to firms that produce poor-quality products for which there is little demand. Since 1986, the central bank has tried to exercise both direct and indirect control measures, such as setting quotas for fixed asset loans. The central bank indirectly controls credit, mainly by its credits to the various specialised banks³. Competition among the state specialised banks increased during this period, as they were allowed to cross-conduct business. For example, the ABC was allowed to set up branches in urban areas, taking deposits from urban residents and making industrial loans.

A major innovation during this period was that foreign financial institutions were licensed to operate in China. Generally speaking, the entry of foreign banking institution started from a small number of foreign banks allowed to set up

Table 3.1: Bank and NBF1 Reform

Year	Name of Bank	Feature
1978	The People's Bank of China	Separated from the Ministry of Finance, the PBC was raised to the ministerial rank in terms of status and functional organisation, and operated solely as the country's central bank in since 1984.
1979	Agricultural Bank of China	Together with rural credit cooperatives, the ABC is the major source of financing the rural sector. The bank's role is to mobilise and direct financial resources from within the rural sector, as well as industrial enterprises in rural township.
1979	Bank of China	Separated from PBC and became an economic organisation responsible to the executive arm of the State Council, deals in foreign exchange business and settles the international account of China. Its designated functions include organising and supplying foreign-exchange funds for investment in China's economic development and handling renminbi loans and deposits related to foreign-exchange operations.
1979	People's Construction Bank of China	Previously, the PCBC was a branch of Ministry of Finance. As from 1981, budgetary grants dispensed through the PCBC to industrial enterprises for fixed capital investment are gradually being changed to repayable bank loans with interest. PCBC can also start to build up its own assets by expanding deposits to strengthen its lending capacity.
1979	China International Trust & Investment corporation	Concentrates on attracting foreign capital and technology, acts as an intermediary in organising various forms of joint ventures between Chinese and foreign partners, works closely with BOC. Authority expanded in 1982 to include setting up of financial institutions abroad.
1982	China's Investment Bank	Manages the use of long- and medium-term loans from the World Bank and other international financial institutions and to attract other sources of foreign funds for lending to domestic projects.
1983	People's Insurance Company of China	Separated from PBC. Specialises in insurance business.
1984	Rural Credit Cooperatives	Sprung up all over the country during 1984/5, mostly in the hands of individuals with different degrees of involvement by the local government. Started to issue shares and short term loans to members.
1984	Industrial and Commercial Bank of China	The ICBC is to take over from the PBC the entire commercial operation in providing bank credits to, and taking deposits from, enterprises. It specialises in the provision of short and medium term credits to enterprises for their working capital requirements and loans for technical transformation, and to self-employed

³ Li, K.W. 1994. *Financial Repression and Economic Reform in China*. Westport, CT: Praeger. P31-43

		people and township enterprises.
1985-1988	Guangdong Dev. Bank, Xiamen Int. Bank, Fujian Industrial Bank, Shenzhen Dev. Bank	Finance the provinces of Guangdong and Fujian and the special economic zones of Xiamen and Shenzhen
	CITIC Industrial Bank, China Merchants Bank	Banking arm of CITIC and China Merchants Holdings Co. Ltd. respectively.
	Bengbu Housing Savings Bank, Yantai Housing Savings Bank	Specialise in housing mortgages.
1987	Bank of Communications	Reactivated on a joint stock basis, handles both domestic and foreign currency denominated banking business, and finances economic development in the eastern coastal provinces with the aim to revive Shanghai's former status as a financial centre. Total asset was RMB2 billion with 50 percent owned by the state and 25 percent by the Shanghai municipal government. Handles renminbi and foreign currencies in both short- and long-term lending and is given flexibility to determine interest rate.

Source: Huang Hsiao, 1984, Money and Banking in the Chinese Mainland, Taipei: Chung-Hua Institution for Economic Research; Tam, On Kit. 1986, Reform of China's Banking; Wang, Yan. 1988, Financial Reform: Decentralisation and Liberalisation, in Planning and Finance in China's Economic Reform.

representative in Special Economic Zones. Foreign banking institutions in China fall into three categories: 1) branches established by foreign banks, 2) foreign banks with representative offices, and 3) joint venture banks between Chinese banks and foreign banks, e.g. Chinese Mercantile Bank, Fujian Asian Bank Ltd., Xiamen International Bank and its Fuzhou branch. The representative office became the first investment vehicle available to foreign banks after China implemented the open-door policy. Representative offices provide introduction, contracts, and service promotion for the parent banks. In theory, only foreign banks with assets of over USD20 billion may set up in China or take a minority stake in a domestic bank. Bank branches offer a more complete range of commercial-banking services, including trade finance, foreign currency loans, and securities underwriting. Joint-venture banks allow foreign banks greater access to the domestic market, but this format limits the foreign bank's control over finances and management. Nonetheless, all these foreign banking institutions are strictly prevented from conducting renminbi business.

3.3.4 Deepening financial reform (1992 – present)

With the famous “Southern China Inspection Tour” undertaken by Deng Xiaoping, the year 1992 marked a new era of economic reform. The economy had started to boom around 1980 and the flow of foreign direct investment (FDI) to China increased substantially from 1980 onwards. The period also witnessed an expansion of the banking sector and the deepening of financial reform.

A new round of financial reforms started in 1993, when inflation pressure increased as a result of booming investment and fast economic growth. After realising that measures to control inflation would not be effective without a modern sound financial system, the central government decided to embark on a new programme in 1993, which consisted of four major contributions: 1) separating the planning credit granting from commercial lending by setting up policy banks to give aid to particular sectors or a certain amount of SOEs; 2) deregulating the banking sector and establishing new banks; 3) improving the legal framework of the financial system; and 4) developing financial markets.

To relieve the commercial banks of special political functions and allow market-oriented reform, three policy banks were established in 1994, designated to be the main vehicles for policy-based lending in the future which is more or less the same as planned credit rationing. They are the State Development Bank, the Agricultural Development Bank, and the Export-Import Bank of China. In addition, the banking sector started to deregulate and lower barriers to entry. As a result, new non-state commercial banks, regional banks, savings banks, and private banks were established. The first private bank in China, the Mingsheng Bank, was set up in 1996 by the All-China Federation of Industry and Commerce, an association of private enterprises. More foreign banks and financial institutions entered China’s financial market and some of them were permitted to conduct domestic currency business.

Foreign banks were authorised to open branches in large cities in 1992. By the end of 2004, the number of operational financial institutions established in China by foreign-funded banks and enterprise groups came to 204, including 179 branches of foreign-funded banks and 25 locally registered institutions in forms of joint-venture banks,

wholly foreign-funded banks and finance corporations; additionally, banking institutions from 38 countries and regions had established 223 representative offices in China⁴. These operational financial institutions were located in 19 cities, mostly coastal cities; particularly around 30 percent of them were in Shanghai⁵. Meanwhile, the geographical range of renminbi business operated by foreign-funded banks was further expanded – from Shanghai and Shenzhen only up to 18 cities⁶. Apart from obtaining the qualification of operating renminbi business, 24 foreign-bank institutions have been authorised to provide financial derivatives products. Moreover, the inter-bank borrowing (lending) renminbi business of foreign-funded banks was increased. All these measures increased the sources of renminbi funds for foreign-funded banks and indicated that China's domestic financial market was further opened to foreign-funded banks.

The initial reason for allowing entry of foreign banks was expanding trade with foreign countries. However, as more foreign companies are investing in China, the demand for financial services has increased. Foreign banks play roles of channelling foreign funds to investment in China, and provide financial services to foreign companies. The entry of foreign banks also brings modern banking skills and technology to China, and increase competition in the financial sector, which would be beneficial to China's financial reform. For instance, in 2002, the central authorities allowed Newbridge Capital to take a controlling stake in Shenzhen Development Bank. This bank, owned by the Shenzhen local government, has 200 branches in the most capitalist city in China by the end of 2002, with deposit growing by 50 percent a year. In January 2003 Citigroup, the biggest bank in the world, won approval from the Chinese government to take its first minority stake in a Chinese bank: 5 percent of Shanghai Pudong Development Bank, for US\$112m. These two remarkable issues can be treated as significant indication of how the new, reformist generation of political leaders in central government intend to use foreign capital and management skills as a way to shake up China's banks (Ziegler, 2003).

⁴ Cited from Xinhuanet news, 'Foreign-bank playing important role in China's banking industry', http://news.xinhuanet.com/fortune/2004-12/01/content_2281161.htm, accessed on 25/02/05.

⁵ Almanac of China's Finance and Banking, (English Edition) 2000. p135.

⁶ The number of opening-up cities increased from two to 18, now including Shanghai, Shenzhen, Tianjin, Dalian, Guangzhou, Zhuhai, Qingdao, Nanjing, Wuhan, Ji'nan, Fuzhou, Chengdu, Chongqing, Kuming, Beijing, Xiamen, Xi'an and Shenyang. This geographical restriction will be fully removed by the end of 2006.

Moreover, considerable strides have been made in getting the banking system into better shape. In 1998 the PBC was given a federal structure that brought decision-making back to the centre and cut across powerful provincial lines. At the end of 1998, a total of nine regional branches of PBC have been set up in place of the previous provincial branches⁷. The big four state-owned commercial banks were also recentralised. Not only have they shut down a large amount of unprofitable sub-branches, but also they have sacked huge numbers of staff: ICBC has laid off one-fifth of its employees, staggering 110,000 people⁸. The banks have hired western consultants to teach them about risk-management system, credit-scoring and tackling bad loans.

NPLs were not perceived as a 'problem' until the 1990s. During the highly centralised planned economic period, since both the borrowers and lenders are state-owned economic identities, the State would help the companies which were not able to repay their debts by providing the bank with budgetary allowance to write off the unpaid debts (Lou, 2001). Consequently, a huge amount of NPLs put on banks' books severely limit banks' ability to lend, becoming an obstacle to the economic growth eventually. The South-East Asia Financial Crisis in the late 1990s convinced Chinese government the importance of having a healthy financial system. Therefore, how to deal with the serious systematic NPLs in Chinese big-four state-owned commercial banks (SOCBs) has been listed on the top of the financial reform agenda.

Among all the available approaches for tackling NPLs, establishing Asset Management Company (AMC) was apparently the best option, which was a certain type of company implemented since 1999 aiming at dealing with NPLs only. In January 1999, the State Council and the PBC authorised the state commercial banks to establish separate accounts for NPLs and form AMCs to sell part of the NPLs at a discount, or to restructure the loans, in order to help banks to clear up their balance sheet as fast as possible⁹. Following this authorisation, four separate AMCs were

⁷ See The People's Bank of China. Brief introduction of the PBC: <http://www.pbc.gov.cn/renhangjianjie/> and <http://www.pbc.gov.cn/fenzhijigou/>.

⁸ Dominic Ziegler, 'Casino Capital' in 'A survey of Asian Finance'. The Economist. February 8th 2003.

⁹ See Chinaonline, 'China's Troubled Financial Health Reflected in State Commercial Banks', February 5th 1999. http://www.chinaonline.com/top_stories/industry_b2_99020516.html; also 'China's State-Owned Banks to Sell Bad Loans; Establish Asset Management Companies' January 19th 1999. http://www.chinaonline.com/top_stories/today_b2_99011911.html

established to handle NPLs of the big-four SOCBs respectively. They are: the Cinda AMC for the PCBC, the Dongfang (Orient) AMC for the BOC, China Great Wall AMC for the ABC, and China Huarong AMC for the ICBC. AMCs in China only deal with the NPLs issued before 1996, while those NPLs granted after the beginning of 1996 have to be tackled by the banks themselves. By the end of June 2000, the four AMCs had taken over RMB1.3 trillion assets from the big four. As a result, the amount of NPLs for the big four dropped by 10 percent and the capital adequacy ratio rose from 3 percent to 8 percent¹⁰.

3.3.5 Credit allocation controls

The direct financial intermediation controls in China was setting the credit ceilings specified in the annual credit plan. This traditional tool of credit control not only set limits on the total lending of each financial institution, but also imposed sub-ceilings for certain categories of loans (World Bank, 1990). As in the credit plan, it specified in a detailed manner that the sources and use of funds by economic sectors and types of enterprises (Chai, 1981). Under such credit control scheme, financial institutions were restricted to increase lending even if they were able to collect more deposits. During the reform period, as with the credit ceilings contained in the plan, the extent to which the credit plan that have actually been enforced varied substantially. Generally speaking, credit plan has been adopted as an effective tool to control the economic growth pace.

In mid-1980s, there was a trend allowing financial institutions to extend additional loans if more deposit could be collected. Meanwhile, local branches were given greater latitude with respect to loan approvals instead of merely applying directives issued by their headquarters. However, when inflation again accelerated in the late-1980s and the mid-1990s, credit ceilings were more strictly enforced by PBC. Nevertheless, during the 1990s the overall trend has been away from direct quotas control and by 1995, only the major SOCBs¹¹ remained subject to credit ceilings

¹⁰ See Chinaonline, 'Asset Management Cos. Receive US\$157bn of Bad Assets from Banks', August 3rd 2000. http://www.chinaonline.com/issues/econ_news/current-news/secure/B200072705.asp; also 'A little off the Top: Big 4 Banks Drop 10% of Bad Debt', December 19th 2000, <http://www.chinaonline.com/industry/financial/newsarchive/secure/2000/december/c00121506.asp>.

¹¹ According to the official statistics, SOBs refers to PBC, policy banks, wholly state-funded commercial bank, CBC, CITIC Industrial Bank and Postal Saving Institutions.

(Mehran *et al.*, 1996). A new Commercial Banking Law promulgated in 1995 also emphasized the need for financial institutions to incorporate commercial criteria into their lending practices (ACFB, 1996). In 1998, credit plan (together with credit ceilings) for SOCBs were ultimately abandoned in favour of asset-liability management principles.

However, it should be noted that an annual guiding plan has been implemented alternatively by the government to maintain the influence on the volume of SOCBs lending. This plan sets recommended target for incremental lending based on macroeconomic conditions and is designed to be used as a reference document upon which SOCBs should formulate their own plan. Evidence from most recent years suggests that the guiding plan has in fact been used quite aggressively by PBC to influence credit volume and structure. For instance, when economic growth appeared slowing down in 1998, PBC stated that SOCBs were allowed to temporarily discard asset-liability management principles such as the loan-deposit ratio, in order to meet the targets specified in the guiding plan. More recently, in response to the “over-heat” syndrome observed in the economic behaviour in early 2004, the PBC’s guiding plan was rectified promptly by arousing the cautiousness towards the credit allocation to certain over-expanding industries¹². Correspondingly, such plan was interpreted by SOCBs, even by many other types of financial institutions as well, as the credit control targets against the excessive investment in these industries.

Due to lack of data and a universally accepted definition as to what actually constitutes directed credit, it is not possible to determine the precise scale of government determined credit allocation. Applying two simplifying conditions to the available data can yield a useful indicator of the degree of government involvement in credit allocation. First, SOCBs are still the dominant market participants in China’s financial sector. To identify the DFL in China, it is useful to examine whether the SOCBs can treat the non-state credit applicants as equally as to their state-owned candidates. Second, it can be assumed that all the credit granted by SOCBs to the state sector is directed by government. In the context of China’s official statistics regarding SOCBs, this involves subtracting from the total, loans made to the agricultural sector, town-and-village enterprises, private enterprise and individual proprietors, and

Table 3.2: Government involvement in credit allocation since 1978

Year	% of increment of total SOB loans	% of increment of loans to SOEs	Loans to SOEs over total SOB loans (%)
1978	8.17	7.76	91.06
1979	10.25	9.55	90.48
1980	18.37	17.05	89.47
1981	18.47	18.01	89.13
1982	11.20	11.21	89.13
1983	12.87	12.85	89.12
1984	32.76	28.26	86.10
1985	23.91	25.93	87.51
1986	28.54	27.62	86.88
1987	18.99	18.22	86.32
1988	16.81	16.47	86.06
1989	17.61	18.99	87.08
1990	22.22	23.06	87.67
1991	18.97	19.46	88.03
1992	19.79	19.62	87.90
1993	22.42	22.85	88.21
1994	22.03	26.55	91.48
1995	22.00	23.69	92.75
1996	20.41	19.86	92.33
1997	25.05	24.16	91.67
1998	15.38	14.88	91.27
1999	7.68	7.36	91.01
2000	3.66	5.35	92.49
2001	4.82	5.49	93.08
2002	13.51	15.31	94.56

Source: author's calculation based on the statistic data extracted from Almanac of China's Finance and Banking (Chinese editions), various issues.

foreign-funded enterprises¹³. Thus, the intensity of government involvement in the credit allocation can then be taken to be SOCB loans to the state sector divided by the total lending of SOCBs (Table 3.2).

From Table 3.2, it is noted that before the establishment of policy banks in 1994, there was a downward trend in the government involvement in SOCBs credit allocation, though not significant. Since 1994, the proportion of SOCB loans to the state sector increased dramatically, which was presumably the result that three policy banks were

¹² The over-expanding industries include steel, electrolytic aluminium, cement, real estate and vehicle.

¹³ This assumption has been criticised by Laurenson and Chai (2003) that not all SOCBs loans to the state sector are in fact policy directed. Some SOEs no doubt would be able to attract credit even in a fully liberalised financial system.

founded and designated to be the main vehicles for policy-based lending. Apparently, the accuracy of this government involvement indicator is affected by the incorporation of policy-base lending with the total SOCB loans. Nevertheless, due to the unavailability of separate statistics for three policy banks, Table 3.2 still indicates that the credit allocation of SOCBs remains largely influenced by government intervention.

3.4 Development of China's stock market

3.4.1 The performance of China's stock market

3.4.1.1 General background

The development of China's stock market is one of the most important elements of China's reform in the financial system. Until 1990 China had no stock market at all. The debut of the Shanghai Stock Exchange (SHSE) in December 1990 marked the start of a new era. Six months later, the Shenzhen Stock Exchange (SZSE) opened for business. This marked the stock market's entry into the Chinese economic system officially and China's capital market's entrance into its formative stage. During the last decade, the growth of China's stock market is outstanding. Compared to the initial 14 listed companies, including 8 on SHSE and 6 on SZSE in 1991, these two stock market exchanges have 1200 listings and a market capitalisation of around USD500 billion by the end of 2002, second in Asian only to Japan¹⁴.

The development of China's stock market is amazingly rapid. Going public is a highly preferable way for a Chinese enterprise to raise funds. It is relatively easy because the Chinese public do not yet have access to alternative investment facilities such as life insurance or property funds. With a 40 percent personal savings ratio, China has considerable surplus demand for outlets for savings. However, large-scale manipulation and even fraud in the listed firms' financial reports have hurt investor confidence¹⁵.

¹⁴ Dominic Ziegler, A survey of Asian finance, *The Economist*, February 8th 2003.

¹⁵ Massimo Luppino, *A summary of the Chinese financial sector*. December 9th 2002.

Table 3.3: Quota of stock issued, 1993-1997 (RMB billion yuan)

	1993	1994	1995	1996	1997
Issuance quota	5	0	5.5	15.0	30.0

Source: Introductory Theory of Securities Market, 1999

However, China's stock market is still characterised as primitive in terms of distorted and volatile share price and unsound legal and monitoring system. The origin and early development of China's stock market are different from practices of western countries. From the very beginning China's stock market was constrained by the central planning system and so is going to take a rather different form from those of the stock markets in other industrialised countries. To some extent, in despite of numerous market activities, the public ownership within a non-market economy usually does not provide the conditions necessary for the development of a truly functional stock market. In the early stage, a quota system is applied in the process of public offering. As Table 3.3 shows, the number of stocks to be listed was limited by the quota. The competent state securities authorities proposed the number of new stocks for the next year based on the macro financial circumstances, development of state-owned enterprise reform and stock market operation situations. State Planning Committee implemented the overall balance of the quota allocation at both provincial and industry level. Then the quota was allocated to provincial authorities and ministerial levels, and candidate issuers were then chosen and approved at the provincial and ministerial level before being submitted for approval at the central government level. China Securities Regulatory Commission (CSRC) then reviewed all documents and determined the suitability of qualification for being listed, and the time and size of the shares to be listed on the exchange. If authorisation is not given, the public offering will be aborted because it will not be listed anywhere.

It has been widely accepted that the shareholding system is an effective approach to promote the reform of state-owned enterprises (SOEs). Due to the inexperience of policymakers, many rules and regulations are less prudential and lagging behind, which hardly ensure the growth and supervision of shareholding companies and stock markets. Consequently, it is inevitable that many shortcomings in China's stock market were not solved at that time.

3.4.1.2 State-owned shares and Legal person shares

In China, most listed companies are corporative SOEs. Shares issued by a typical SOE consist of three types: state-owned shares, legal person (corporation) shares and individual shares. In general, the state-owned shares and legal person shares are subject to restrictions on transfer, but constitute the majority of total shares, taking about 66 percent of the total share capital of the listed companies. Individual shares are the only tradable shares accounting for around 34 percent.

The reasons for introduction of this three-type-share structure lie on the central planning system during the economic reform process. Prior to the economic reform, the ownership structure of an enterprise either took the form of state-ownership or collective-ownership under the traditional centralised planning economy. By introducing the shareholding system, the prior concern by the policymakers is how to maintain the state-ownership feature in the national economy. Offering pure individual shares would entirely change the ownership structure of SOEs. Thus, state-owned/legal person shares were designed to prevent the state losing its dominant position. Moreover, state-owned/legal person shares are also strictly prohibited from being traded in the secondary market in case of state's holding of its assets being eroded.

As common shares, state-owned shares and legal person shares should enjoy the same rights and profits, as the individual shares should. However, individual investors lack the equal rights compared with state and enterprises holders because of unequal purchasing prices. In general, if the state shareholder purchases the shares at their face value, say, one yuan per share, the individual investors are supposed to buy their shares at the fixed price of at least six times or even more than the stock face value. If the government allows the state-owned/legal person shares to enter into the market without reasonable compensation for the individual shareholders, it is not only being unfair to the latter but also hinders the stock market development.

3.4.1.3 A-shares and B-shares

Since China's stock exchanges were established, shares have been initially classified as A-shares and B-shares. A-shares are exclusively geared to the domestic market. B-shares are denominated in renminbi but traded and purchased in foreign currencies

(usually in US dollar and HK dollar) strictly by foreign investors¹⁶. Besides these two essential classes of shares, H-shares are issued by Chinese companies and traded on Hong Kong Stock Exchange.

A-shares and B-shares are two main classes of shares traded on Chinese stock market, which are not mutually convertible. A-shares are for Chinese citizens to buy with renminbi, which account for the majority of all issued shares and almost every shareholding company issues A-shares. B-shares must be traded in foreign exchange, and the companies issuing B-shares should pay the shareholders dividends with foreign exchange converted from renminbi profit at the current market exchange rate. According to the Company Law, each share of different classes is supposed to have the same right and equal share of the profit and property of the company. Therefore, B-share holders have the same right and should bear the same obligations as A-share holder.

In fact, the purpose of establishment of B-shares market is to raise foreign capitals, to learn operating experiences from mature stock markets as well as promoting internationalisation of China's stock market. Initially, both segmentation of investors and issuing model was set up artificially in order to prevent foreign speculative capital from flowing into A-shares market, resulting in turmoil of China's stock market. The segmentation of markets was a double edged sword to protect currently infant China's stock market, and was in the interest of supervision of stock markets by authorities. On the other hand, segmented markets between A-shares and B-shares constrained the stock market development. The non-convertibility of B-shares to A-shares and strict segregation between these two classes of shares mean that foreign investors have little opportunity control the listed companies because the majority of shares are A-shares. Therefore, most large investors lack of interest in investing in the B-shares market. Compared to the over-speculative A-share market, the B-share market performs more inactively and stably: the average price and P/E ratio of B-shares are considerably lower than those of A-shares, shown as Table 3.4.

¹⁶ Originally, B-shares are reserved for foreign investor. From February 2001, it was opened up to the Chinese national investors. 'Notice on the regulations for the Chinese domestic residence investing in B-shares stock market' (Guanyu jingnei jumin touzi jingnei shangshi waizigu youguan wenti de

Table 3.4: Trading price of A-share and B-share in the same company
(December 30, 1996)

Name of Stock	A-share price (yuan/per share)	B-share price (US\$/per share)	B-share price converted into the domestic currency*	Multiplier
Zhenkong	4.7	0.19	1.58	2.97
Erfang	4.3	0.17	1.41	3.05
Dazhong	16.48	0.83	6.88	2.40
Yongsheng	8.46	0.30	2.49	3.47
Zhongqian	9.93	0.45	3.73	2.66
Zhongfang	4.46	0.17	1.41	3.16
Jiaodai	7.17	0.24	1.99	3.60
Lujian	9.44	0.30	2.49	3.80
Luntai	10.10	0.44	3.65	2.77
Bingxiang	13.22	0.54	4.48	2.95

* The figures are calculated based upon the official exchange rate on December 30, 1996:
1US\$=8.31RMB

Source: *Shanghai Securities Newspaper*, Dec 31, 1996.

3.4.1.4 Performance of listed companies

In China, most of listed companies were initially state-owned enterprises. The state-owned enterprises transformed their structures according to the requirements of shareholding system, but the operation mode and management mechanism of many state-owned enterprise are still in line with the planned economy model. Namely, the corporate structure and operation mechanism has not been modernised in terms of the requirements of company limited by shares or modern enterprise system. These companies could not be called shareholding companies in a real sense.

Since listed companies were set up through administrative procedures under the government approval and checking rather than based on the market requirements, they are characterised by poorly defined ownership: neither the shareholders' rights can be enjoyed nor their obligations have to be undertaken is clearly defined. Although the introduction of individual shareholders is through public listing, it has little to do with the clear separation of ownership and management due to the existence of the huge state shareholders. In these circumstances, various moral hazard problems derive from

this equivocal ownership. In many listed companies, the board members are almost identical to the members of the executive officers while few outside monitors can come into effect. In practice, the managers of the list companies usually make decisions that promote their own interest whereas damage the interest of individual shareholders and the directors of the board are only responsible for the government rather than its shareholders. Furthermore, the operation of the listed companies is subject to extensive administrative control and intervention from various levels of government, causing serious incentive problems that reduces the companies' efforts in enhancing performance.

The quality of the listed companies is the real issue. Most of the listed companies are more interested in raising funds and making profits through splitting more new stocks in the form of premium placement to original shareholders than in improving their management and lowering operational cost. They invest the raised funds into the field that are not related to their major business without the agreement of shareholders. Even some of the better-regarded ones indulge in all sorts of market abuses, such as lending money raised on the stock market to the parent company rather than investing it, or speculating in the stock market on their own account. CSRC has been criticised as being too aware of the shortcomings. It has introduced quarterly audited financial statements and a requirement for independent directors on company boards. It has put tight restrictions on new listings which has disproportionately hurt the country's private companies. The CSRC was purely acting as the country's chief attributor of equity capital rather than a monitoring authority¹⁷.

3.4.2 The influence of stock market on economic growth

In this section, we mainly examine the impact of China's stock market development by using a relatively comprehensive dataset of China's listed companies published online at <http://datainfo.stock.hexun.com>. This website is produced by Chinaweb Ltd, in association with contributors such as Hexun, a leading provider of financial services in China, and the *South China Morning Post*, Hong Kong-based leading English

¹⁷ See Zeigler, D. 'Casino Capital'. Over the past couple of years, the CSRC has been forced to abandon plans to plug the state's around RMB900billion-1,700billion yuan unfunded pension liability by selling government-owned shares. In practice, investors took fright at the prospect of the shares of

language news provider. It makes use of available selected data on China's listed firms, with the information being sourced from the latest available company annual reports and summarised by the original data collector. Another important point needs to be highlighted here. The tradable shares in China's stock market have been classified into A-share and B-share, which are priced in different currencies and represent shareholders' rights differently (see Section 3.4.1.3). For the purpose of examining the domestic stock market performance, the data and information constituted in the following discussion refer to A-share exclusively (1236 listed companies at the end of 2004).

3.4.2.1 Corporate financing effect

To consider the corporate financing contribution of stock market, the ideal approach is to compare the relative importance of internal financing, external equity financing and external debt financing in explaining the growth of the net corporate assets (Singh and Weiss, 1998). Unfortunately, the straightforward information on each financing source is not available, thus preventing such an analysis from being conducted here. The starting point here is to calculate the equity/asset ratio for each listed company, the mean value of which was 51 percent. Though this result presents the significance of equity financing for listed companies in an absolute sense, it is unable to indicate the importance of equity capital relative to other financing sources.

The liability/asset ratio of listed companies is also useful in measuring the importance of equity financing. Liabilities of non-listed SOEs consist almost exclusively of bank loans and in recent years have reached extremely high levels. Based on the perception that stock market could help to release the burden of debt financing of SOEs, it is believed that listed companies would less rely on debts than those non-listed companies. There are two ways to testify this hypothesis. First, one would expect a negative correlation between the equity/asset ratio and liability/asset ratio. This means, those firms which have been permitted greater access to equity financing, should have been able to reduce their dependence upon debt to a larger extent. Relevant data

thousands of companies (the not very good ones) being dumped on the market. Consequently, share price have slumped. *The Economist*, February 8th 2003.

confirm a strong negative correlation between these two ratios, with a correlation coefficient of -0.93 in 2003.

Nevertheless, associated with the analysis on China's capital market structure, it is an alarming and worrisome issue that more and more listed companies started switching to the credit market to raise investment funds. Some economists believe that listed companies in general are operating with a rather low liability/asset ratio, indicating a large potential capability of increasing debt financing. They argue that the moderate usage of debt financing is a healthy sign for good financial management ability. In addition, from the view of banking sector, listed companies are presumably more prudential in project selection and implementation based on the consideration of efficient supervision from both insiders and outsiders. Thus, increasing bank credits allocation to listed companies would reduce the credit risk and improve the quality of bank assets.

However, more concerns have been raised against the abuse of bank credits by listed companies. This issue can be illustrated from two aspects. First, the increasing proportion of bank credits in total investment funds reflects the development of China's stock market has slowed down, particularly in terms of the market scale expansion. The public investors' confidence and enthusiasm on stock market have been seriously undermined by a number of crucial problems remained unsolved for a long time, such as the divergence of share price for different type of shares, majority of non-tradable state shares and poor operating performance. Second, since bank credit is assigned by banking sector directly to individual firms, unlike issuing shares in stock markets, there is no need for listed companies to publicise the purpose and use of credits to individual investors. Hence, it is difficult for outside shareholders to investigate and monitor the use and performance of bank loans. This phenomenon raises the concern about the final destination of these funds. Since 2003, it has been seen that there is an increasing number of listed companies seeking some professional financial institutions to manage their funds. There is a high probability that these companies attempted to invest in stock market with their raised funds chasing for a higher return. Undoubtedly, a large amount of these investment funds are bank loans. By this means, bank assets eventually enter the stock market pursuing the speculative activities under the disguise of project investment loans, despite the state supervision

and administrative department firmly prohibits the bank assets enter stock market directly. In these circumstances, it has been argued that the listed companies increasing their bank credits would provoke the risk and instability of financial sector, particularly of the banking sector, and will trigger the financial crisis in certain extreme situation.

Second, if equity financing has been significant part of overall financing, it could also be expected that the listed firms (mainly SOEs) would have a lower liability/asset ratio than SOEs taken as a whole. Due to concerns on data availability, this study solely focuses on comparing listed companies from the industrial sector with overall state-owned industrial firms. Additionally, as the majority of China's listed companies are from industrial sector, with a small amount coming from the service sector such as real estate development, tourism, transportation and finance, in these circumstances, the focus on industrial firms is appropriate.

Aggregated data for all industrial SOEs in 2003 are available from China Statistic Yearbook (2003, p.433-34), while the data of listed firms are sourced from the online database acknowledged earlier. In order to take these data comparable, we first removed the non-industrial listed firms from the calculation. According to the classification criteria of three economic sectors, industrial sector includes four sub-sectors: mining, manufacturing, energy provision and construction. Each of them can be further detailed into several market segments. Provided that a number of listed companies run business in numerous sectors of the economy simultaneously, whether include or exclude a listed firm is not always a clear-cut matter. Nevertheless, the listed companies and the corresponding information have been classified clearly into each economic sector based on the unified criteria. Therefore, 937 listed companies were retained after the filtering.

According to Laurenceson and Chai (2003), it is necessary to distinguish the productive and non-productive assets prior to the analysis of any financial ratios derived from or associated with assets. This is because non-listed industrial SOEs provide a variety of services to workers and their families such as nurseries, schools and hospitals. In the process of listing, these non-productive assets are removed from firm's books. In other words, the list companies' assets are counted for productive

components; while assets of overall industrial SOEs displayed in statistic yearbook include both productive and non-productive components. Consequently, removing the non-productive components from overall industrial SOEs assets is a crucial step to guarantee the comparability between listed and non-listed firms. However, the information on accurate amount for industrial SOEs' non-productive assets is not accessible. Hence, several researchers investigated the approximate percentage of the non-productive assets. Among them, Jefferson, Rawski and Zhang (1996) estimate the percentage of industrial SOEs' assets not used for industrial production was around 18. Xu and Wang (1997) state that such non-productive assets account for 25-50 percent of the to-be-listed firm's total assets. In this study, the arbitrary figure of 25 percent has been used for simplicity. After undertaking the data adjustment steps, the estimated average liability/asset ratio of listed industrial firms was 50.4 percent in 2003, compared with the 78.5 percent for overall industrial SOEs. Therefore, this result supports the view that external equity financing has been a significant source of funding for listed companies and useful in terms of reducing their reliance on debt finance.

3.4.2.2 Corporate governance effect

To gauge the corporate governance effects of China's stock market, the ideal measurement is the listed companies' productivity of capital. Due to the unavailability of the necessary data, computing the profitability is the most relevant and suitable alternate. Considering one of the essential objectives of transforming SOEs into listed companies is to make them more responsible for their own profits and losses, we calculated the net profit/asset ratio for each industrial listed company. In order to make a comparison with the ratio of other companies with different types of ownership, we used the information of listed companies compiled at the end of 2002. There were 1085 listed companies issuing A-share only, 65 percent of which were operating in industrial sector. The average ratio of industrial listed companies' net profits/assets was 5.7 percent. In addition, 78 industrial firms, equivalent to 10.6 percent of the total industrial listed companies, made losses in 2002, yielding a negative net profit/assets ratio. The corporate governance impact of stock market appears comparable with that achieved by other industrial firms featuring various ownerships. The net profit/asset ratio for all industrial SOEs (including state-owned

and state-holding enterprises, non-productive assets have been removed) was 3.9 percent, 5.6 percent for collective firms, 6.5 percent for foreign funded firms and 5.2 percent for firms funded from investment sources based Hong Kong, Macao and Taiwan¹⁸.

Unsurprisingly, SOEs still achieved the lowest profitability among the various types of ownership enterprises given their poor corporate governance and lack of incentives. Xu and Wang (1997) point out that publicly-listed companies represent only a small subset of China's enterprises, a perhaps better performed group of enterprises which were chosen to be listed on the two stock exchanges. It is a prerequisite condition for a firm to attain a qualification of stock market listing that it must have been profitable for the previous three years. Based on an earlier survey undertaken on 40,000 state-owned industrial enterprises by Ministry of Finance (1999), it has been noticed that the financial conditions in nearly half of these enterprises fell short of the regulatory requirement for listing. Apart from the strict financial condition for IPOs, regulatory guidelines also specify that a listed company must achieve a rate of return on net assets of at least 10 percent when they are considering raising additional funds through the stock market. From this point of view, the listed companies should have been guaranteed with a higher profitability than SOEs. Thus, the net profit/assets ratio of listed industrial enterprises is undoubtedly higher than that of all state-owned industrial firms.

However, despite the short history of China's stock markets, the fact that over 10 percent of listed companies had a negative net profit/asset ratio indicates some serious corporate governance problems. In most recent years, more and more newly listed companies have been discovered making losses or predicted to be making losses soon after they successfully obtained funds from stock markets. In the first eight months of 2003, there 41 new listed companies successfully realised IPO in both Shanghai and Shenzhen Stock Exchanges. Nevertheless, more than half of these companies experienced a dramatic decline in their operating profit. The weighted average earning per share of these 41 enterprises was RMB0.0026, far below the average level of the whole market for the same period which was RMB0.123. In particular, South Airline

¹⁸ Figures are based on author's own computation by using the original data derived from China Statistic Yearbook, 2003, pp.432-434.

(*Nanfang Hangkong*) company announced a loss in its mid-term financial report seven days after the company was listed and its shares started being transacted on the stock exchange. The similar situation also exists in those listed companies raising additional funds through stock market. It is not news to realise that a large amount of raised funds from stock markets have been either left unused or misused. The actual investment activities of raised funds have been largely found different from the specification in prospectus of issuing equities. In these circumstances, due to the asymmetric information distribution, investors are the weakest and most vulnerable market participants.

Many scholars have been criticising the unsound supervision mechanism and primitive legal and accounting framework. Nonetheless, the fundamental problem in the case of China's stock market is that the high ownership concentration actually reflects the continuing dominance of state ownership in many listed companies. Dominant state ownership means that the traditional incentive problems SOEs facing with have not changed. As long as the state continues to be the primary shareholder, the corporate governance impact of 'insider' on firm's performance will be suboptimal. Furthermore, since the state-controlled shares cannot be legally traded, the influence of 'outsiders' is compromised and meaningless. The proportion of tradable shares to total outstanding shares can be employed to proxy the degree to which outsider influence occurs. By the end of 2004, the average ratio of tradable shares to total outstanding shares was 27.7 percent, while less than 8 percent of the listed companies whose ratio was greater than 50 percent. Thus, a market for corporate control is nonexistent for the overwhelming majority of listed companies. Because of the inefficient monitoring framework, managers faced limited threat of punishment for poor decision making from either 'insiders' or 'outsiders'. Thereby, what managers are most concerned about is to raise as much money as they can from individual shareholders; while they did not take enough responsibility on securing the investment funds, neither on maximising shareholders' profit.

3.4.2.3 Allocative efficiency effects

According to Bonser-Neal and Dewenter (1999), it is useful to estimate in a regression the various determinants of savings including stock market parameters against the rate

of savings in order to investigate the impact of stock markets on macroeconomic channels to growth. However, this approach in case of China cannot be used given that only annual data since 1991 are available for many of the required variables. In these circumstances, Table 3.5 exhibits the comparison between the saving mobilisation performance of China's stock market and that of financial institutions. Given the limited investment channels, saving money in financial institutions used to be the unique option for households to handle with their surplus income. Due to the establishment of stock market, part of household's savings have been apparently attracted by and transferred into stock market. Generally speaking, it is perceived that the expansion of stock market in terms of the scale of market would have influenced the financial institutions in absorbing household savings negatively. Though China's stock market has been growing rapidly, it remains a trivial source of savings mobilisation, indicating a marginal contribution to the capital investment, thereby of less importance to the economic growth.

Testing for the informational efficiency of stock prices revolves around examining whether stock prices behave in a manner implied by the Efficient Market Hypothesis (EMH). The EMH contends that if stock prices are efficient in an informational sense, they will rapidly adjust to new information and that current prices will fully absorb and reflect all available information (Fama, 1965). Empirical testing of the EMH involves testing whether current stock prices and returns can be predicted on the basis of past values. If stock prices are efficient then these variables should display a random walk process. Otherwise, the stock pricing mechanism can be considered inefficient because investors can theoretically achieve profits simply by utilising available information such as past prices.

In China's context, numerous empirical studies on the behaviour of stock prices in China have concluded that they do not follow a random walk process (for instance, among many others, Song *et al.*, 1998; Mookerjee and Yu, 1999; Ma and Barnes, 2001; Groenewold *et al.*, 2001; Laurenceson, 2002). In the worldwide research upon EMH, by using various sample data, including short-term intervals and long-term intervals of different stock markets, the majority statistical results indicated that the popular efficient market model does not seem to be supported by the statistical data (see, for instance, Geweke, 1980; Melino, 1980; Dybvig and Ingersoll, 1984; Marsh

Table 3.5: Saving Mobilisation Performance
--Stock Market vs. Financial Institutions

Unite: RMB100 million

	Stock Markets	% of change	Financial Institutions	% of change
1991	5.0		4066.4	
1992	94.1		5389.0	
1993	276.4	193.7	6159.0	14.3
1994	99.8	-63.9	10845.5	76.1
1995	85.5	-14.3	13209.7	21.8
1996	294.3	244.2	14889.0	12.7
1997	856.1	190.9	13819.1	-7.2
1998	889.3	3.9	13307.6	-3.7
1999	944.3	6.2	13081.0	-1.7
2000	2103.0	122.7	15025.5	14.9
2001	1251.9	-40.5	19812.8	31.9
2002	961.7	-23.2	27300.2	37.8
2003	1357.7	41.2	37138.2	36.0
2004	1510.9	11.3	32469.5	-12.6

Note: The data for stock market refer to the capital raised through A share issues on China's stock market. The data for financial institutions refer to the amount of new deposits in China's overall financial institutions. They are calculated as the change in outstanding year-end-balances.

Source:

1. Data from 1991 to 2002: *Almanac of China's Finance and Banking*, 2003; *China Securities and Futures Statistical Yearbook*, 2003.

2. Data of 2003 & 2004: *China Securities Regulatory Commission, online database*, <http://www.csrc.gov.cn/cn/statinfo/index.jsp>; *The People's Bank of China, online database*, <http://www.pbc.gov.cn/diaochatongji/tongjishuju/index2.asp>

and Merton, 1986; Frankel and Stock, 1987; LeRoy and Parke, 1988)¹⁹. However, some alternative interpretations have been asserted upon the variance between the actual prices and forecasted price, which include the influence of information about a major disaster, the disturbance of "rational bubbles" and the impact of business cycle on discount rates²⁰.

¹⁹ Rober J. Shiller (1989) has consolidated the various arguments asserted by these economists in his book *Market Volatility*, Part II The Stock Market.

²⁰ The essential element of rational bubbles (or near-rational bubbles) is that when prices are rising, many agents expect them to continue to rise, buy, and prices rise roughly in line with expectations, even though in some sense the price is already high. The discussion upon such possibilities is aroused by Blanchard and Watson (1983), Diba and Grossman (1988), Quah (1985), West (1987, 1988b) and Follid, Hodrick and Kaplan (1986). For further details, see Rober J. Shiller (1989), pp.96.

Given the fact that the actual stock price is weakly correlated with the forecasted price, a number of studies have used measures of stock price volatility to provide evidence against the efficient market models (Shiller, 1978; LeRoy and Porter, 1981). As a result, it has been identified that the volatility of stock price is too large to be justified in terms of information about future dividend, which is rather to be explained alternatively by the large movements of ex-ante real interest rates or the irrational market subject to fashions and fads (Shiller, 1989).

Moreover, Shiller (1989) highlights that the investor interaction (investor psychology) is a likely source of stock price volatility, while such argument seems to be beyond the statistical results achieved based on econometric techniques. In these circumstances, since there is no fundamental psychological principle for people's unpredictable and uncontrollable reaction, the stock price volatility seems hardly to disappear despite the time passed or research methodology improved (Shiller, 2003). Hence, in his study on behavioural finance, Shiller (2003) suggests that instead of keeping the presumption of efficient financial market in mind, it is more important for economists to understand and include the human foibles and arbitrary feedback relations into their analytical models.

Testing whether stock prices accurately reflect the economic fundamentals underlying a firm is conceptually more difficult. Using the degree of stock price volatility, Singh (1997) asserts that if stock prices are driven by speculative motives and herding behaviour, they will be highly volatile and represent inefficient signals for capital flows in the economy. The stock exchanges in Shanghai and Shenzhen have been highly volatile, while price bubbles are not a rare phenomenon. Before the daily oscillation of composite price index and individual share price had been restricted within the magnitude of 10 percent, Shanghai's composite price index once experienced doubled in a single day in 1994.

Xu and Wang (1999) also note that the speculative nature of shareholding in China amongst individual investors is apparent by the fact that the average period for which they held shares was just 1-2 months, which compared with 18 months in U.S. stock market. Many researchers have expressed the view that stock prices are excessively volatile in the sense that they often reflect speculative activities rather than the

Table 3.6: Stock Market Volatility in China: a comparative perspective

	China	Brazil	India	Hungary
1993	26.2	11.1	8.7	31.1
1994	42.7	31.1	8.5	24.0
1995	11.9	12.3	5.5	14.9
1996	10.7	6.0	8.3	11.9
1997	8.6	12.2	7.1	7.5
1998	6.3	17	8.2	12.5
1999	11.1	10.3	9.0	8.9
2000	9.78	12.7	8.5	11.9
2001	4.7			
2002	5.6			
2003	6.9			
2004	7.4			

Note:

1. Volatility is measured by calculating the standard deviation of the monthly percentage change in the respective country's share price indices.
2. The blank space signifies that data were unavailable.

Source: Data before 2000: *Emerging Stock Market Factbook*, various issues. Data of China's stock market: author's calculation based on online stock market information, <http://datainfo.stock.hexun.com>

economic fundamentals of listed firms (Spencer, 1995; Mookerjee and Yu, 1999). A number of researchers, such as Spencer (1995), Yao (1998) and Laurenceson and Chai (2003), further examine the effect of state-controlled shares on share prices volatility and conclude that the non-tradable state-shares worsen the degree of share price volatility. When only a small proportion of a company's total shares are available for trading, share prices cannot reflect the market's view of the fundamental value of a listed firm.

However, it should be pointed out that this volatility does appear to have declined in the most recent years. Table 3.6 shows that the standard deviation in the Shanghai composite share price index (calculated on the basis of monthly observations) fell from a high of 42.7 in 1994 to 4.7 in 2003. Moreover, it is also informative to compare the Chinese experience with other large transitional economies to measure the extent of volatility in China's stock market. Therefore, Table 3.6 also exhibits the stock market volatility in China, Brazil, India and Hungary. Stock markets in all these transitional economies, except the one in India, experienced a volatility declining process in 1990s. Comparatively, China's stock market was initially volatile while this

situation has improved since 2001, which mainly attributes to the state government's vigorous actions against the speculative activities, including the inspection and restriction upon bank loans entering stock market.

3.5 Summary

This chapter reviewed China's financial reform process, mainly focusing on the banking sector and security market. As far as the banking sector reform is concerned, not only the earlier structural change was surveyed, but also the measures undertaken to standardise the commercial bank's operation have been highlighted.

Before undertaking the survey on China's banking sector reform and stock market development, we briefly highlighted two major components in China's economic reform process – price liberalisation and enterprises corporatisation. Being as a market-socialist economy, China has not yet completely lifted control over price setting though the Soviet pricing system no longer exists. Meanwhile, state ownership remains in large SOEs despite the rapid establishment of small and medium-scale private companies, in which circumstances the soft budget constraint is still widely applied.

Despite the rapid expansion of market capitalisation putting it among the ten largest stock markets in the world, China's stock market appears to convey more historical significance than economic sense over a decade after its official launch. Especially the historical problems remained unsolved which substantially offset the benefits of the stock market. Following the chronological review of the banking sector reform, the last section in this chapter mainly examined the influence of China's stock market in descriptive analyses, which have been illustrated from three aspects: corporate financing effect, corporate governance effect and allocative efficiency effect.

Chapter 4: Methodology and Data description

4.1 Introduction

The research question of this thesis is to investigate the financial-growth nexus in the context of China, which will be explored from two aspects. The methodological approach is to estimate the econometric models by using secondary data. In the first estimated model, financial sector, specifically in terms of banking sector, will be taken into account as an extra input factor in the conventional production function. This is followed by the Granger causality test by using monthly time-series data from China's stock market.

Section 4.2 illustrates three empirical research technique adopted in this study – error correction model, panel data analysis mechanism and Granger-causality test. Section 4.3 exhibits the data source and different types of data, including the raw/original data, manipulating data and derived variables. Section 4.4 mainly discusses the validity and reliability of using secondary data, while analysing the shortcomings in China's statistical data, which is followed by the concluding section 4.5.

4.2 Methodology

4.2.1 Error correction model (ECM)

In typical economic time series data, 'level' equations estimated with least squares frequently have an error structure that is not covariance stationary. A non-stationary error structure is generally associated with relationships estimated by using highly trended variables. Variables containing a time trend tend to produce very high correlations with each other. Relationships among highly trended variables, however, are typically meaningless in terms of discovering causal links. A sufficient condition for the error structure to be stationary is that all the variables in the equation be stationary.

The relationship between co-integration and ECM, first presented by Granger (1981), has been extensively developed by Engle and Granger (1987) on more specific estimation procedures and testing. In practice, researchers first use unit root tests to determine the order of integration of the raw data series. Second, run the cointegrating regression suggested by economic theory. Third, apply an appropriate unit root test to the residuals from this regression to test for cointegration. Fourth, if cointegration is accepted, use the lagged residuals from the cointegrating regression as an error correction term in an ECM. Unfortunately, Monte Carlo studies have shown that estimates of the cointegrating regression have considerable small-sample bias, in spite of excellent large-sample properties, and have suggests that the fourth step above be replaced by estimation of the full ECM equation, i.e. it is better to estimate the long-run relationship jointly with the short-run dynamics rather than to estimate it separately (Kennedy, 1998, p.270).

One well-known method of attempting to deal with non-stationarity is to transform each variable from its level to its change form. Rate of changes are much more volatile than levels and consequently more difficult to explain using variables that have no causal link with the dependent variable (Malley, 1990).

The innovation of the ECM approach is to employ a specification that uses a combination of growth rates and levels while simultaneously attempting not to violate the basic set of assumptions in regression analysis. Equations estimated in this manner allow the relevant economic theory to enter the formulation of long-run equilibrium in levels (captured by one or more error-correction terms) while the short-run dynamics of the equation are determined by growth rates. The form of a simple dynamic specification in two variables with an ECM is as follows:

$$\Delta y_t = \alpha + \beta \Delta x_t + \gamma (y_{t-1} - \delta x_{t-1}) + \varepsilon_t \quad (4.1)$$

where y and x are measured in logarithms;

Δ = first difference operator, that is $\Delta y_t = y_t - y_{t-1}$, representing the growth rate;

α = constant term;

ε_t = stochastic disturbance term, which is jointly dependent on the distributions of y and x .

Eq. 4.1 the ECM representation of the original specification; the last term is the error-correction term, interpreted as reflecting disequilibrium responses. The terminology can be explained as follows: if Δy_t starts to grow at a rate that is inconsistent with its long-run steady-state growth path, then the ECM acts to pull it back on track. Δy_t might deviate from its long-run growth rate, for example, if there were a series of extremely large random disturbances or a systematic effect of a missing variable(s) not specified in the long-run solution. The ECM has this corrective effect because its coefficient is negative ($-1 < \gamma < 0$ for stationarity). For example, as y_{t-1} becomes larger (smaller), the value taken by the term $(y_{t-1} - \delta x_{t-1})$ become larger (smaller), but this value is then multiplied by the negative coefficient (γ), which has the effect of lowering (raising) Δy_t .

According to Malley (1990), there are two major advantages of the dynamic specification with an ECM. First, it allows the researcher to make a distinction between short-run dynamics and long-run equilibrium. ECM forms allow the short-run dynamics to be determined by the data. In addition, sensible long-run equilibrium conditions can be directly imposed on the equation. Second, these specifications tend to lead to forecasts that display little tendency systematically to over-predict or under-predict the variables of interest. This is because they are estimated in growth rates of dependent and some of the independent variables, which is typically sufficient to obtain white noise residuals.

Given its powerful advantages, in this research work (Chapter 5), ECM will be first employed to investigate the economic growth pattern in the context of China by using the annual aggregated data covering the time period from 1952 to 2003. Particularly, the right-hand side terms will be expanded by introducing more explanatory variables with their time lags according to the economic theory.

4.2.2 Panel data analysis mechanism

4.2.2.1 Benefits and reasons for using provincial-level panel data

The financial-economic growth relation has been widely tested by using cross-section and time-series panel data (see, for example, Ram, 1999; Levin and Renelt, 1992; Odedokun, 1996; Leahy *et al.*, 2001). Panel data analysis permits the researcher to study the dynamics of change with relatively short time series. The combination of time series with cross-sections can enhance the quality and quantity of data in ways that would be impossible using only one of these two dimensions (Gujarati, 2003, p.638). However, not many research studies have been done within China's context. In contrast to most other empirical analyses on the nexus between financial development and economic growth, which were carried out in a cross-country setting, this study uses provincial-level panel data.

The main reasons for using cross-province and time-serial data are as follows. Compared with the cross-country studies, using provincial data is able to increase the probability of homogenous data compilation methodologies (Aziz and Duenwald, 2002). Undoubtedly, the use of provincial-level data expands the sample size considerably. Even if China's annual data collected from 1949 when the nation was officially founded, the time-span from 1949 till the most recent year will yield a 54-observation study sample. When using provincial-level data, the sample size substantially expands by 10 times, yielding over 550 observations given 31 provinces, autonomous regions and municipalities ranging from 1984 to 2002.

The plausibility of applying panel technique in China's context mainly stems from the following considerations. First, in such a huge country as China, many provinces are even larger than many medium-sized countries in the world in terms of geographical and population size. In addition, the provincial economic experiences vary over the nation, which has generally been noticed that the coastal area is more prosperous and developed than the interior regions while the substantial disparity has tended to widen gradually.

Second, the stability feature of the banking system and labour market provide the preconditions for establishing a data sample combined with cross province and time-series. Due to the regional residence control system, a worker is restricted to work in the province/city where (s)he was born, which largely constrain the labour force mobility. Hence, the growth of regional labour force is relatively steady. China's

banking system has been similarly segmented since the credit allocation is also region-oriented: companies are not allowed to borrow money across provinces/cities. As banks are the major financial intermediaries channelling investments funds to enterprises, the segmentation of banking system on provincial level results in a rather stable growth of credit allocation.

Based on the above considerations, this cross-province study in the context of China is analogous to a cross-country study of medium-size countries: the nation can be regarded as 30 relatively independent provinces, where the individual feature of each province has particular influence over its own economic performance. For this reason it is reasonable to treat each province as an ‘observation’ and to explore the links between growth and financial development at the provincial level.

4.2.2.2 Drawbacks of present provincial-level data

Though in recent years, a number of scholars conducting a series of studies on China basis also used provincial and time-specific data (Aziz and Duenwald, 2002; Liu and Li, 2001), they didn’t establish or update their dataset on all China’s provinces. It is partly because of the inconsistency and insufficiency of data availability. For instance, Liu and Li (2001) excluded five provinces (Shanghai, Fujian, Guangxi, Sichuan and Tibet) out of total 30 provinces (actually should be 31)¹ from the regression analysis because the time series data of investment of these five provinces were insufficient (p.257). As a result, their panel study used the annual data of 25 provinces between 1985 and 1998 for all provinces estimation only yielding 350 observations in total.

Similarly, Aziz and Duenwald (2002) used a provincial level dataset first compiled by Zhao (1998) and later updated by them. They explained that it was because the problem of limited information on financial variables that they could only conduct an analysis with a dataset covering 27 provinces from 1988 to 1997 (270 observations in total). Meanwhile, the short time span of the data is another major shortcoming of their study.

¹ By the year when Liu and Li published their paper, there should be 31 administrative regions in China, including 27 Provinces and four Direct Administrative Municipality (Beijing, Shanghai, Tianjin and Chongqing that are under the direct control of State Government). The political status remains the same over all these regions.

4.2.2.3 Panel analysis model

Given the different consideration upon the issue whether the unobserved effect is uncorrelated with the explanatory variables, the panel data models can be identified as fixed effect model (FEM) and random effect model (REM). This can be interpreted as the following regression function:

$$y_{it} = x_{it}\beta + c_i + u_{it}, \quad t = 1, 2, \dots, T \quad (4.2)$$

where x_{it} can contain observable variables that change across t but not i , variables that change across i but not t , and variables that change across t and i . c_i is the unobserved effect (sometimes called individual effect). The u_{it} are called the idiosyncratic disturbances as they change across t as well as across i .

In modern econometric applications, the term ‘random effect’ is synonymous with zero correlation between the observed explanatory variables and the unobserved effect: $\text{cov}(x_{it}, c_i) = 0, t = 1, 2, \dots, T$; while the terminology ‘fixed effect’ means that c_i is allowed to be correlated with x_{it} .

In REM analysis, c_i is put into the error term by assuming (a) strict exogeneity of all explanatory variables (including unobserved variable): $E(u_{it} | x_{it}, c_i) = 0, t = 1, \dots, T$ and (b) x_{it} are always fixed and generally include an intercept term and c_i is independent of x_{it} : $E(c_i | x_{it}) = E(c_i) = 0$. Under these assumptions, the random effects approach exploits the serial correlation in the compound error, $v_{it} = c_i + u_{it}$, in a generalised least squares (GLS) framework. Eq. 4.2 can be re-written as

$$y_{it} = x_{it}\beta + v_{it}$$

where $E(v_{it} | x_{it}) = 0, t = 1, 2, \dots, T, v_{it} = c_i + u_{it}$.

Based on the assumption that the conditional variances are constant ($E(u_{it}^2) = \sigma_u^2, t = 1, 2, \dots, T$), the conditional covariances are zero ($E(u_{it}u_{is}) = 0, \text{ all } t \neq s$) and a homoskedasticity assumption on the unobserved effect c_i ($\text{var}(c_i | x_i) = \text{var}(c_i)$), the implementation of a feasible GLS procedure is valid and reliable to estimate the coefficient β effectively.

In many empirical applications, the whole point of using panel data is to allow for c_i to be arbitrarily correlated with the x_{it} . This approach is FEM estimation. However, we cannot include time-constant factors in x_{it} , because there would be no way to distinguish the effects of time-constant observables from the time-constant unobservable c_i if c_i could have been arbitrarily correlated with each element of x_{it} (Wooldridge, 2002, p.266). In these circumstances, the FEM view the c_i as parameters to be estimated along with β .

In order to estimate each c_i along with β , one possibility is to define N dummy variables for each cross section observation: $dn_i = 1$ if $n = i$, $dn_i = 0$ if $n \neq i$. Then run the OLS regression

$$y_{it} \text{ on } d1_i, d2_i, \dots, dN_i, x_{it}, \quad t = 1, 2, \dots, T; i = 1, 2, \dots, N \quad (4.3)$$

Then, \hat{c}_1 is the estimated coefficient on $d1_i$, \hat{c}_2 is the estimated coefficient on $d2_i$, and so on. The estimator of β obtained from estimated system 4.3 is the fixed effect estimator. One benefit of using system 4.3 is that it produces the appropriate estimator of variance of residuals σ_u^2 because it uses $N(T-1) - K$ as the degree of freedom, where K is the number of regressors.

Since the key consideration in choosing between a random effects and fixed effects approach is whether c_i and x_{it} are correlated, it is important to have a method for testing this assumption. Hausman (1978) proposed a test based on the difference between the random effects and fixed effects estimates. Since FEM is consistent when c_i and x_{it} are correlated, but REM is inconsistent, a statistically significant difference is interpreted as evidence against the random effects assumption $E(c_i | x_{it}) = E(c_i) = 0$.

According to Wooldridge (2002, p.290), it is often easier to use an F statistic version of the Hausman test for testing more than one parameter. Let w_{it} denote a $1 \times M$ subset of time-varying elements of x_{it} (excluding time dummies). Then consider the extended model

$$\tilde{y}_{it} = \tilde{x}_{it}\beta + \dot{w}_{it}\xi + error_{it}, \quad t = 1, 2, \dots, T; i = 1, 2, \dots, N \quad (4.4)$$

where \tilde{x}_{it} and \tilde{y}_{it} are the quasi-demeaned data², \tilde{w}_{it} is the time-demeaned version of w_{it} and ξ is a $M \times 1$ vector. The Hausman test can be implemented by testing $H_0 : \xi = 0$ using standard OLS analysis. The simplest approach is to compute the F statistic. The restricted sum of squared residuals (SSR_r) is obtained from the OLS regression \tilde{y}_{it} on \tilde{x}_{it} that can be used to obtain $\hat{\beta}_{RE}$; while the unrestricted sum of squared residuals (SSR_{ur}) comes from the estimation of regression 4.4. Then the F statistic is

$$F = \frac{(SSR_r - SSR_{ur})}{SSR_{ur}} \cdot \frac{(NT - K - M)}{M}$$

Under H_0 , F can be treated as an $F_{M, NT-K-M}$ random variable due to $M \cdot F \overset{a}{\sim} \chi_M^2$ ³.

The statistical inference is: if F is smaller than the critical value (say, at the 5 percent significant level), indicating there is practically small differences between the random effects and fixed effects estimate, it is possible to reject the null hypothesis. In the opposite case, the Hausman statistic fails to reject given the seemingly large differences between the random effects and fixed effects estimates. In the latter situation, it is plausible to conclude that the random effects assumptions hold and to focus on the REM estimates.

These estimated and hypothesis testing procedure will be thoroughly applied to the empirical study in this research in Chapter 6 based on a consolidated panel data set covering 30 provinces and 18 years in the context of China.

4.2.3 Granger-causality test

The financial-economic growth nexus will also be examined by using the Granger-causality test in Chapter 7. The essential advantage of this method is to identify the direction of financial sector development and economic growth, i.e. the role of financial development in economic growth process – supply-leading or demand-following. Similarly, in most of the existing empirical researches, the Granger-

² Quasi-demeaned data refer to the random effects estimator is obtained by a quasi-time demeaning: rather than removing the time average from the explanatory and dependent variables at each time t, random effects removes a fraction of the time average (Wooldridge, 2002, p.287).

causality test has been applied to a number of cross-country studies rather than focusing on a single country. Moreover, China's financial market development is rarely included into such cross-country studies. Therefore, it is worthwhile inspecting the direction of financial-economic growth relationship in China's context.

Causality in the sense defined by Granger (1969) and Sims (1972) is inferred when lagged values of a variable, say x_t , have explanatory power in a regression of a variable y_t on lagged values of y_t and x_t . The vector autoregression (VAR) can be used to test the hypothesis. That the unrestricted equations have identical regressors means that these tests can be based on the results of simple OLS estimates. The notion can be extended in a system of equations to attempt to ascertain if a given variable is weakly exogenous to the system. If lagged values of a variable x_t have no explanatory power for any of the variables in a system, then we would view x as weakly exogenous to the system. This specification can be tested with a likelihood ratio test or with a form of F test constructed by stacking the equations.

Tests of the restrictions can be based on simple F tests in the single equations of the VAR model. In Sims approach (1972), Granger causality relationship is expressed in two pairs of regression equations by simply twisting independent and dependent variables as follow:

$$X_t = \alpha_0 + \sum_{i=1}^{k_1} \alpha_i X_{t-i} + \sum_{i=1}^{k_2} \beta_i Y_{t-i} + \varepsilon_t \quad (4.5a)$$

$$Y_t = \gamma_0 + \sum_{i=1}^{k_3} \gamma_i Y_{t-i} + \sum_{i=1}^{k_4} \delta_i X_{t-i} + v_t \quad (4.5b)$$

$$X_t = \alpha_1 X_{t-1} + \alpha_2 X_{t-2} + \dots + \alpha_i X_{t-i} + \varepsilon_t \quad (4.5c)$$

$$Y_t = \gamma_1 Y_{t-1} + \gamma_2 Y_{t-2} + \dots + \gamma_i Y_{t-i} + v_t \quad (4.5d)$$

Equations (4.5a) and (4.5b) are called unrestricted, (4.5c) and (4.5d) restricted. In this study, X denotes an indicator of stock market development, Y denotes economic growth and the subscripts t and $t-i$ denote the current and lagged values respectively. Hsiao (1981) suggests searching over the lag lengths (k_1 to k_4) and applying an information criterion to determine the optimal length of the lag structure.

³ For detailed analysis, please refer to Wooldridge (2002), p.286-287.

We used the two most common choices of information criteria: Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC).

According to Granger's definition of causal relationships:

$$Y \text{ does not cause } X, \text{ if } \beta_1 = \beta_2 = \dots = \beta_i = 0 \quad (4.6)$$

$$X \text{ does not cause } Y, \text{ if } \delta_1 = \delta_2 = \dots = \delta_i = 0 \quad (4.7)$$

In order to judge whether these conditions hold, Sims employ the following joint-significance test—F-statistic against the selected coefficient restrictions applied to Eq.4.5a and Eq.4.5b relative to Eq.4.5c and Eq.4.5d:

$$F = \left[\frac{(R_{UR}^2 - R_R^2) / m}{(1 - R_{UR}^2) / (n - 2m - 1)} \right]$$

where:

R_{UR}^2 is the coefficient of determination of unrestricted equation;

R_R^2 is the coefficient of determination of restricted equation;

n is the number of observations;

m is the number of lagged periods.

With Sims test, the direction of causality is judged as follows:

The result of F-test	Direction of Causality
a) (4.6) holds, (4.7) does not hold	X causes Y ($X \rightarrow Y$)
b) (4.6) does not hold, (4.7) holds	Y causes X ($Y \rightarrow X$)
c) Both (4.6) and (4.7) hold	Feedback between X and Y ($X \leftrightarrow Y$)
d) Neither (4.6) nor (4.7) holds	X and Y are independent

For the purpose of generality, it is useful to write the VAR in the multivariate regression format, partitioning the two data vectors y_t and x_t into $[y_{1t}, y_{2t}]$ and $[x_{1t}, x_{2t}]$, where x_1 is lagged values of y_1 and x_2 is lagged values of y_2 . The VAR with this partitioning would be

$$\begin{bmatrix} y_1 \\ y_2 \end{bmatrix} = \begin{bmatrix} \Gamma_{11} & \Gamma_{12} \\ \Gamma_{21} & \Gamma_{22} \end{bmatrix} \times \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \end{bmatrix}, \quad \text{Var} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} = \begin{bmatrix} \Sigma_{11} & \Sigma_{12} \\ \Sigma_{21} & \Sigma_{22} \end{bmatrix}.$$

The unrestricted maximum likelihood estimates can still be obtained by least squares regressions. For testing Granger causality in the VAR model, the hypothesis $\Gamma_{12} = 0$ is of interest. In these circumstances, the hypothesis can be tested using the likelihood ratio statistic. Testing procedure based on a Wald-test rationale starts from computing (Greene, 2003, p.593):

S_{11} = residual covariance matrix when current values of y_1 are regressed on values of both x_1 and x_2

$S_{11}(0)$ = residual covariance matrix when current values of y_1 are regressed only on values of x_1

The log-likelihood ratio statistic is $\lambda = T(\ln|S_{11}(0)| - \ln|S_{11}|)$, where T is the sample size. The statistic would have a limiting χ^2 distribution with degrees of freedom equal to the number of restrictions.

It is well known that an F test for the null hypothesis that some parameters of a model are jointly zero in a stable VAR model is not valid when the variables are integrated. Zapata and Rambaldi (1997) argued that, in the presence of one cointegrating vector, “the two-step procedure introduced by Engle and Granger (1987) was all that was needed to test to no-causality hypothesis”. On the other hand, they noted that “the dimension of the cointegration space complicates this testing problem considerably” (p.285). Furthermore, Toda (1994) and Ho and Sorensen (1996) suggested limitations of the ability of the Johansen and Juselius (1990) likelihood ratio test to detect long-run economic relationships.

To minimise these problems, we use the procedure developed by Toda and Yamamoto (1995) that is a modified Wald test of restrictions on the parameters of a VAR(k) model. This MWALD test statistic has an asymptotic χ^2 distribution in a VAR($k + d_{\max}$), where d_{\max} is the maximal order of integration suspected in the system. They argued that the test does not require knowledge of the cointegration properties of the system and can be applied when there is no cointegration. Further, it can be used when stability and rank conditions are not satisfied provided that the order of integration of the process does not exceed the true lag length of the model.

Ideally, the Granger-causality test technique could be applied to the entire financial market, including banking sector and stock market, which will provide a rather complete perception on this issue. Given the data limitation of the banking sector indicators, Granger-causality test is hardly applied to the whole financial market.

Nevertheless, it is still a good attempt to apply the stock market data to Granger-causality test in order to identify the role of stock market in China's economic growth.

4.3 Data description

In this study, we have tried to compile a 'complete' dataset from every available and accessible information sources to avoid the drawbacks of limited number of observations. Before we carry out the precise technical operation and analysis, the major task is to seek the accurate variables according to our specific requirements. However, not every variable for conducting the regression function is available immediately. Most of them need to be collected, manipulated and rearranged to meet the criteria of the model specification.

The variables adopted in this empirical work can be sorted into three different categories: raw/original data, estimated data based on a certain mechanism and technique and derived variables. The base data are mainly abstracted from a number of statistical yearbooks published by the National Bureau of Statistics of China (NBSC). These statistical yearbooks as data sources are listed in Table 4.1. As the data in each yearbook were actually the values of the preceding year, the time range of the employed data for the final empirical work stopped at 2003.

4.3.1 Raw/original data

The original data taken out from various statistical yearbooks directly include GDP, Labour Employment, Bank Loans, Depreciation Rate for Fixed Assets and Investment in Fixed Assets.

4.3.1.1 GDP and Labour Employment

In Statistical Yearbook of China, GDP and labour employment statistics are compiled and published on an annual basis. Therefore, these two items are simply collected from the yearbook directly. In particular, GDP and Labour Employment are collected on both aggregated level and industrial level, i.e. the Primary Industry, the Secondary

Table 4.1: Summary of data source

Yearbook title	Volume series available ⁴
Statistical Yearbook of China (<i>Zhongguo Tong Ji Nian Jian</i>)	1981-2004
Statistical Yearbook of individual provinces	Available volumes for different provinces vary and being discontinuous. Volumes of 1999-2004 are mainly referred.
China Statistical Yearbook on Investment in Fixed Assets (<i>Zhongguo Gu Ding Zi Chan Tou Zi Tong Ji Nian Jian</i>)	1995-2004
Almanac of China's Finance and Banking (<i>Zhongguo Jin Rong Nian Jian</i>)	1989-2004
Almanac of China's Population (<i>Zhongguo Ren Kou Tong Ji Nian Jian</i>)	1987-2004
China securities and futures statistical yearbook (<i>Zhongguo Zheng Quan Ji Huo Tong Ji Nian Jian</i>)	1995-2004

Industry and the Tertiary Industry. For simplicity, we label each of these variables as GA, GM and GS, LA, LM and LS, representing the GDP and Labour employment of each industry respectively.

4.3.1.2 Three Industrial Sectors in China

The statistics on the three industrial sectors are compiled according to the stipulation in the Report on Establishing Statistics of the Tertiary Industry by State Statistical Bureau, which was issued by the General Office of the State Council in April 1985.

The three sectors are shown as follows:

- The primary sector: Agriculture, including forestry, animal husbandry, and fishery.
- The secondary sector: Industry, including extraction, manufactory, piped water, electric power, steam, heat water, and gas
- The tertiary sector: all the industries except for the primary and secondary industries above.

4.3.1.3 Bank Loans and Bank Deposits

Bank Loans (BL) and Bank Deposits (BD) are complete and straightforward items taken from *Almanac of China's Finance and Banking* and *China's Statistic Yearbook for 50 Anniversary (1949-1998)*, but only for the period 1984-1997 rather than the full sample period. Since 1998, the statistic data of BL and BD have been counted on a broader level compiled in the national statistic yearbook which resulted in a larger value of BL and BD consequently.

According to the definition from People's Bank of China, State Banks (SB) include People's Bank of China, Industrial and Commercial Bank of China, Agriculture Bank of China, Bank of China, Construction Bank of China, National Development Bank, Import-Export Bank of China, Agriculture Development Bank of China, Communication Bank of China, CITIC Industrial Bank, Saving deposit agencies of postal office. China's Overall Financial Institutions (OFI), on the other hand, is a broader concept that includes housing saving bank, urban credit cooperative banks, rural credit cooperatives, urban credit bank, financial trust investment agencies and financial companies apart from State Banks.

Under the full supervision and administration of State Government, foreign banks and financial institutions set up their branches and/or representative offices in a number of major cities in China. Nevertheless, they have been strictly excluded from operating the domestic-currency-related business in any occasions, neither taking deposits nor granting loans⁵. Following-the-clients motivation is one of their major market-entering strategies. Their target customers, thus mainly focus on those multinational enterprises from their own countries operating in China. In these circumstances, the impact of foreign banks and financial institutions is rather minor or irrelevant to the domestic financial sector in terms of the effect on financing the domestic corporations.

In this empirical study, we aim at investigating the role of domestic financial sector in China's economic development process. Correspondingly, we only take the domestic

⁴ The available volumes of these yearbooks are those series have been published till the date when the data collection work was undertaken and completed.

financial institutions into account and do not pay much attention on the performance and their influence of foreign banks and financial institutions on the empirical study level.

Generally speaking, approximate 80 percent of the loans in China's financial market are generated from State Banks. It will not cause too much difference whether we should use the data of SB or of OFI (on the national level) as long as the data consistency is ascertained for the sample period. As we mentioned above, BL and BD statistic from SB are only available from 1984 to 1997, while the statistic from OFI did not ever exist during the same period. However, the information on SB ceased publishing in *Almanac of China's Finance and Banking* in 1998 without any explicit reason or explanation, which has been entirely substituted by the statistic of OFI. This situation happened not only on the aggregated level, but also on the provincial level. Nevertheless, part of the provincial BL and BD data from SB can be found in the local statistical yearbook of each individual province.

Under the consideration of general advantages and disadvantages, BL and BD statistics of SB from 1984 to 2003 have been selected. It should be noted that the BL and BD figures of the following nine provinces for 1999-2003 are unavailable, which has been replaced by BL and BD of OFI (on the province level): Liaoning, Jilin, Heilongjiang, Zhejiang, Anhui, Guangxi, Sichuan, Guizhou and Tibet. Therefore the sample data eventually adopted to conduct the statistic testing are estimated by the author. The idea behind this estimation is to average the ratio of BL and BD of SB over the one of OFI when both of these two items are available. Then this average ratio multiplies the BL and BD of OFI of those nine provinces and yields the BL and BD value of SB. Correspondingly, the concept of 'Banks' in this thesis rather refers to the SB except for the interpretation in particular circumstances.

4.3.1.4 Depreciation rate

Since the value of capital stock is not an explicit statistical item, the adopted capital stock data are derived by the author based on the rationale of dynamic equilibrium of

⁵ The operation of RMB-related business with foreign enterprises opened to the foreign financial institution in 2002 as trial, but only constrained to those enterprises banking in a small number of cities

capital stock that can be interpreted into the equation: $K_t = K_{t-1} - \delta K_{t-1} + I_t$, where δ is the depreciation rate of fixed assets.

The annual depreciation rate from 1980 to 1992 was reported in the Chapter of General Survey in *Statistical Yearbook of China, volume 1993*. This rate has been applied to the overall nation. Hence, the capital stock since 1980 can be simply calculated by adopting the values of depreciation rate and investment for each industry of individual province. The depreciation rate has been replaced by the actual depreciation value of Fixed Assets for each individual province since 1993. The depreciation value needs to be deflated and transformed into the constant price of 1984 before it is applied to the computation of Capital Stock.

4.3.1.5 Investment in Fixed Assets

An essential input factor of production function is the capital stock. Since this item could not be found explicitly from any China's statistical sources, neither on aggregated level nor on provincial level, the estimation process starts from finding out the accurate value of each determinant factor of the calculation of capital stock. It is obvious that the investment in fixed assets (IFA) is one of the key issues. In general, IFA is the amount of work done to build and purchase fixed assets in the monetary form during a certain period. It is computed at estimated prices according to the actual progress of project. It excludes the values of the building materials that have not yet been used in the bodies of project, of the advances for projects, and of the equipment that needs installation but has not yet been installed⁶. The provincial data of IFA compiled and published by NBSC are available from *China Statistic Yearbook on Investment in Fixed Assets, 1950-1995* and annual volume from 1996 to 2004.

4.3.2 Estimated data

including Shanghai, Tianjin, Shenzhen and Dalian (Leung, 2001).

⁶ The description of investment in fixed assets is derived from the Indicator Specification of the Chapter of Investment in Fixed Assets in *Statistical Yearbook of China* (various volumes).

Deflator is the key estimated data in this research, which can not be abstracted from the Statistical Yearbook directly, while the estimation was carried out on the basis of groups of original data with certain assumption.

Since GDP value from the yearbook is termed in the price of current year, while the labour employment is in real terms by definition. Given the concerns of keeping the variables in the same form, the inflation effect should be wiped off from the annual GDP value. Hence, GDP value needs to be deflated and transformed into the real term by using an appropriate deflator, the same philosophy will be applied to the rest of nominal variables.

The common deflator in most of the econometric empirical work is Investment Price Indices in Fixed Assets (IPI). However, annual IPI did not exist as an important indicator in China statistical system until 1991, and cannot be tracked back to the first year of our sample period 1984. Hence, Retail Price Index (RPI) and Consumer Price Index (CPI) are two most appropriate substitutions can be found. Technically, these two sets of deflators can be used interchangeably. In China's specific circumstances, the calculation base of CPI has been modified since 1991. Prior to 1991, CPI was an index reflecting the living expenditure of employees from state-owned and collective-owned companies, which obviously neglected the prices paid by rural families. In 1990 and onwards, CPI has been obtained on the consideration of overall households' consumption in the country. RPI, on the other hand, was a consistent indicator over the sample period. Therefore, RPI is the preferred deflator.

Due to the huge difference between the basket of goods in 1984 and that in 2003 due to the rapid GDP growth during the past two decades, it is convincing that the constant price of 1995 is more plausible than that of 1984 to be used in this research. As the data sample covers the period from 1984 to 2003, the nominal data is transformed into the constant prices with base year 1995. Thus, RPI, on both provincial level and aggregated level, has to be recalculated into a series of figures where that of 1995 is equivalent to 100.

4.3.3 Derived Variables

This type of data is obtained by doing some simple arithmetic calculation based on the values introduced in above two sections. The calculating data include the indicators of financial intermediation, the capital stock on both aggregated and industrial level, real GDP and real capital stock, weight value of output.

4.3.3.1 Indicators of Financial Intermediation

One of the hypotheses in this empirical study is whether the development of financial sector stimulates the economic output growth. Banking industry is the major component in China's financial sector. On regional level, there are five indicators of financial development going to be applied to the hypothesis testing procedure. They are all the ratios (indices) computed by using the deposit and loans data of State Banks. Considering the material coherence, the description and feasibility of using these five measurements will be demonstrated in Chapter 6.

4.3.3.2 Real Capital Stock

Based on the information of investment and depreciation rate, we can easily find out the annual Capital Stock (CS) value of each province by using the formula as long as the initial CS is ascertained. The ideal way to obtain the most accurate data for our investigating sample period is to have the real CS value of year 1949 when the nation of People's Republic of China was founded. Since we would rather focus on the change of CS since 1984, the real CS value would be less important. Moreover, this initial information is not available while the total regional investment could only be tracked back to year 1980. Therefore, we ought to manipulate the real CS value from 1980 and onwards for each individual province. The author calculates the initial CS estimates in the way adopted by Dhareshwar and Nehru (1993), Benhabib and Spiegel (2000) and Fan *et al.* (2003). That is, prior to 1980, real investment has presumably grown at a steady rate (r), which is assumed to be the same as the rate of growth of real GDP from 1952 to 1979. Thus, for individual province, in initial CS (i.e., CS at 1980) is calculated by $K_{i,1980} = \frac{I_{i,1980}}{r_i + \delta}$, where r_i represents province i 's growth rate

and δ represents the depreciation rate of the CS⁷. This approach ensured that the 1980 value of CS is independent of the data used in our analysis. Moreover, given the relatively small CS in 1980 and the high level of investment, the estimates for later years are not sensitive to the 1980 benchmark value of CS (Fan *et al.*, 2003).

4.3.4 The other variables

The open door policy implemented in 1979 has been treated as the milestone of China's economic reform. It is a common perception that 1979 is an outstanding structural break in China's economic development. Although the dataset of this empirical work did not span the pre- and post-open-policy age, there are many other individual factors may affect China's growth pattern. Rather than adding considerable group and time serial dummy variables to capture the individual effect of every province and every year against the base case, we would prefer to include more determinants into the production function.

For instance, FDI was negligible until well into China's reform period, but has accelerated since the early 1990's. The contribution from FDI to Total Investment in Fixed Assets (TIFA) is growing rapidly though the proportion is relatively small comparing with the other investment fund sources. This phenomenon can be found from Table 4.2 where displaying the change of FDI in the past nine years. Within the TIFA survey, the contribution from FDI has been included. The rationale of investigating the effect of domestic investment upon the economic growth suggests subtracting the FDI value from each industry in order to restore the picture of the real domestic investment. Nevertheless, there was no record upon industrial FDI before 1995. Consequently, we would consider the aggregated FDI to TIFA ratio as a replacement.

FDI is usually termed in US dollar while TIFA is termed in RMB, in which circumstances the ratio between two variables in different currencies is not valid.

⁷ Since no regional depreciation rate of CS existed, the calculation is based on the assumption that the national depreciation rate is applied to each province. This is more convincing in the planned economy as the economic activities were operated fully under the control of State Government in accordance with the pre-set plan. Hence, the pace of economic development was remained the same throughout the country.

Table 4.2: Foreign Direct Investment as percent of Total Investment in Fixed Assets (1995-2003)

Year	FDI in Fixed Assets: real value		Total Investment (RMB billion)	Contribution to Total Investment (%)
	(RMB billion)	Growth Rate (%)		
1995	2.3		20.02	11.2
1996	2.75	19.56	22.91	11.8
1997	2.68	-2.5	24.94	10.7
1998	2.62	-2.5	28.41	9.2
1999	2.01	-23.32	29.85	6.7
2000	1.7	-15.5	32.92	5.2
2001	1.73	2	37.21	4.6
2002	2.08	20.5	43.5	4.8
2003	2.6	25	59.09	4.4

Source: author's calculation based on Total Fixed Assets Investment sorted by Fund Resources, *China Statistic Yearbook (2004)*, p.183-185.

Therefore, FDI should be transformed into RMB price. Given that the exchange rate varied over the last two decades, the procedure of accomplishing this transformation includes two steps. In the first step, FDI from 1985 to 2003 is deflated by US RPI where 1995 price has been treated as the constant one, which is consistent with the deflated domestic price. Secondly, the constant FDI is multiplied by 1995 exchange rate, thus obtaining the FDI in RMB price.

Meanwhile, it has been widely accepted that the education level would generate a positive effect towards the labour productivity. Hence, it may also be worth of taking the education level into account, for the purpose of investigating to what extent the education development may influence the economic output. A number of indicators can be adopted to capture the education effect, while the most appropriate one is the ratio of enrolment in higher education institutions over the enrolment in secondary education schools. The annual population figures have been amended when the census occurred thus affecting the data consistence. Therefore, the ratios having population data involved are not suitable ones. In addition, the nine-year compulsory educational scheme⁸ is a vital contribution to the sharp reduction of the percentage of illiterate workforce. However, the share of workforce achieving higher education remains rather small comparing with that in many other developed countries. A general

assumption states that better educated workforce is positively correlated to the higher labour productivity, consequently resulting in a faster economic output growth. Based on such assumption, it would be more appropriate to emphasise on the progress in higher education than that in primary education.

4.4 Data Validity and Reliability

Data validity and reliability is a crucial determinant for research project commitment. Where the research project is conducted on national or regional level, secondary data are the most appropriate and unique sources. However, the credibility of China's statistical standard and mechanism is always a questionable subject. Both domestic and overseas scholars doubt the reality of China's statistical data as they believe the official published data are suspicious, either overestimated (such as GDP growth rate) or underestimated (such as the volume of Non-performing Loans). Whether the statistical data have been consciously concealed is a topic beyond investigation, neither is the aim of this research. Nevertheless, it is worthwhile to evaluate China's statistical data in an objective manner before the research finding being addressed.

4.4.1 Advantages and disadvantages of using secondary data

Comparing with limitation of primary data, using secondary data can not only save the resources (in particular the time) for collecting data, but also achieve a longer time span than what we can obtain from primary data (Ghuri et al., 1995). In addition, secondary data are likely to be higher-quality data to some extent, especially for those collected by government or institution surveys (Stewart and Kamins, 1993).

Secondary data generally can be achieved from three main groups: documentary, survey and compiled data (Saunders et al. 2003). There are a number of disadvantages when using secondary data. One of them is the suitability of the data. Since primary data are the new data collected with specific research purpose, they can usually answer the research question and/or objectives straight forward. Secondary data,

⁸ This educational scheme guarantees each Chinese citizen has the right to receive free education service for six-year primary school education and three-year junior high school education.

however, have always been organised and collected for some other purposes before the individual researcher approaches them. Therefore, they seldom answer the research question(s) directly but they still provide useful source for our investigation and analysis (Denscombe, 1998).

As Stewart and Kamins (1993) argue that the researchers should be in advantage when they are using secondary data compared with those using primary data due to the data existence already. Therefore, what the research needs to do is to evaluate them prior to use. The evaluating and investigating the suitability of secondary data are worthwhile in these circumstances as this important step will save the time for rejecting the unsuitable data in the future, especially when there are several different data sources (Saunders et al., 2003).

Apart from the concern of data suitability, data accessibility and availability is another problem worth being born in mind. It will be difficult and costly to gain access where data have been collected for commercial reasons. Moreover, the use of confidentiality is another restriction to the accessibility, which is very much so in the context of China for those data from the sensitive areas. Another reason for this is the data aggregation. For the purpose of meeting the requirement of original research, process data have been aggregated in some way but unable to be retrievable to match the individual research objective. Banking lending data from China's banking sector is a good example for it. In order to testify the contribution of China's banking sector to economic growth, it had been ideally designed to obtain the industrial banking lending data for each province. Nevertheless, banking lending data on provincial level have been summed up into the aggregated figures while there is no way to restore the industrial level data.

Apart from the difference in measuring criteria, the change of administrative structure is another obstacle of maintaining the statistic data consistent over the time range. During the data sample period, the number of administrative regions in China was raised from 29 to 31 given two major adjustments towards a couple of administrative regions. The change affected a number of statistic series including the geographical size, population, economic output, investment etc. Since we are taking the growth of output as the dependent variable, the growth rate obtained by using two figures

measured in different criteria/standard may not be appropriate. It would lead to either a sudden increase or decline unexpectedly, which will do harm to the data consistency.

The first administrative adjustment is the Island of Hainan was separated from Guangdong Province in 1988 and became an individual administrative unit which was equivalent to the Province class. Obviously, the isolation directly caused the inconsistency of statistic data before 1987 and 1988 onwards on both Guangdong Province and Island of Hainan. The second similar modification took place in 1997 on Sichuan Province and Chongqing City. The latter one used to be a city within Sichuan Province. In 1997, it was separated from Sichuan and became an individual administrative unit, the fourth Municipality Directly under the Central Government, being parallel to the other two Municipalities of Shanghai and Tianjin and equivalent to the other provinces in terms of political and economic status. Again, the statistical data for both Sichuan Province and Chongqing City are inconsistent and incomparable before and after 1997. The statistical data of both Hainan and Chongqing during the period before their separation from the original province can be obtained from the local Statistical Yearbook.

In the case of Hainan Island, the geographical size remains the same, thus the population increases at a steady rate. Correspondingly, the rest of the economic related indicators also changed in the same trend as usual. However, the geographical size and population of Chongqing City largely increase from what they used to be before 1997. In addition, the other statistical items such as IFA and economic output GDP also differ from those before 1997. It is obvious that there would be a prominent jump in those economic indicators of Chongqing while there is a conspicuous drop in the case of Sichuan Province.

However, further detailed information for individual district within Chongqing City authority is nowhere to be found. As a result, the statistic data of Chongqing City in pre-isolation stage could not be restored to stay in the line with those data after 1997. Therefore, a feasible way to eliminate this inconsistency factors is to reject those data for both Chongqing City and Sichuan Province, reducing the number of regions from 31 to 29. For the sake of keeping as much information as possible, we can retrieve the statistical data for Sichuan Province by holding Chongqing City as a part of Sichuan

Province (it is so geographically!). In other words, it means to sum up the figures of these two regions into the aggregated item for Sichuan Province exclusively.

In some other situations, data definitions are modified due to the preference and/or intention change of the authority. The industrial survey is one of the typical samples. Prior to 1998, the industrial survey was conducted based upon the type of ownership, i.e. total industrial enterprises were defined as those beyond township administrative level inclusively. The number of total industrial enterprises and their output value were two essential items within the survey report. As the complementation of economic reform has intensified and accelerated, the state government tended to highlight the performance and efficiency of state-owned and state-holding industrial enterprises. Consequently, the survey was undertaken in accordance with the output scale, i.e. the number of industrial enterprises and their output value has been narrowed down to total state-owned enterprises and non-state-owned enterprises with annual gross output value over RMB5 million exclusively. As a result, the figures within the above two survey items appeared to decline substantially from year 1997 to 1998.

4.4.2 Drawbacks and Development of China's Statistical Standard and Mechanism

By reviewing the development of China's statistical system briefly, we have to admit the drawbacks within the current statistic data. The People's Republic of China founded in 1949. The first official statistical yearbook was not published until 1981, indicating the regular statistical system was established since then. The data in statistical reports started being updated and published since 1981 on the annual basis.

Nowadays, the statistical standard applied by NBSC is formulated according to the standardised and transparent system with the help and acceptance of IMF. With the frequent communication and co-operation with IMF and World Bank during the past two decades, NBSC has implemented a serial of reforms against the statistical mechanism and procedure for the purpose of staying in line with the international standard. Hence, China's statistical pattern is far from mature while it has been improved rapidly. However, the contradictory data from local and central statistical authority forced the implementation of the further reform.

Generally speaking, the state government did not pay too much attention on the accuracy of the statistic data, particularly in the stage prior to 1981. A number of reasons led to the distortion of China's statistic data. In the earlier stage, breaking away from being a poor country was the eager desire in China. The steel output was then distortedly demonstrated as the unique indicator of economic development. Under the misunderstanding of the economic growth pattern and domestic situation, the state authority launched the 'Great Leap Forward' (1958-1960).

During those insane times, China's economic structure was incredibly destroyed as the overall resources had been dedicated to raise the steel output regardless of the other economic sector's development. Thousands and thousands pieces of lands were left uncultivated since the farmers had been forced to enter the steel factories. As a result, the fact that the grain yield dropped rapidly made the authority rather dissatisfied and worried. In contrast to finding out the proper solution to save the economic situation, the statistical authority on each level, however, decided to fabricate the statistical data, intending to draw an excellent picture of rapid and powerful economic growth. Consequently, spurious data on grain yield widely appeared all over the country. In most extreme cases, the reported figures were four times the actual ones.

Another prevailing phenomenon can be used to explain the data distortion. The statistic data, particularly the GDP figure, have been adopted as the measurement to evaluate the achievements in local government in recent years⁹. Moreover, GDP figure has been tightly linked with the promotion of individual careers when the achievement of high GDP enhances promotion prospects for senior officials. In these circumstances, statistic data collecting and compiling is no longer an independent and objective work for the purpose of reflecting the real economic performance. Consequently, it becomes an irresistible temptation for many provincial governors to intervene the data compilation or even magnify the growth figure of GDP given the GDP-focused benchmark. For instance, NBSC published the national GDP increased by 9.3 percent in the first half year of 2004. However, it has been noticed that the GDP stock value computed on the basis of GDP value reported by provincial bureau

⁹ See 'Distortion of GDP Leading to the Statistical Reform Storm', <http://biz.163.com/2004w11/12728/2004w11-1099712794258.html>, accessed on 6th Nov. 2004.

of statistics was 19.8 percent higher than the value achieved by the computation conducted by NBSC individually, resulting in a 4.2 percent difference in GDP growth rate between the national-published data and the aggregated provincial data.

Meanwhile, an officer of NBSC pointed out that there is a high possibility that the weight value of the tertiary sector has been underestimated¹⁰. NBSC launched a general survey towards the Tertiary Industry in 1993, when the weight value of Tertiary Industry was raised to 34 percent from 28 percent. In the recent years, this value has been unreasonably reduced to 31 percent where the rapid growth of Tertiary Industry in the past decade indicates a higher contribution to the aggregated economic growth. In addition, statistical data on a number of servicing sector such as education and hygiene are rather rough and less comprehensive because of lacking a proper survey scheme.

Correspondingly, NBSC has been gradually undertaking a number of measures to correct the distorted statistical data. Specialised statistic data have been compiled and reported in individual publications. *China Statistical Yearbook on Investment in Fixed Assets 1950-1995*, the first official publication on Investment, enables the readers to receive the provincial data on investment in fixed assets back to 1981. *Almanac of China's Finance and Banking*, for another example, was first edited and published in 1989 in order to display the significant policy change or modification, as well as the key indicators of China's banking sector.

Moreover, in order to improve the data effectiveness, NBSC started publishing the economic indicators on monthly basis in the statistic bullet points since 2000. Meanwhile, the compilation and computation of national level GDP are going to be operated by NBSC exclusively. In another words, provincial GDP data reported by individual region will not be used as the base data for national GDP computation for the purpose of eliminating the linkage of statistic data with career promotion, thus wiping off the interventions from provincial authority upon statistic data.

¹⁰ See 'Distortion of GDP Leading to the Statistical Reform Storm', <http://biz.163.com/2004w11/12728/2004w11-1099712794258.html>, accessed on 6th Nov. 2004.

4.5 Summary

This chapter outlined the methodology for the research work, followed by the data description and evaluation. Due to the specific property of the research objective, quantitative research method is the preferable way to be operated throughout the empirical study. Methodologies of three econometric techniques adopted in this empirical study have been illustrated carefully – Error correction model, panel data analysis and Granger-causality analysis. Correspondingly, the data selection and compilation is the major task before the hypothesis testing being proceeded. As the research question will be testified on the provincial level in China, secondary data from various statistical yearbooks appear to be the most plausible sources to cope with the quantitative analysis, comparing with the advantages and disadvantages of using primary data.

Though the credibility of China's statistical information has been questioned for a long time, this panel dataset is achieved upon the basis of most objective information from various statistical yearbooks edited and published by the NBSC, including three types of data termed as original, derived and computed variables. In particular, derived variables applied to the estimated model are based on the relevant and available original data sources, additionally in accordance with some theoretical formulas and mathematical techniques. It can be concluded that these derived variables are not the products gained from absolutely arbitrary ways, thus should be trustworthy.

Chapter 5: The national economic growth – ECM analysis

5.1 Introduction

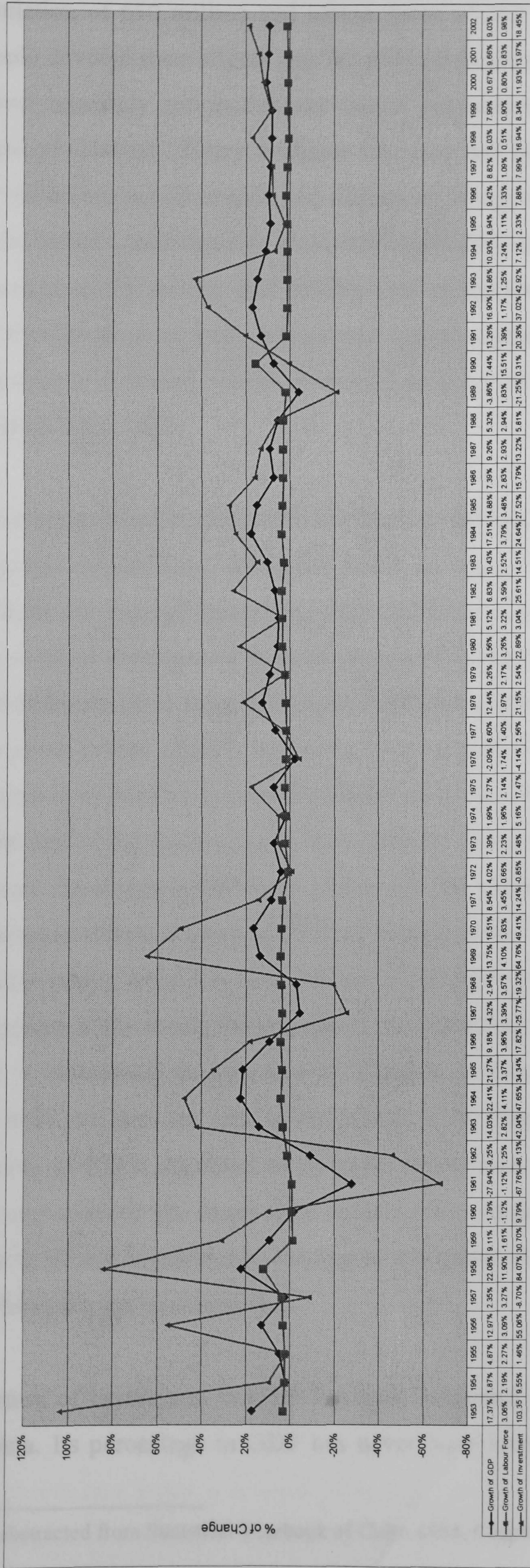
In this chapter we conduct an investigation on the basis of aggregate level data. The material in this chapter is organised in the following structure: Section 5.2 will generally review the aggregate economic performance during the past half century, followed by the statistical result obtained by using error correction model (ECM) in Section 5.3. The analysis of economic growth resource is illustrated in Section 5.4, including capital stock growth and labour force growth. Section 5.5 mainly considers the efficiency of the investment efficiency. A brief summary of this chapter is presented in Section 5.6.

5.2 The aggregate economic performance

From Chart 5.1, China's economic growth pattern can be characterised as the investment-driven style: the economic growth heavily relied on the capital accumulation. For most of the time, the growth of investment was much higher than the growth of GDP, with a rising capital-output ratio. Meanwhile, during the sample period on aggregate level data (1952-2002), the growth of fixed assets investment experienced several large fluctuations, particularly in the pre-economic-reform stage.

From late 1950s to mid 1960s, investment in fixed assets in China suffered the first major fluctuation, resulting in a severe recession. In the late 1950s, after achieving the victory against the imperialism and winning the national liberation, how to break away from the poverty and become a prosperous and powerful country is the nationwide strong wish. Under the belief and guidance of surpassing UK in 10 years while catching up with US in 15 years, the authorities launched the 'Great Leap Forward' (GLF) in 1957 when they drew up the second five-year plan of China's economic development. The speed of developing industry, particularly heavy industry, was insanely driven up regardless the actual capability of development. For instance

Chart 5.1: Growth of Real GDP, Growth of Real Fixed Assets Investment and Growth of Labour Employment



Source: author's own calculation based on the statistical data derived from Statistical Yearbook of China (*Zhongguo Tong Ji Nian Jian*), Almanac of China's Population (*Zhongguo Ren Kou Tong Ji Nian Jian*) and China Statistical Yearbook on Investment in Fixed Assets (*Zhongguo Gu Ding Zi Chan Tou Zi Tong Ji Nian Jian*), various issues.

with a population of 650 million and labour force of 266 million in 1957, over 90 million people devoted their efforts into the steel production regardless of lack of the necessary raw materials and inadequate capital equipment for people employed to work in steel production¹. Every available resource had been dedicated to the steel production while leaving thousands and thousands of agricultural land uncultivated. However, the inferior techniques in steel making resulted in the poor quality of steel products; consequently, million and million tons of steel was abandoned. The huge waste and misallocation of both human and capital resources led to the massively distorted economic structure, which eventually paid off by the upcoming three-year natural calamity since 1959.

The State Authority learnt lessons from the GLF in 1962 and adjusted the emphasis of future economic development. However, when the state economy appeared to have recovered from the damage caused by GLF and natural calamities, the well-known Cultural Revolution commenced in 1966 dragged the whole nation back to a chaos. The economic construction apparently again collapsed into turmoil during the ten-year Revolution event, where China's economic development suffered for a second time. The re-evaluation of Mao's ideology that prevailed in the Cultural Revolution in 1976 signalled the end of the ten-year man-made disaster. Soon after that, the emphasis of China's future development had been placed on the economic growth followed by China's economic reform starting in 1979. By adopting the 'opening up' policy, China has been successfully attracting large stream of foreign investment funds, know-how and management skills during the process of implementing its own economic reform, which was a substantial contribution to China's continuous and rapid economic growth for over two decades. Due to the effects of the Tiananmen Square Event, the social stability in China appeared to be under threat and not sustainable, while the investment environment was likely to be unfavourable. In this instance, the investment in fixed assets shrank considerably, leading to a negative economic growth on a third occasion during the last half century.

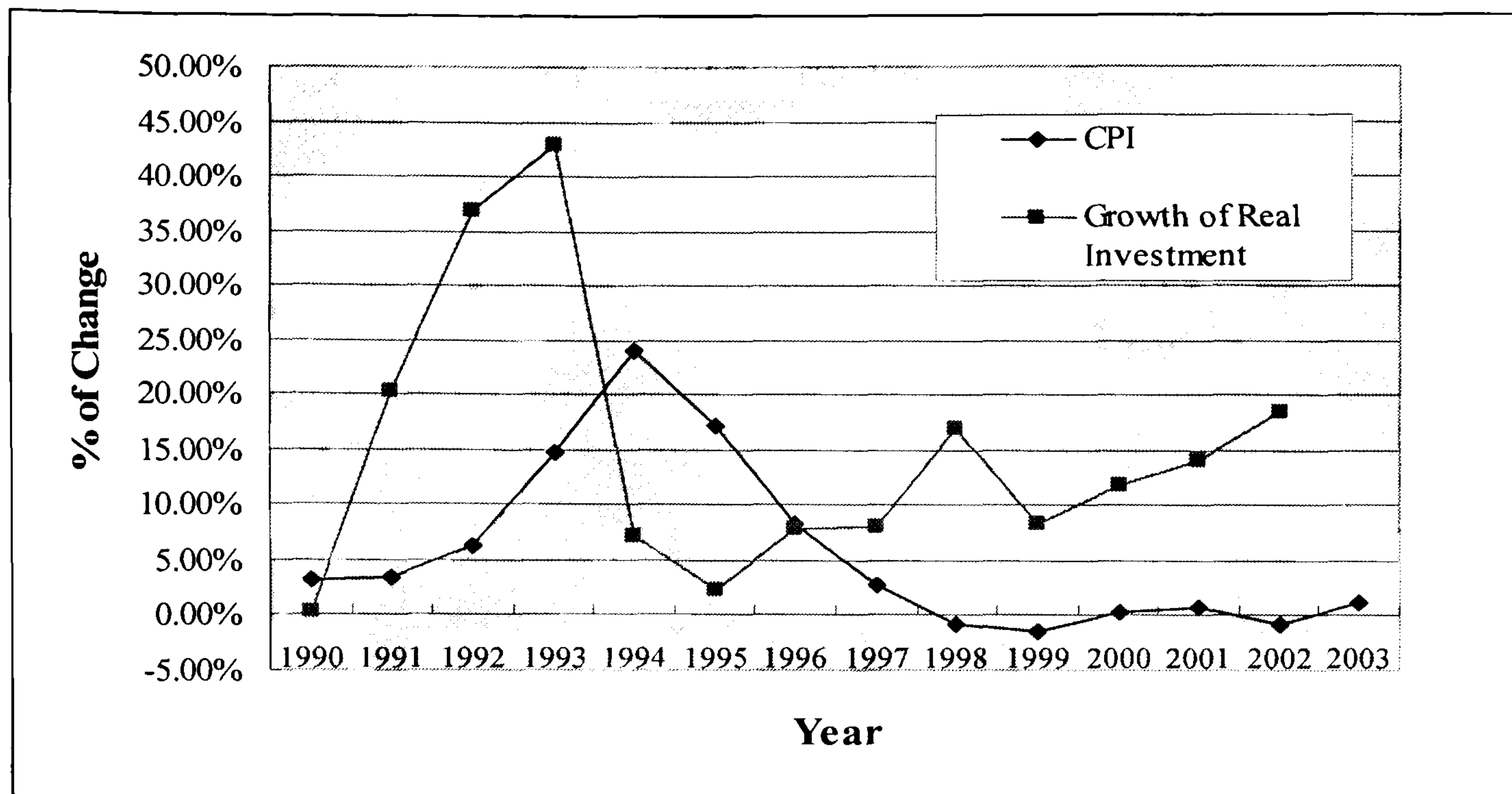
The proportion of investment in GDP has been sustained at a high level for a long time in China. Its percentage in GDP has never been lower than 30 during the last

¹ Figures are abstracted from Statistical Yearbook of China 1984, Chapter of Population and Labour Force.

decade. It reached 37.7 percent in 1993 and declined to 33.5 percent in 1997, then resurged to the peak of 41.5 percent in 2002. The investment-led development model could be attributed as the main engine behind China's economic take-off since it embarked on reform and the opening-up track more than two decades ago. Although such a growth pattern does have its advantages—it could quickly accumulate immense capital by tapping into the cheap land and labour resources to produce a fast growing economy—it also has serious consequences. Under the investment-led development model, the national economy is more likely to witness huge swings. Because the economic growth is mainly propelled by the investment, and when the investment soars, it is likely to drive up prices. Under such circumstances, in order to stop the price rising, the government will be forced to take macroeconomic measures to tighten the credit, which in turn could choke the economy and thus create a vicious circle.

Chart 5.2 shows the annual inflation rate since 1990, measured by the annual change of consumer price index (CPI). Meanwhile, the growth rate of real investment in fixed assets in the same period has been illustrated in the same graph. China's economy experienced boom and bust in earlier years of 1990s. The fixed assets investment climbed up rapidly from 1989 to 1993, particularly in the period of 1991-1993, the growth rate of investment remained at over 20 percent annually. In 1993, the investment growth rate reached its peak at 43 percent. Various construction projects were carried out at the same time all over the country. There was a construction competition among the provinces and cities: a nationwide 'economic development zone fever' and 'real estate fever' appearing in 1992, where the real estate price rose sharply and the speculation widespread. For instance, in the most famous beach city of Hainan province, Sanya, there were over 2 million square metres of real estate unsold when the bubble busted, more than half of which was unfinished building. The overheated investment led to the price rise of both raw material and energy, which was known as the cost driven inflation. As a result, China's economy suffered a serious inflation from 1993 to 1995.

Aiming at cooling down the overheated economy, the state government launched the retrenchment programme in July 1993 and the programme lasted till 1997. The economic growth rate began a gradual slowdown in 1995 but investment has been maintained at a relatively high level. The investment growth rate was brought down to

Chart 5.2: China Annual Change of CPI in Last Decade (%)

Source: *Statistic Yearbook of China*, 2003, pp.313. The latest figure of 2003 is abstracted from <http://www.worldindex.com> on China's deflation data, accessed on 18/01/2005.

7.1 percent in 1994 and further down to around 3 percent in 1995, while remaining at less than 10 percent in the following two years. Nevertheless, the economic growth rate had maintained at over 8 percent annually since 1995. In such circumstance, it is believed that the goal of a 'soft-landing' was achieved.

Since late 1997, the state government switched the policy orientation, deciding to stimulate the economic growth. Consequently, the state government has implemented the proactive fiscal policy, mainly by issuing treasury bonds to finance the infrastructure construction, the large-scale development of the western region and technical renovation. Meanwhile, the expansion of consumption has been regarded as an important component of the implementation of the proactive fiscal policy. Apart from the fiscal policies, the Chinese government had reduced interest rate twice in 1996, and five times more since 1997. After the People's Bank of China (PBC) abolished the credit rationing of state-owned commercial banks and implement risk management, the PBC replaced the instructional loan planning scheme by quarterly indicative loan planning scheme since 1998. As a result, the commercial banks have had more autonomy over new loans. Furthermore, the Central Bank had changed the deposit reserve system in March 1998. The 7 percent payment preparation requirement was abolished and the deposit reserve requirement was lowered from 13

percent down to 8 percent, which led to a 60 percent reduction in the legally required deposit reserve ratio. Unlike the previous boom and bust cycles, the efforts the government exerted through all these channels did not yield the expected effects. In particular, the economy has undergone a period of falling prices (deflation) since 1998 despite of the rapid increase of investment. Among the variety of debates aroused upon the reasons for this deflation, some economists (see, for instance, Lin, 1999, 2004) argue that it was the excess supply resulting from the excess capacity of productivity that dragged China into the deflation.

However, since early 2003, China's economy has been warned of the appearance of inflation signal, and actions should be taken against it before the situation becomes more severe and out of control. With real GDP growth of 9.7 percent in first quarter 2004 and continued fast expansion, China's year-over-year CPI inflation rate rose to 3.8 percent in April, even exceeded the 5 percent red-line set by the central bank. In July, the index surged by 5.3 percent, the highest monthly growth since February 1997. For an economy that has been haunted by years of deflation, rising prices is viewed in a positive manner. However, if the prices rally is too strong, it will exert a negative impact on people's life and the economic competitiveness of the country. For example, given the inflation rate of 3 percent in the first quarter of 2004, the nominal annual interest rate on demand deposits was 1.98 percent, yielding a significantly negative real interest rate. The situation is even more severe than in 1993: where the nominal interest rate was 11 percent while a soaring inflation rate up to 24 percent. The negative interest rates have led to a sharp decline of bank deposits in banks of Wenzhou (a famous commercialised city in Zhejiang Province). Similar phenomena also existed in many other cities.

The PBC's lax monetary policy has, until very recently, contributed to a rapid credit expansion. In addition, shortages in energy and raw materials pushed up prices. China's extraordinary growth has pushed up raw material prices. In 2004, China's crude steel production was up about 17 percent from 2003 and accounted for 25.8 percent of global output². Moreover, China also consumes 37.5 percent of the world's cement production. Its energy consumption is about 10 percent of the world total and

² Figures are derived from online statistics resources, including 'China's steel production may cause oversupply' <http://www.manufacturingtalk.com/news/msi/msi232.html>; 'China's crude steel output to top 300 mln tons' http://english.people.com.cn/200508/01/eng20050801_199569.html.

is increasing at an annual rate of 11 percent. The impact of the price rally of industrial products has already been transmitted to the consumption sector. Taking housing loans for example, they increased by nearly RMB600 billion (USD72.5 billion) in the first six months of the year 2004. And commercial housing prices witnessed double-digit growth. It has been argued that if housing prices had been taken into consideration, then the CPI growth might be much higher (China Business Weekly, September 13, 2004). To cool the economy, the PBC has raised the official reserve ratio three times since August 2003. In early 2004, under the instruction and guidance of PBC, all commercial banks started to restrain the credit allocation and strengthen the supervision towards a number of overheated industries, such as cement, real estate, steel and vehicle. In October 2004, PBC increased the interest rates for the first time since the past nine years, while the further rise of interest rate is convincing and predictable.

During the sample period, the growth of labour employment at the aggregate level was rather smooth compared with the fluctuation of economic growth except two abnormal outliers appeared in year 1958 and 1990 (Chart 5.1). Before 1958, the average ratio of labour force to the population was approximately 36.5 percent. In 1958, there was an increase in the participation rate by 3.5 percent of the population (rising from 36.8 percent to 40.3 percent), indicating a growth of more than 23 million people. The sudden shift-up is again the result of the Great Leap Forward. In particular, employment in Secondary Industry more than tripled from 21 million to 71 million in one year of 1958. However, the dramatic rise in industrial workers involves a large reduction in employment in the Primary Industry where the labour force contracted from 193 million to 155 million³.

5.3 Statistical result on aggregated level data

5.3.1 Model specification and data description

The production function (based on the Cobb-Douglas model) is applied in China's context by using time-series data from 1952 to 2003 for the purpose of investigating

the productivity of two main input factors, human and physical capital. The main adopted variables are economic output, labour force input and capital stock input, termed in 1995 constant price and transferred into logarithm form, denoted as Y, L, K, respectively.

The economic output, represented by GDP, and labour force input are derived from annual statistical yearbook. Physical capital stock, on the other hand, was computed by using depreciation rate and fixed assets investment data, where the calculation approach has been thoroughly demonstrated in the Data Description chapter (Chapter 4). However, since the national investment information before 1980 is not available, the statistic of investment on Infrastructure Construction and Innovation has been used as the substitute, where the sum of these two categories of investment was apparently lower than the overall investment volume. Consequently it generated a structural break between 1979 and 1980, affecting the continuity of capital stock series. Hence, the dummy variable DUM80 has been introduced to capture this structural break, where it took the value one for 1980 and onwards while zero for the years before 1979.

Additionally, the dummy variable POP described previously has been adopted to reflect the two outliers in labour force. As a consequence of Great Leap Forward Movement (1958-1959), China suffered a three-year Great Famine till 1962. From Chart 6.1, the growth rate of investments in fixed assets sharply dropped from over 80 percent in year 1958 to -70 percent in 1961; correspondingly, real GDP growth declined from 20 percent to -28 percent. In order to capture the unusual economic property in this abnormal stage, we create another dummy variable GLF, which equals one for 1958-1961 and zero for the rest of the years.

In 1990, labour force increased by more than 15 percent that was much higher than the average level of 3.5 percent annually, and indicates that it comes from a change in the data collection rather than a genuine rise in the labour force. This jump in the figure which in a sense is artificial due to the adjustment made according to the population census undertaken in 2000. Generally speaking, the population related information would be more accurate and almost identical to the true situation in the census year, as in the rest of the time; the published population was compiled based upon the sample

³ Figures are derived from *Statistical Yearbook of Labour in China*, 1993, pp.13.

survey. There were five official population censuses carried out since the foundation of the country, in year 1953, 1964, 1982, 1990 and 2000 respectively. According to the record in accessible data sources, it is the common practice that when a most current census was made, the prior data would be adjusted based on actual information collected from the census. For instance, the employment figures of 1990 were compiled directly from the Fourth Census accomplished in that year. The figures after 1990 were calculated on the basis of 1990 Census till the fifth census was made, while those before 1990 had been modified correspondingly. However, when the fifth population census was carried out in 2000, the adjustment has only been made from 1990 and onwards based on the actual information collected from year 2000. This is the main reason for the rapid increase of labour force in 1990. Thus, the plausible way to capture this information is to introduce a dummy variable, denoted as POP, whose value equals 0 for the time period 1952-1989, while 1 for the years from 1990 onwards.

5.3.2 Estimated result analysis

Bearing the autoregressive property of time-series data in mind, stationarity issue of each variable should be first identified before the regression relationship can be estimated amongst these variables. Since three variables are moving with an upward trend (see Chart 5.3), the statistic result derived from Dickey-Fuller regressions with an intercept and a linear trend provides a reliable analysis. Both Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) suggested that the order is likely to be 1 or 2, where Augmented Dickey-Fuller (ADF) statistics are both (in absolute value) lower than their (asymptotic) 95 percent critical value (-3.5025). It is therefore not possible to reject the null of unit root in the three variables at the 5 percent significant level. The summary of unit root test result was listed on Table 5.1 from which we can draw the conclusion that none of the three time-series variables are stationary.

Dickey and Fuller (1979) pointed out that the regressions involving time series can falsely imply the existence of a meaningful economic relationship if a variable is non-stationary, unless it combines with other non-stationary series to form a stationary

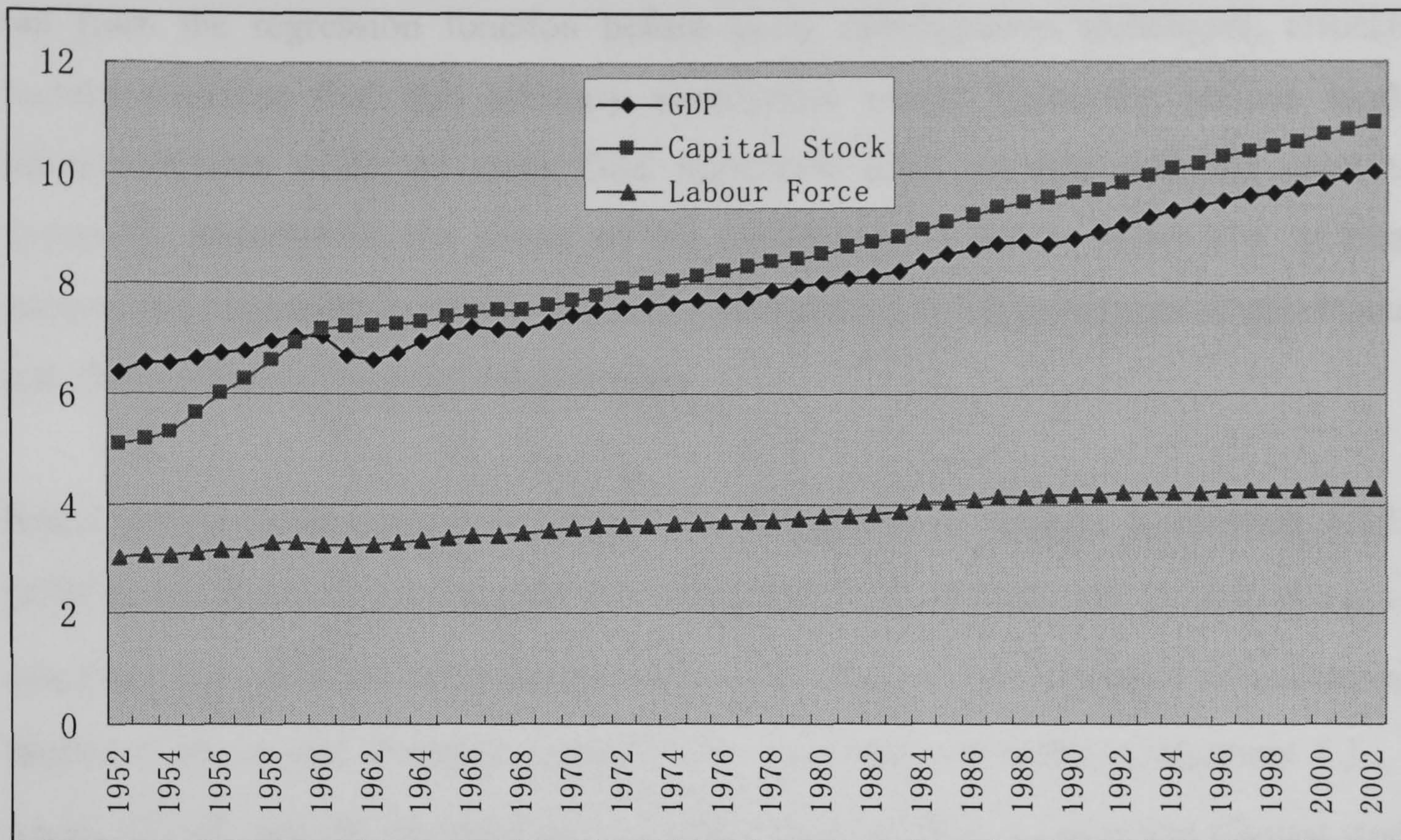
Chart 5.3: GDP, Capital Stock and Labour Force (in logarithm form)

Table 5.1: Unit root test for GDP, Capital Stock and Labour Force (in logarithm form)
—original value vs. first difference value

Variable	ADF Statistics Result		95% critical value
	AIC	SBC	
GDP	-2.9511	-2.9511	-3.5025
Capital	-3.0077	-3.2325	-3.5025
Labour	-1.9639	-1.9639	-3.5025
Δ GDP	-5.7164	-5.7164	-2.9228
Δ Capital	-5.0091	-5.0091	-2.9228
Δ Labour	-6.5612	-6.5612	-2.9228

Note: AIC = Akaike Information Criterion; SBC = Schwarz Bayesian Criterion

cointegration relationship. Therefore, Engle and Granger (1987) propose the residual-based unit root test (EGDF) for cointegration. To perform a cointegration test, it is necessary that the order of integration of all the variables should be the same (Enders, 1995, p.219). The order of integration can be defined as the number of times a series variable should be differenced to become stationary. By taking the first difference of each variable, ADF test indicated that all variables are stationary (see the second half of Table 1). In other words, these three variables are integrated of order one $I(1)$.

However, since the rationale of EGDF implies that non- $I(1)$ variables have to be taken out from the regression function before using cointegration techniques, criticism mainly concerns that this arbitrary elimination would cause the serious model misspecification while the static OLS regression does not deal with the short-run dynamics. Meanwhile, the power of the residual-based test is rather low in small sample and less reliable, which inevitably introducing a further degree of uncertainty into the analysis of long-run relationship.

Based on the error correction mechanism interpreted in Chapter 4 (Section 4.2.1), ECM in this research is taking the following form: $dY_t = f(dL_t, dK_t) + \lambda(\xi_{t-1}) + \varepsilon_t$. It describes the variation of economic output in terms of the variation of exogenous factors (Labour and Physical Capital) and the error correction component (ξ_{t-1}); where dY , dL and dK are the first difference form of GDP, Labour and Capital stock respectively, representing the growth rate of these three variables. ξ_{t-1} is the equilibrium error in the model of cointegration, representing the catch-up effect. It is measured by the difference between the actual output and the estimated output in their $t-1$ period, denoted as $\xi_{t-1} = Y_{t-1} - Y_{t-1}^*$. Hence, the coefficient of ξ_{t-1} , λ (subject to $-1 < \lambda < 0$), will be estimated to measure the speed of dynamic adjustment has been made towards equilibrium every period.

In empirical applications, the explanatory variable may influence the dependent variable with a time lag. This often necessitates the inclusion of lags of the explanatory variable in the regression. Meanwhile, given to the consideration that the dependent variable may be correlated with lags of itself, the lags of dependent variable should be included in the regression as well. These considerations motivate the commonly used Autoregressive Distributed Lag of order p and q (ARDL(p, q)), where the specification shares the same meaning of ECM but taking the advantage of using OLS estimators to present the sign and dimension of long-run parameters.

Recently, Pesaran, Shin and Smith (2001) propose a new approach – bounded testing approach – to testify the existence of a long-run level relationship. Based on their idea, in this empirical study, the estimated function can be interpreted as the following:

$$dY_t = \alpha_0 + \alpha_1 t + \phi Y_{t-1} + \theta_1 K_{t-1} + \theta_2 L_{t-1} + DUMMY + \sum_{j=1}^k dY_{t-j} + \sum_{j=0}^k dK_{t-j} + \sum_{j=0}^k dL_{t-j} + \varepsilon_t \quad (5.1)$$

where 1) α_0 is the intercept term and α_1 is the coefficient of time trend;

2) ϕ is equivalent to λ , the error correction coefficient in ECM;

3) the long-run coefficients of capital stock and labour force input are computed

$$\text{as: } \beta_1 = -\frac{\theta_1}{\phi}, \beta_2 = -\frac{\theta_2}{\phi} \text{ respectively;}$$

4) given to the annual data adopted in this study, k equals one.

5) parameter DUMMY includes three dummy variables GLF, POP and DUM80, which have been defined previously.

In these circumstances, before computing the long-run coefficients of each variable, it is necessary to identify the existence of long-run relationship, i.e. the null hypothesis of no levels long-run relationship is $H_0 : \phi = \theta_1 = \theta_2 = 0$, and this can be tested using the F-test. The distribution of this F-statistic is non-standard but rather includes two set of critical value—the upper bound (assuming that all the underlying regressors are $I(0)$) and the lower bound (assuming that all the underlying regressors are $I(1)$). In this case where all the regressors are $I(1)$, this test reduces to the no cointegration test (H_0). Given that the number of stochastic regressors is 2, the F-statistic value is 6.1754, higher than the upper bound of critical value at 95 percent significant level 5.85, indicating that the null hypothesis can be rejected.

Meanwhile, in long term, the effects of those structural breaks (measured by dummy variables POP and DUM80), are believed to be temporary given that the inconsistency of data compiling is the major reason for that. The impact of the economic fluctuation because of Great Leap Forward event (measured by dummy variable GLF) is also assumed to vanish gradually in the long-run dynamic process. Hence, a strong evidence of a stable long-run equilibrium can be written as:

$$Y = 3.381 + 0.0353TRENDS + 0.6941K + 0.1716L$$

The coefficients of K and L (β_1 and β_2) are calculated by using the formula

$$\beta_1 = -\frac{\theta_1}{\phi}, \beta_2 = -\frac{\theta_2}{\phi}, \text{ where } \phi = -0.4051, \theta_1 = 0.2812 \text{ and } \theta_2 = 0.0695, \text{ obtained from}$$

the OLS estimated result based on Eq.5.1 (they are all significant at 5 percent critical level).

The short-run dynamic stemmed from the error correction mechanism can be written as:

$$\begin{aligned} dY = & 2.3717 + 0.0352\text{TREND} + 0.3129dK + 0.8366dL + 0.0056\text{DUM80} \\ & (0.5874) \quad (0.0083) \quad (0.1258) \quad (0.1905) \quad (0.0276) \\ & + 0.0398\text{POP} - 0.0892\text{GLF} - 0.3332\xi_{t-1} \\ & (0.041) \quad (0.045) \quad (0.0574) \end{aligned}$$

where dY , dK and dL denote the growth of output, growth of capital stock and growth of labour force respectively; ξ_{t-1} represents the difference between the actual output (LY_{t-1}) and the estimated output (LY_{t-1}^*) in their $t-1$ period; the coefficient of ξ_{t-1} is the estimated error correction coefficient λ . Only GLF dummy variable has been discovered with a significant impact upon the short-run dynamic growth process, while the structural break caused by inconsistent data compiling has not been found correlated with the output growth.

Combining the long-run equilibrium relationship with short-run dynamic (presented as ECM), the estimated result indicates that China's economic output experiences the decreasing return to scale as the sum of elasticity of capital stock and labour force ($\beta_1 + \beta_2$) is less than one. At the same time, it also provides the evidence that in China's context, the growth of fixed capital plays a vital role in economic growth (lower estimated coefficient of dK), while the contribution from labour force was less important (higher estimated coefficient of dL).

Given that the incredibly fast growing of capital stock is associated with the relatively smooth rise of employment, this estimated result seems plausible. However, it has been argued that the low estimation for China's labour force is particularly stemmed from the bias in the measurement of labour growth in terms of both the quantity of labour input as well as the quality improvement, which will be further discussed in the following section. Apart from the two key input factors in production process, the time trend, representing the technical progress also has a positive and reasonable effect on the economic growth, contributing around 3.5 percent rise in the output per annum.

The error correction coefficient, λ , is 0.33 and statistically significant. This coefficient presents the extent of 'catch-up' between actual inputs and what could be potentially produced, and what is actually produced. More precisely, when the input factors are observed increasing faster than output growth, the coefficient equivalent to 0.33 reflects the input factors have not been fully utilised and the actual output level is 33 percent lower than what it should be. It is also true when interpreted in the opposite way: the economic growth does not drop as much as the input growth slows down. In summary, this coefficient reflects that output does not immediately adjust to changes in inputs, especially capital inputs; while it may also reflect that inputs do not adjust to the variations in demand through which output fluctuates.

5.4 Sources of GDP Growth

The estimated parameters displayed in error correction mechanism show the coherence with our expectations based on raw data analysis: the major contribution to GDP growth derives from the growth of capital stock while the contribution of labour force growth was relatively small. To better understand the growth process, it is worth looking further into the causes of the growth of capital stock and labour force respectively.

5.4.1 Capital Stock Growth

As we stated earlier, capital stock growth depends mainly on investment. In the past two decades, China has consistently allocated a large share of GDP to investment as many other developing countries have done. According to Yeh (2001), the investment performance in China has two distinctive aspects. First, China sustains a high level of investment rate (in terms of percentage of GDP) though its per capita income is far below many other Southeast Asian countries in 2004⁴. Second, China's investment rate has remained quite stable over time since the implementation of open-door policy

⁴ The investment rate of China in 2004 ranked 4 in the world (those countries with no information available excluded), while its per capita income ranked 122. Information derived from World Factbook, online version, <http://www.cia.gov/cia/publications/factbook/rankorder/2185rank.html>, <http://www.lexas.us/worldfactbook/economy.asp?country=China>, accessed on 13th March, 2005.

in 1978, despite its economic system underwent dramatic reforms and its neighbour countries has been hit by a rigorous and contagious financial crisis⁵.

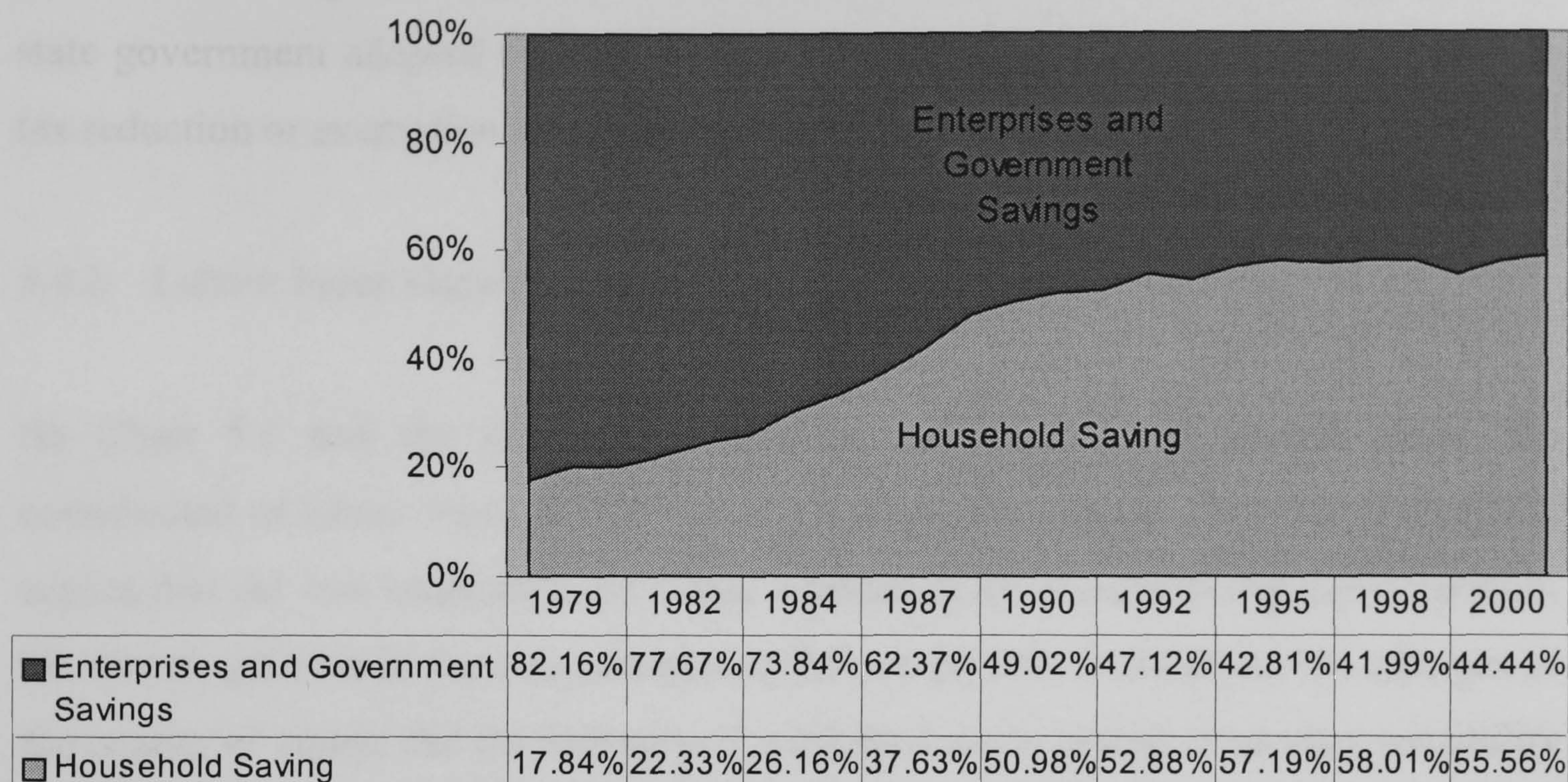
Two investment sources have been particularly important in sustaining a high and stable investment rate in China: the high household savings and the increasing volume of foreign capital inflows mainly in terms of FDI. In the post-reform period, domestic savings, which can be divided into household bank savings and legal entity deposits (the latter one includes registered companies, enterprises, societies and government organizations), raised from RMB113.54 billion in 1979 to RMB1080.62 trillion in 2002. In particular, it is worth noticing that the household saving has a rapidly rising share of total domestic deposits. From Chart 5.4, it is clear that the share of household savings accounts for less than 20 percent of total domestic savings in 1979; by 2002, the share increased to nearly 60 percent.

The rapid growth of household savings can be attributed to the growth of personal income resulting from economic reform. In 1979, the total personal income was RMB228.5 billion; per capital personal disposable income was just RMB237.4. Up to 2002, the per capita personal disposable income was thirty times up to RMB7703.8⁶. Consequently, the individual saving deposits in bank as percentage of GDP rose from 16.9 in 1986 to 76.9 in 2002. A number of factors can explain this high household savings rate. Apart from Chinese people's traditional character of being frugal, the present motivation of individual to save money is to set aside resources for children's education, medical service expenses and retirement. Meanwhile, since consumer credit scheme is either unavailable or fragile, Chinese people would rather accumulate money for large lump-sum expenditure such as purchases of houses, cars and other consumer durables. Nonetheless, it is quite natural for the households to save more for various purposes based on the precaution against uncertainties.

Regarding the foreign capital inflows, there has been a sharp increase since 1985, particularly in the case of direct investments (see Table 5.2). The total amount of foreign capital flow increased considerably within the five-year period from 1990 to

⁵ Despite the significant contraction of investment growth rate in 1989 due to the Tiananmen Square Event, the investment rate did not experience much fluctuation since 1978. See Chart 6.1.

⁶ Figures achieved from China's Marketisation Reform Achievement (*Zhongguo Shichanghua Gaige de Jixiao*), online accessed www.jjxj.com.cn/news_detail.jsp?keyno=5538.

Chart 5.4: Structural Change of Gross Saving

Note: Total domestic savings refer to the sum of household savings and legal entities (including enterprises and government) savings in State Banks.

Source: Processed on the basis of data from *Almanac of China's Finance and Banking*, various issues.

Table 5.2: Foreign Capital Inflow in Major Forms, 1985-2002 (Billion US\$)

	1985	1990	1995	2002
Total	4.65	10.29	48.13	55.01
Loans	2.69	6.54	10.33	0
Direct Investments	1.66	3.49	37.52	52.74
Others	0.3	0.27	0.28	2.27

Source: *Statistical Yearbook of China*, volumes of 1986, 1991, 1996, 2003.

1995, with an annual increase rate up to 36 percent. Within the three forms of inflow, not only the real amount of FDI increased dramatically, 50 times up from 1985 (USD1.7 billion) to 2002 (USD52.7 billion), but also the FDI share of total capital inflow climbed up from 36 percent in 1985 to 78 percent in 1995, then even further up to 96 percent in 2002; at the same time, foreign loans as a popular form of capital inflow has vanished since 2001. These figures indicate a perceived and important fact that direct investments are less volatile than foreign loans provided to China's less sophisticated financial system. China has been able to exert a pull on large volumes of FDI for several reasons. The first is the attractiveness of China's large potential market given to a population of 1.3 billion. Then, taking the advantages of the

relatively low labour and land costs becomes the next reason for many manufacturers have been moving their facilities from overseas into mainland China. Furthermore, the state government adopted various measures to encourage foreign investment such as tax reduction or exemption for certain period.

5.4.2 Labour Force Growth

As Chart 5.1 and the estimated coefficient of labour force growth show, the contribution of labour input to GDP growth is relatively modest. However, Yeh (2001) argues that the low estimation for China's labour force is particularly stemmed from the downward bias in the measurement of labour growth. In addition, the changes in the quality of labour and the intensity of work have been treated as another possibility to the underestimated contribution from the labour force input.

In the present data, labour input is measured in terms of the number of persons employed rather than person-hours worked due to the lack of information. There is a strong likelihood that the actual average hours worked per worker have increased in the post-reform stage despite the low growth rate of number of worker employed. In the past two decades, as a result of diversification of ownership and fast expansion of non-state sector (particularly the township and village enterprises), employment in the non-state sector has been growing faster than in the state sector. For instance, within about a decade (1994-2003), the urban employment in state-owned units dropped nearly 35 percent; while only 3.9 percent of urban workforce was assigned in collective-owned units compared with nearly 20 percent in 1994. The urban employment in other enterprises with all the other types of ownerships has increased by more than 45 percent in last decade, much faster than the growth in the previous decade (20 percent rise from 1985 to 1994, see Table 5.3).

In addition, it is perceived that the working hour and working intensity in non-state sector are generally much longer and tougher than those in state sectors. China's Labour Law explicitly stipulate that employees should work no more than eight hours per day or 40 hours per week; no authorised prolonging of hours worked may be made by any employer. If in any circumstance extension of hours has to be pursued, wage payments to labourers should be no less than 150 percent of their contract wages.

Table 5.3: Urban Employment and Composition by Ownership of Economic Entities since Economic Reform (% , Total=100)

	Number of Employee (million)	State-owned	Collective-owned	Others*
1978	95.1	78.3	21.5	0.2
1985	128.1	70.2	25.9	3.9
1994	186.5	60.1	17.6	22.3
2003	256.4	26.8	3.9	69.3

* Other ownership includes private enterprises, self-employed individuals, joint-ownership, shareholding corporations and foreign funded units.

Source: Processed on the bases of data from Statistical Yearbook of China, 2004, pp.120-121.

However, according to a most recent survey conducted in Beijing (June, 2004)⁷, the average days worked each week in Beijing is 5.9; additionally, more than 44 percent of the labourers work seven days a week and over 10 hours a day, which hugely exceeds the statutory hours of work. Nevertheless, the average wage of these labourers is even lower than the local average wage level. The survey also discovers that the prolonging of hours worked is extremely serious in such sectors as construction, wholesale and retail and restaurants, where private-owned enterprises are the major operators and more than 60 percent of the labourers work over 10 hours a day and seven days a week. The similar phenomenon has been widely found all over the country, particularly in the south and east coastal areas where the economic growth is overwhelmingly rapid. Along with the increasingly high unemployment pressure, the labour market remains as a demand-side market where the bargaining power of labourers is rather weak.

Furthermore, underestimated growth accounting figures may also suggest that the indirect contribution of the large labour supply to GDP growth has been substantial. For the purpose of retaining China's comparative advantage in international market, the real wages has been kept low for a long time. Meanwhile, since we have neither distinguished employment by economic sector/industry nor considered the migration phenomenon, we neglected the effect from economic structural change and labour mobility on national aggregated level. Apparently, the rapid development and growth of Tertiary Industry increasingly require more labour force input. Partly due to the

agricultural reform, extensive amount of labour force has been set free from the land and rushed into urban area. Its contribution is significantly found in the growth of construction industry and many other labour-intense sectors. Similarly, as the growth disparity between coastal region and interior area has been enlarged considerably, the surplus labour that migrated to the coastal areas could have displaced the better-qualified workers that the latter could move to more productive jobs.

5.5 Investment Efficiency

When evaluating investment efficiency in macroeconomic terms, two measurements can serve as the vital criteria. The first one is the ‘coefficient of investment in fixed assets (CIFA)’ which is obtained the dividing of annual increment of GDP with investment. This is rather a straightforward index to represent the investment efficiency and officially computed and published by NBSC. In the past decade, the efficiency index kept decreasing dramatically from 0.70 in 1993 to 0.125 in 1999 while the ratio slightly increased to 0.172 in 2002, which means every 100 yuan value of investment produced the increment of GDP by 70 yuan in 1993, however the same amount of investment would only bring about 17.2 yuan increment of GDP in 2002 (see Table 5.4). According to Dr. Weitang Fan, the Director of the Research Centre of Energy Resource, the consumption of energy resources in China is intensely higher than that in developed countries and the average level of the world: it is 3 times as much as in US while 7.2 times higher than in Japan⁸.

The second measurement is the ‘incremental capital-output ratio (ICOR)’ (see, for example, Prinsloo and Smith, 1996; Easterly, 1997; Hanmer and Naschold, 2000; Kwan, 2004). It is computed by the dividing the ratio of investment to GDP with real economic growth. This ratio gives an indication of the amount of capital utilised per unit of output and the smaller it is, the more efficient the investment. Because China invested 40.5 percent of its GDP and achieved 8 percent growth on average between

⁷ See Liang, S.T. ‘The Awkward Labour Law of China (Laodong Fa de Ganga yu Bei’ ai)’, editorial on China’s HR Web, 1 November 2004, <http://www.hr.com.cn/law/law040810/detail.php?id=17516>, accessed on 21 March 2005.

⁸ Further details can be referred to the ‘The Fierce Waste of China’s Energy Resource (*Guo nei neng yuan liang fei yan zhong*)’, World Business Comments, 26th March, 2004. <http://energy.icxo.com/htmlnews/2004/03/26/136525.htm>.

Table 5.4: Coefficient of Investment in Fixed Assets, 1981-2002

Year	GDP	Increment of GDP (a)	Investment in Fixed Assets (b)	Coefficient of Investment in Fixed Assets (a/b)
1981	4862.4	344.6	961	0.359
1982	5294.7	432.3	1230.4	0.351
1983	5934.5	639.8	1430.1	0.447
1984	7171	1236.5	1832.87	0.675
1985	8964.4	1793.4	2543.2	0.705
1986	10202.2	1237.8	3120.6	0.397
1987	11962.5	1760.3	3791.7	0.464
1988	14928.3	2965.8	4753.8	0.624
1989	16909.2	1980.9	4410.4	0.449
1990	18547.9	1638.7	4517	0.363
1991	21617.8	3069.9	5594.5	0.549
1992	26638.1	5020.3	8080.1	0.621
1993	34634.4	7996.3	13072.3	0.612
1994	46759.4	12125	17042.1	0.711
1995	58478.1	11718.7	20019.3	0.585
1996	67884.6	9406.5	22913.5	0.411
1997	74462.6	6578	24941.1	0.264
1998	78345.2	3882.6	28406.2	0.137
1999	82067.5	3722.3	29854.7	0.125
2000	89468.1	7400.6	32917.7	0.225
2001	97314.8	7846.7	37213.5	0.211
2002	104790.6	7475.8	43499.91	0.172

Note: Both GDP and investment value are termed in current prices, 100 million.

Source: Statistical Yearbook of Investment in Fixed Assets, 1950-1995 & 2003.

Table 5.5: China's Incremental Capital-Output Ratio

- Comparison with Japan, Korea and Taiwan during their High-Growth Periods

		Investment/GDP (%) a	GDP growth rate (%) b	ICOR a/b
China	91-95	39.6	11.6	3.4
	96-00	37.6	8.4	4.5
	01-03	40.5	8.0	5.1
	1991-2003	39.1	9.5	4.1
Japan (1961-70)		32.6	10.2	3.2
South Korea (1981-90)		29.6	9.2	3.2
Taiwan (1981-90)		21.9	8.0	2.7

Source: Based on the official statistics of each country derived from International Financial Statistics, the IMF online statistic database.

2001 and 2003, the capital coefficient came to 5.1 (see Table 5.5). In other words, in order to boost growth by one percentage point, the equivalent of 5.1 percent of GDP had to be newly invested. China's ICOR has been on an upward trend since the 1990s, indicating a decline in investment efficiency. Furthermore, China's average ICOR for the years 1991 to 2003 was 4.1, which was comparatively higher than that for Japan, South Korea and Taiwan when they were experiencing high economic growth. Despite the fact that Japan's growth during the 1960s was 10.2 percent, higher than that of present-day China, the ratio of investment to GDP was 32.6 percent, yielding a low ICOR of 3.2. ICORs for South Korea and Taiwan in the 1980s were 3.2 and 2.7, respectively, much lower than that for China since the 1990s.

The conclusion can be drawn that the investment in China is severely underutilised and generating a huge waste on resources. It thus becomes the main reason for the lower productivity of input factors. Though the economic growth in China has maintained at over 8 percent per annum, it is built up on the cost of successively inefficient investment.

5.6 Conclusion

This chapter examined the economic growth performance on national level during the past half century, including the general analysis on the role of financial sector, in particular the banking industry, in the process of China's economic development. The growth pattern in China has been identified as an investment-led development model.

By exploring the benefit of ECM, both short-term dynamic and long-term equilibrium of economic growth in China have been thoroughly demonstrated. The statistical result strongly supported that China's economic growth is driven by the quickly accumulated capital stock attributed to the rapid increase of fixed assets investment. In order to capture the influence of certain structural breaks, three dummy variables were introduced into the estimated function. However, none of them was observed significant impact upon the long-run economic growth.

The contribution to the national economic growth has been illustrated in three aspects, including the capital stock accumulation and labour force improvement. It has been asserted that the dramatic increase of savings and FDI are two major investment sources. The contribution of labour input to GDP growth is statistically modest. It has been argued that this result is underestimated which is stemmed from the bias in measurement of labour growth on one hand. On the other hand, the changes in the quality of labour and the intensity of work have been treated as another possibility to the underestimated contribution from the labour force input.

Chapter 6: Economic growth pattern and banking sector contribution to economic growth in China – panel data analysis

6.1 Introduction

As discussed in Methodology and Data Description chapter (Chapter 4, Section 4.2.2), purely cross-section analysis techniques were widely used in the early stage of research on the relationship between financial development and economic growth (see, for instance, Jao, 1976; Gelb, 1989; Odedokun, 1996 etc.). With the developments in econometric techniques, panel data analysis is apparently the more sophisticated and powerful technique which can be utilised in the investigations of this issue. As mentioned earlier, cross-country data of developed countries, of developing countries, across developed and less-developed countries, have been thoroughly examined and illustrated. However, not many attempts have been made to conduct the study over a consolidated data sample with cross section (province) and time-series.

This study is the first one to use panel technique to analyse the financial intermediaries and growth relationship based on the following considerations. China is a huge country with 31 provinces. The stability feature of the banking system and labour market provide the preconditions for establishing a data sample combined with cross province and time-series¹. In these circumstances, the nation can be regarded as 31 relatively independent provinces, where the individual feature of each province has particular influence over its own economic performance. For this reason it is reasonable to treat each province as an ‘observation’ and to explore the links between growth and financial development at the provincial level. Hence the panel analysis technique is applicable. Given to the advantages of panel data technique, we will develop a three-sector production function with the application of China’s cross-provincial data.

The rest of the material will be organised as follows. Section 6.2 specifies the estimated framework of the empirical study. This will be followed by a discussion

¹ For details, see Section 4.2.2.1 in Chapter 4.

over financial intermediation (mainly banking sector) indicators in Section 6.3. Section 6.4 – 6.6 demonstrate the statistical result based on using the panel analysis technique from three aspects: the economic growth pattern in China (Section 6.4), the impact of banking sector development on economic growth (Section 6.5) and the impact of direct and indirect financing on economic growth (Section 6.6). Section 6.7 provides the summary.

6.2 Model Specification and Classification of Economic Zones

6.2.1 Model Specification

Economic growth is believed to be influenced by financial development indicators along with many others, and there is no standard framework which has been used. Generally, economic growth is designed to be a function of a set of financial development indicators (F), while adding a set of other variables (X) into the estimated equation. This can be expressed in the following form:

$$\text{Economic Growth} = f(F, X).$$

The set of control variables has been expanded to include various information such as fiscal surplus (Aziz and Duenwld, 2002), human capital (Benhabib and Spiegel, 2000), FDI (Aziz and Duenwld, 2002; Boyreau-Debray, 2003), export (Odedokun, 1996; Ram, 1999), private sector productivity (Chen and Feng, 2000; Boyreau-Debray, 2003) and many others depending on individual research purpose. Moreover, another instructive development is to construct the framework on the basis of neoclassical production function (see, for instance, Bencivenga and Smith, 1991; Benhabib and Spiegel, 2000; Li and Liu, 2001; Fan *et al.*, 2003; etc.).

National output grew at average 9.8 percent per annum from 1984 to 2002, and the economy has also undergone dramatic and continuing structural changes. The share of agriculture has declined as the manufacturing and services sectors have grown much faster. Therefore, we are interested in evaluating the impact of structural change on economic growth and whether there are differences between sectors over, for example, rate of technical change.

Based on the works done by Odedokun (1996) and repeated by many other researchers (such as Ram, 1999; Aziz and Duenwald, 2000), economic growth is developed as a function of a series of input factors, which has a general form presented as:

$$\dot{Y} = f(X_t, F_t, Z_t, C_t) \quad (6.1)$$

where \dot{Y} is the growth variable, measured by GDP growth on province level. X is the set of standard neoclassical growth factors, including the growth of labour force and capital stock. Both \dot{Y} and X are defined in log-differences. F is the financial intermediation variable of interest which will be measured by several banking indicators (details on this aspect will be furthered illustrated in Section 6.3.1). Z is a set of other control variables, including FDI, Education, and industrial ratios representing the effect of industrial structural shift on economic growth. Apart from the sign and dimension of the coefficient of financial development variable, our interest also lies on the performance of other variables included in the estimated equation, i.e. the set of neoclassical growth factors and control variables.

It needs to be borne in mind that total investment fund include both domestic funds and foreign funds. Since the implementation of open-door policy, foreign capital turns out to be a vital resource of the domestic investment funds. China has become the world's top recipient of foreign direct investments (FDI) among the developing countries. FDI is investment undertaken by foreign investors in the form of: i) acquiring substantial shares in domestic companies; ii) entering into partnerships with domestic companies through joint ventures; or iii) establishing the solely foreign-owned enterprises in China. Nevertheless, the contribution of foreign funds varies over time and provinces (see Table 6.1). Generally speaking, foreign funds investment increased dramatically since mid-1990s while contracted gradually afterwards. The coastal regions (such as Fujian and Shanghai) have been regarded as the more desirable area to attract foreign capital than interior regions (such as Liaoning and Qinghai).

In order to identify the influence of domestic investment on economic growth, it is necessary to exclude the impact of foreign funds. A plausible way to capture the effect of foreign funds is to introduce the ratio of FDI to total fixed assets investment as the

Table 6.1: Contribution of Foreign Funds to the Total Investment in Fixed Assets
(%) – nation and selected provinces/municipal (1995-2003)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Nation	11.20	11.80	10.60	9.10	6.70	5.10	4.60	4.60	4.40
Fujian	22.73	25.29	24.50	22.84	23.05	24.23	24.14	25.61	22.63
Shanghai	9.71	14.37	13.29	12.87	13.99	7.23	5.66	4.15	4.18
Liaoning	12.70	10.60	14.00	9.00	6.40	5.80	3.80	4.50	2.80
Qinghai	0.65	3.13	2.39	3.00	0.77	1.40	1.08	1.00	1.48

Source: China Statistic Yearbook, 2004 (electronic version), statistical yearbook of individual province – Fujian, Shanghai, Liaoning and Qinghai, 2004.

control variable into the estimated model (Eq.6.1). However, given that these two variables are compiled in different currencies, annual FDI needs to be transformed into domestic currency on a constant price basis. The transformation technique has been demonstrated in Section 4.3.4.

It has been widely accepted that the quality of labour force would have a vital impact upon the productivity of labour input, consequently having a significant contribution to real sector performance. Hence, it is also worth controlling the quality of labour force where the Education variable is the proxy used in this empirical study. Although a few other possibilities can be adopted as the proxy of the education variable, it is appropriately measured as the annual growth rate of the ratio of enrolment in higher education institutions over the enrolment in secondary education schools. The selection of education proxy has also been demonstrated in Section 4.3.4.

A panel regression equation for estimating Eq.6.1 can be written as the following:

$$\dot{Y}_{it} = \alpha + \beta X_{it} + \gamma F_{it} + \delta Z_{it} + c_i + e_{it} \quad (6.2)$$

$$\dot{Y}_{it} = \alpha + \beta X_{it} + \gamma F_{it} + \delta Z_{it} + d_t + e_{it} \quad (6.3)$$

$$\dot{Y}_{it} = \alpha + \beta X_{it} + \gamma F_{it} + \delta Z_{it} + c_i + d_t + e_{it} \quad (6.4)$$

There are two additional coefficients c_i and d_t to be estimated. The estimates of c_i represent the mean differences across different provinces; the estimates of d_t represents the mean differences in different time periods. Therefore, provincial fixed effects are considered in Eq.6.2, time-specific fixed effects are concerned in

Eq.6.3, and both provincial and time-specific fixed effects are taken into Eq.6.4. The concept of using fixed effects is similar to the inclusion of dummy variables.

In contrast to fixed effects, a model with random effects for panel data is:

$$\dot{Y}_{it} = \alpha + \beta X_{it} + \gamma F_{it} + \delta Z_{it} + u_i + v_t + e_{it} \quad (6.5)$$

The random error u_i is the randomness related to province i but not related to time, while random error v_t has the reverse condition. Three kinds of randomness, u_i , v_t , and e_{it} are integrated in the regression and the variances of these random errors are estimated. In addition to Eq.6.5, we can also examine the random effects u_i or v_t separately.

Eq.6.2 - 6.5 are mainly estimated using the statistic software package Limdep. Given to its powerful property, both one-way and two-way fixed-effect and random-effect estimation is undertaken using Limdep. The rationale of panel data analysis has been thoroughly illustrated in Section 4.2.2. Hausman test will provide the evidence of model selection – FEM or REM. Next, we aim to test two hypotheses. First, whether the structural shift affects the economic output growth. Second, whether the financial sector generates a significant contribution to the output growth will be testified on both national level and the provincial level.

6.2.2 Classification of economic zones

Moreover, the rapidly increasing disparity between the coastal regions and interior provinces stimulates the concerns on the growth pattern in different regions in China; whether the local financial development has a same impact on the economic growth in an individual region. In order to inspect the growth pattern in different regions, we need to make a classification of economic regions in China first.

Initially, when we consider the regional economy-related issues, 27 provinces and 4 municipalities were either dichotomised into a coastal region (eight provinces + three municipalities) and an interior region (19 provinces + one municipality), or alternatively separated into three economic zones, i.e. East, Middle and West. This

type of classification roughly indicated the economic development level throughout the nation: rich in the East, poor in the West, moderate in the Middle. However, the relevance of this standard classification has been criticised as it did not take the differences in various aspects into account, such of those as natural resources distribution, initial economic endowments, economic structure, industrialisation level, residential consumption price index and etc. Thus, it would result in the misunderstanding of the real variation between regions and consequently lead to the misguidance in policy formulation.

Currently, a more scientific and applicable approach has been exerted based not only on the integrated comprehension of the natural and economic features and advantages of individual province but also the interaction and correlation among the neighbouring provinces, by which means 30 provinces in China can be separated into eight economic regions². Hence, based on this new classification scheme, we duplicate the estimated equation for eight regional data separately and provide a thorough comparison analysis among them. Those regions and provinces contained are:

- South Coastal Region (SCR): Guangdong, Fujian, Hainan
- East Coastal Region (ECR): Shanghai, Jiangsu, Zhejiang
- North Coastal Region (NCR): Shandong, Hebei, Beijing, Tianjin
- Northeast Zone (NEZ): Liaoning, Jilin, Heilongjiang
- Southwest Zone (SWZ): Guangxi, Yunnan, Guizhou, Sichuan+Chongqing
- Northwest Zone (NWZ): Gansu, Qinghai, Ningxia, Tibet, Xijiang
- Middle Reaches of Yangtze River (YZR): Hunan, Hubei, Jiangxi, Anhui
- Middle Reaches of Yellow River (YR): Shanxi, Shaanxi, Henan, Inner Mongolia

6.3 Indicators of financial intermediation

6.3.1 The existing banking indicators

A number of researchers having attempted to inspect the impact of financial

² This rationale is first provoked by Shangtong Li (2004), the Master of Research Centre of Development Strategy and Regional Economy which is subordinated to State Council. This classification standard is regarded as the basis for the formulation of the Eleventh Five-year Plan which largely emphasises on the regional economic development and lessening the disparity between regions.

intermediaries on economic growth, and three indicators of banking sector development are traditionally used in their cross-country studies which are defined as follows (see, for example, Levine, 1997; Levine *et al.*, 1999; Demirguc-Kunt, 2000). The first indicator, usually termed as ‘financial depth’, is measured by the ratio of liquid liabilities to GDP, including currency and demand deposits of banks and non-bank financial institutions (M2). The essential assumption is that the size of the financial sector is positively influencing the quantity and extent of financial services.

The second indicator measures the importance of commercial banks with respect to central bank in allocating savings by computing the ratio of commercial bank assets to commercial banks and central bank assets. It implicitly assumes that the commercial banks should perform better than the central bank in allocating financial resources. Central bank has been assigned the authority as the monetary policy maker and instructor and the supervisor of financial market rather than a profit-oriented business entity. Therefore, central bank does not allocate financial resources directly. Its general task is to maintain the stability of domestic financial market and smooth functioning of the financial and banking system. According to Levine (1996), commercial banks are more likely to be good at mobilising the savings and facilitating the trading, hedging, diversifying and pooling the risks than central bank.

The last indicator of financial intermediation is the ratio of credit granted by commercial banks to the private sector to GDP. The underlying assumption is that financial systems that allocate more credit to private firms are more engaged in researching firms, exerting control, providing risk management services, mobilising savings, and facilitating transactions than financial systems that simply funnel credit to the government or state-owned enterprises (SOEs). It is argued that the banks will lose their awareness against financial and managerial risk due to the implicit bailout support from governments upon the credit assigned to the governmental institutions and SOEs. In these circumstances, it is believed that the higher proportion of private credits will enhance caution in risk prevention and risk monitoring and control. Consequently, it will help to enhance the quality of bank credits thereby supporting the economic growth.

6.3.1 Five alternative banking indicators

More analysis on the application on these three indicators will be illustrated further in the following chapter, where we will study the impact of entire financial system on economic growth in China, including the performance of banking sector and securities market. Our concerns here, however, rather concentrate on whether these three indicators are suitable and applicable to our particular cross-provincial hypothesis testing. Based on a careful research on the data sources, none of the three banking development indicators is available on the provincial level. Therefore, we have to build up our own indicators corresponding as closely as possible to the ones used in cross-country analysis. Provided to the available information, the following five indicators are likely to be the most appropriate.

6.3.1.1 SIZE and CENTRAL

Since we could not find specific data on M2 for each province, we use the ratio of total deposits of the banking system (at the provincial level) to GDP (in the corresponding province) as our first indicator to measure the size of the local banking sector (SIZE). Moreover, given that the focus in the empirical study concentrates on the banking sector first, the ratio of bank deposits to GDP is more plausible measure the size of banking sector on provincial level since M2 includes cash and notes as well as bank deposits. Similarly, central bank credit is not available at the province level either. Hence, we use the ratio of loans to deposits of the State Banks as a proxy for central bank lending to the provinces (CENTRAL)³. The idea of using CENTRAL is to gauge the ratio of reserves to deposits, where the reserves of the commercial banks come from the central bank. In China, it has been found that the volume of deposit is determined by economic activity, while the volume of loans was largely affected by policy objectives through the credit plan and quota. The national quota of credit volume had been set by the headquarter of each commercial bank, and thereby being assigned to their corresponding provincial branches based on the volume allotted in previous years. According to the research findings of Nicolas Lardy in 1998, some fast growing provinces could have a low credit quota and be constrained in their lending relative to the rapid growth of their deposits. Meanwhile, banks in slower growing regions could be allotted high quotas with insufficient local deposits to finance their

³ The idea here comes from the study of Lardy (1998), Dayal-Gulati and Hussain (2002), Boyreau-Debray (2003).

lending under the support of additional funds from central bank. Hence, the ratio of loans to deposits can be interpreted as a measure of interregional fund allocation, as the State Banks are assigned with greater flexibility to use within bank transfers to adjust regional needs (Boyreau-Debray, 2003).

6.3.1.2 LGDP

The third indicator of financial intermediation is the ratio of bank loans to GDP (LGDP). The loans here prominently refer to the credits granted by the Overall Financial Institutions⁴. Ideally, this indicator should be measured by the ratio of credit to state (or non-state) enterprises to GDP. However, Chinese statistics did not provide any information on credit allocation between state-owned and non-state-owned enterprises in the early years of the sample. Though the information on bank credits has been specified more explicitly since 2000, the statistical standard is not unified in all provinces, resulting in the unbalanced dataset for every province. Thus, we are more interested in evaluating the primary function of banking sector in channelling investment funds first.

6.3.1.3 CONCENTRATION

The fourth indicator is introduced to evaluate the intensity of competition in China's banking sector. We are interested in assessing whether the change of the structure of banking sector as a result of competition affects the local economic growth in China. When the People's Bank of China was granted the authority of a central bank in 1984, its commercial operations were transferred to four specialised banks and each of them was authorised in a particular area: the Agricultural Bank of China (ABC) for the rural sector, the Industrial and Commercial Bank of China (ICBC) for the industrial sector, the People's Construction Bank of China (PCBC) for long-term investment and the Bank of China (BOC) for foreign exchange. Step by step, these four initially specialised banks were allowed to compete for deposits and loans in each other's previously monopolised market. Enterprises are also allowed to open more than one account in different banks. Despite the existing evidence indicates that the four

⁴ Overall Financial Institution is the broadest concept in China's banking sector, including state-owned and state-held banks as well as non-bank financial institutions, which has been fully explained and defined in the Data Description chapter.

state-owned banks largely maintained their operation in the originally specialised areas, the development of new financial institutions, including rural and urban credit cooperatives, non-state-owned commercial banks (such as Merchant Bank of China, Everbright Bank of China etc.), regional commercial banks and non-banking financial institutions, has severely enhanced the native competition for deposits.

Moreover, after China's WTO entrance, the restrictions over foreign banks and financial institutions operations on domestic currency will be gradually removed. Consequently, increasing competition for domestic deposits and credit market shares may also come from foreign large and sophisticated financial institutions. Since the late 1980s, qualified foreign banks and financial institutions commenced setting up their branches and/or representative offices in a number of major cities in China. Under the full supervision and administration of state government, they have been strictly excluded from operating the renminbi business in any occasions, neither absorbing the deposit nor assigning credits. 2005 will be seen as the milestone for foreign financial institutions as restrictions will be eventually abolished in this year and foreign banks will be entitled to national treatment. The general consensus was that these foreign financial institutions would rapidly increase their market share depending on their diversified product options and higher quality of service, thus generating competitive pressure to native banking sector.

The concentration of banking sector may contribute either a negative or a positive effect upon economic growth. On the one hand, a high degree of concentration introduces inefficiency that would harm firms accessing to credit, thus hampering economic growth (Pagano, 1993). On the other hand, empirical evidence suggest that the banks with monopoly power would have greater incentive to establish and maintain a close lending relationship with their credit clients, which in turn promotes enterprises' access to investment funds (Peterson and Rajan, 1995). By using a cross-country dataset over the period 1989-1996, Cetorelli and Gambera (2001) find that bank concentration has a negative effect on industrial growth, while the relationship appeared to be weakly negative when a dataset of 66 countries with a time range of 15 years (1980-1995) was observed by Levin (2000). Following these arguments, there two main outcomes derive from the weakening the monopolistic position of China's state-owned banking sector. First, increased banking sector

competition provides greater incentive for state banks to improve the efficiency of financial resources allocation and credit monitoring, in which circumstance the private sector is believed to benefit most from, thereby promoting the economic growth. Second, increased competition from non-state banks may also lead to a drop of saving deposits in the state banks, consequently threatening their ability to channel funds to state-owned sectors.

We introduce a Herfindahl index of banking sector (CONCENTRATION) to represent the banking market structure in the provinces concentration (Boyreau-Debray, 2003). The index is computed as the following equation:

$$H_{i,t} = \sum_{j=1}^n \left(D_{j,i,t} / \sum_{j=1}^n D_{j,i,t} \right)^2$$

where $D_{j,i,t}$ represents the deposits for bank j in province i at time t , $\sum_{j=1}^n D_{j,i,t}$ is the total amount of deposits for n banks equivalent to the total deposits for local branches of State Banks at the same time. It is obvious that the index equals one in case of pure monopoly and $1/n$ where shares of deposits distribute evenly among the n banks. The available data allows us to distinguish seven banks (financial institutions): the four state-owned banks (ABC, ICBC, PCBC and BOC), the Bank of Communication, the Saving Deposit Agencies of Postal Office (SDAPO) and the “other financial institutions”⁵. Unlike the experiment done by Boyreau-Debray (2003), we identify the seven categories of banks (financial institutions) within the concept of State Banks, thereby excluding rural credit cooperatives but distinguish an important component, the SDAPO. SDAPO is authorised to conduct the deposit business exclusively. Consequently, it gathers substantial investment credits that cannot be distributed by SDAPO but transferred among the state-owned banks via the central bank adjustment and instruction. Using the deposits of each financial institution, we compute concentration index for each of 29 regions⁶.

6.3.1.4 SOB

⁵ The “other financial institutions” include three policy banks, i.e. Import-Export Bank of China, Agriculture Development Bank of China and National Development Bank, and CITIC Industrial Bank. The establishment time of these banks differed from each other. Not enough data for each of them started from the sample period. Thus, they were combined together and regarded as the eighth category in State Banks.

⁶ Due to the insufficient data for Tibet, this region has been taken out from the computation of index.

The fifth and last indicator helps us to inspect the performance of the four state-owned banks respect to the Overall Financial Institutions, which is defined as the credits from four state-owned banks to the credits from total local financial institutions, denoted as SOB. The application of the last indicator is likely to be a complement to the third indicator, while has a similar implication as using the fourth one. State Banks and the Overall Financial Institutions have been distinguished in Section 4.3.1.3: State Banks consist of the four state-owned banks, policy banks and state-held banks. SOB not only measures the level of concentration of the local financial market, but also evaluates the efficiency of state-owned banks' operation. By investigating the banking sector as an individual industry, there is likelihood that the higher market share the state-owned banks take, the lower efficiency the banking industry makes. In other words, it is the 'soft-budget constraint' phenomenon existing in financial market that the discussion will be further provided in the following section.

We believe that the state-owned banks lack of incentive to improve their management skills and risk prevention and controlling because of the certainty that central bank will bailout the state-owned banks whenever they get into trouble, which is a similar mechanism working in the operation of SOEs. The primary function of state banks was to channel savings to SOEs. For instance, over 80 percent of the total amount of loans from state banks was extended to SOEs in the late 1990s (Lardy, 1998). Even though the recent rapid reform in state banking sector concentrates on the profit maximisation and strengthening manager's obligation, the state banks still prefer SOEs being their customer mainly due to the higher confidence achieved governments' more or less explicit bailout scheme towards SOEs. By contrast, credits to non-state-owned enterprises are perceived as more risky because of higher information cost and moral hazard. The higher ratio of SOB implies more reliance the local banking sector places upon the central bank support and the less efficient role it plays. As the state-owned banks are forced or more willing to serve SOE-clients, consequently, the economic growth of a province is supposed to be dragged back due to a poor functioning market of both financial sector and real production sector.

6.4 Statistic analysis – economic growth pattern in China

For an empirical application of Eq.6.1 to China's output growth, the estimation is conducted on the basis of a panel dataset across 27 provinces and three municipalities from 1985 to 2002. The dependent variable in these regressions is the annual output growth for each province in different years (GY). The independent variables include the growth of labour force growth (GL), the growth of capital stock (GK), FDI and Education indicators and the proxy of structural shift.

Table 6.2 shows the regression result under different assumptions of fixed and random effects. The column labelled (a) refers the estimated results including the industrial weight values, where (b) column displays the estimated results without weight values. Given the different types of fixed and random effects used in the regressions, Table 6.2 shows the regression results under different assumption of fixed and random effects. Before we inspect the performance of each estimator, it is necessary to identify which model is the most appropriate for our estimation. Hence, we use both Lagrange Multiplier (LM) Test and Hausman Test, where the former is used to distinguish the common ordinary least square model and panel model, the latter is applied to testify the selection between Fixed-effect (FE) Model and Random-effect (RE) Model.

Given to the low mobility of labour and capital in China, the structural change in terms of the input factors allocated between three industries in each province is more likely to influence the provincial economic growth. Thus, the provincial fixed effect should be taken into account. Meanwhile, though the dataset employed in this study tended to contain as much information as possible, the provincial data on an annual basis are only available for 18 years. Because of the relatively short time period, RE model is presumably not appropriate in these circumstances, while this assumption have been proven by Hausman test result later on in the empirical estimation process (Table 6.2). When we applied the hypothesis testing upon the one-way model (FE/RE with provinces OR time) and two-way model (FE/RE with provinces AND time), the p-value of LM test reject the hypothesis of using one-way FE/RE model. Furthermore, the p-value of Hausman test indicates the application two-way FE model is preferred to the two-way RE model. Associated with these statistical outcomes and the nature and restriction of our data sample, the hypothesis testing result supports the view that

Table 6.2: China's Economic Growth – panel estimation result (1985-2002)

Independent variables	Dependent variable: economic growth (growth of GDP)			
	Fixed-effect Provinces (a)	Random-effect Time (b)	Fixed-effect Provinces and Time (c)	Random-effect Province and Time (d)
GL	0.1702 (0.7462)	0.0388 (0.0555)	0.1085 (0.5525)	0.2244 (0.5594)
GK	0.4596*** (0.0637)	0.4582*** (0.051)	0.4572*** (0.0521)	0.4544*** (0.0595)
FDI	0.0381 (0.0437)	0.0461** (0.0223)	0.0391** (0.0215)	0.0099 (0.0372)
Education	0.0148** (0.0103)	0.0535 (0.8107)	0.0739* (0.0572)	0.0417** (0.0197)
WLM	0.0104 (0.0086)	-0.0164 (0.197)	0.0178 (0.0515)	0.091 (0.0644)
WLS	0.1644** (0.0733)	0.0118 (0.0429)	0.3971** (0.1845)	0.0345 (0.0746)
Constant	N/A	0.027** (0.0106)	0.0267** (0.0104)	0.022 (0.023)
AR ²	0.1884	0.123	0.6005	0.1279
LM Test /Hausman Test (P-value)	0.38/0.02	0.00/0.70	0.00/0.04	N/A
Number of observations	540	540	540	540

Note: The estimated coefficients are computed by using LIMDEP software package. The standard errors (presented in parentheses) are also taken from the LIMDEP printout, and both have been rounded off to the fourth decimal place. The asterisk *, ** and *** represents the significance level of 10 percent, 5 percent and 1 percent respectively. All dependent and independent variables are calculated in log-differences. Independent variables are growth of labour force (GL), growth of capital stock (GK). Control variables include FDI (volume of FDI over total fixed assets investment) and Education (the annual growth rate of the ratio of enrolment in higher education institutions over the enrolment in secondary education schools) proxies, the weight of manufactory and servicing labour input over total labour force respectively (WLM & WLS).

the regression with both provincial and time-specific fixed effects gives the best results for our panel data (column c).

There are a number of options to capture the effect of structural shift: the weight of industrial output, the weight of industrial fixed assets investment and the weight of labour force. In our estimated model, the growth of GDP has been chosen to be the independent variable while all the explanatory variables are exogenous to the growth model. The inclusion of the weight of industrial output as the proxy of structural shift effect may create endogenous bias to the estimated result. Meanwhile, as we pointed out in data specification chapter, the statistics upon industrial fixed assets investment has been pursued until 1995. Consequently, industrial level data before 1995 should only be achieved by self calculation based on certain assumption. In these circumstances, using the weight of industrial investment as the proxy for structural shift effect may not be appropriate. In order to avoid the multicollinearity problem, only two out of three ratios have been included to the estimated equation. In particular, the weight of manufactory labour force (denoted as WLM) and servicing sector labour force (denoted as WLS) are selected to present our concern over the structural shift effect upon these two industrial sectors given the rapid growth in these two sectors over the sample period.

The estimated result presented in Table 6.2, column c indicated that all estimated coefficients are positive and significant except labour force growth and weight of manufactory labour force. This result implies that the major contribution to the national economic growth is the substantial capital stock accumulation, while less commitment comes from the growth of labour force. During the economic and financial reform period, production factors have significantly shifted from lower productivity sector (such as agricultural sector) to the higher one (such as manufactory and servicing sectors). Nevertheless, it seems it is the servicing sector that mostly benefits from such shift given that the positive and highly significant estimated coefficient of the control variable – WLS.

The growth of labour force is statistically insignificant correlated to the national economic growth. Comparing with the substantial annual increase of physical capital stock, the year-to-year variability of labour force is rather moderate (see Chart 5.1).

Hence, it is understandable that there is no correlation observed between the growth of labour force and the growth of output. Furthermore, the accuracy of labour input measurement is questionable. As we pointed out previously in Chapter 5, there is a strong likelihood that the actual average hours worked per worker have increased in the post-reform stage despite the low growth rate of number of worker employed, which have been taken into account into the present labour force input statistics system. In addition, it is perceived that the working hour and working intensity in non-state sector are generally much longer and tougher than those in state sectors. However, this effect hasn't been taken into consideration either. Therefore, it is believed that the insignificant estimation for labour force growth is particularly stemmed from the downward bias in the measurement of labour growth.

Thirdly, when we decompose the contribution of each production factor with an accountancy approach, it is noticed that the growth of labour force input only accounts for a very small proportion. During the sample period (1985-2002), average growth rates of national economic output (GY), capital stock market (GK) and labour force (GL) are 8.6, 9.97 and 1.63 percent, respectively. Given the estimated coefficients of GK and GL (presented in Table 6.2), it is straightforward to achieve the proportional contribution of GK and GL are 0.0456 and 0.0019⁷, which account 53 and 2.2 percent of the overall national economic growth. Meanwhile, technical progress, captured by the constant term (0.0267) which is also statistically significant, has been found generating around 30 percent of the contribution to the national economic growth. About 15 percent of the national economic output growth derives from the structural change effect. This finding is consistent with various existing studies: Fan, Zhang and Robinson (2003) find that the structural change accounts for 17.5 percent of total GDP growth; similarly, World Bank (1996) attributed 11 percent of GDP growth in 1985-1994 to employment reallocation, while Sachs and Woo (1996) estimated this contribution up to 13 percent of GDP growth when they extended the data sample to 1979-1994. From this accountancy view, the statistically insignificant effect of labour force growth is convincing due to its trivial contribution to the economic growth.

⁷ This computation results are simply obtained by using the average factor growth rate times their corresponding estimated coefficient.

Table 6.3: Composition of Labour Force by Educational level, 1982 and 1999⁸
(in percentage)

Educational level	1982	1999
Total	100.0	100.0
Illiterate or semi-illiterate	28.2	11
Primary School	34.4	33.3
Junior high school	26.0	39.9
Senior high school	10.5	11.9
College and above	0.9	3.8

Source: *Statistical Yearbook of China*, 1986, pp.114-115; 2000, pp.171.

The estimated coefficients of both FDI and Education are also significant at 5 percent and 10 percent significant level respectively. This result supports the hypothesis that the open door policy aiming at attracting more foreign investment funds to finance the domestic economic development is a constructive and successful strategy. It is also consistent with substantial empirical studies regarding the considerable contribution of FDI to economic growth in China.

The vital contribution of educational level enhancement indicates the improvement in the quality of human capital is another essential resource attributed to the productivity increase. The change of educational level in work force is a useful indicator to measure the improvement in human capital as the general presumption states that the higher level of education employers achieve, the more skilful they would be and consequently enhancing the labour productivity. Table 6.3 shows the share of labour force with different level of education in 1982 and 1999. Obviously, the most vital change is the sharp reduction of the percentage of illiterate (or semi-illiterate) workforce associated with a large increase share of junior high school graduates, which is essentially the attribution of implementing the nine-year compulsory educational scheme (six-year primary school plus three-year junior high school). Although the share of workforce achieving higher education degree remains rather small, we have to notice that the growth rate of this share is prominent (from 2.8 percent in 1995 to 3.8 percent in 1999).

6.5 Statistic analysis – financial intermediation and economic growth

⁸ Due to the data unavailability from 2000 and onwards, the latest figures (say 2002 or 2003) of this subject are not obtainable.

6.5.1 Descriptive Statistics

Table 6.4 exhibits the average value of the real GDP growth rate and the five banking indicators, where we can observe considerable variation across provinces. Figure 6.1.a-e explicitly reveals the relationship on the basis of averaged banking indicators. Due to the data insufficiency, Tibet has been excluded from the calculation for Figure 8.1(d), where the time range spans from 1987-2002 to maintain seven categories of financial institutions for the computation of concentration index of local banking sector. Since the credit information from the Overall Financial Institutions has not been compiled until 1990 on provincial level, the introduction of the third and last indicator – LGDP and SOB reduced the time series from 18 years (1985-2002) to 13 years (1990-2002) for each of 29 provinces (Tibet excluded). Regarding the average level, banking indicators are all negatively related to the real GDP growth, though the relationship appears to be relatively weak in terms of using central bank lending to province (CENTRAL) as the proxy of banking sector development.

SIZE ranges from 43.7 percent of GDP in Hunan to 242.2 percent to GDP in Beijing. The LGDP ratio is as high as 137.6 percent in Beijing but only of 53.7 percent of GDP in Zhejiang. The pattern of central bank credit to the provinces is also uneven. In the state bank in Jilin, credit is 1.73 times higher than deposits, while in Beijing, Zhejiang, Fujian, Guandong, Tibet and Xinjiang, credit outstanding does not even match deposits provided that the indicator of CENTRAL in these provinces is less than 1.

Given that a benchmark of equal shares among the seven financial institutions is 0.14, none of the provinces has the index value less than 0.2, which indicates that the banking sector in China is likely to be highly concentrated. The provinces associated with the lowest degree of concentration are Jiangsu, Zhejiang, Fujian and Hainan (0.24). Beijing has the highest concentration (0.34), and Sichuan (+Chongqing), Inner Mongolia, Liaoning, Jilin, Heilongjiang, Shaanxi and Gansu have an index value over 0.3. Additionally, it is worthwhile to point out that the Herfindahl index can be given a ‘numbers equivalent’ interpretation: an index X indicates equivalent to $1/X$ equally sized banks. From this point of view, the local banking market is highly concentrated.

Table 6.4: Descriptive statistics of banking sector and economic indicators—average values (1985-2002)

	GDP					Education		
	growth rate	SIZE (%)	CENTRAL	LGDP ^a (%)	CONCENTRATION	SOB ^b (%)	FDI (%)	Education (%)
Beijing	5.94	242.12	0.58	137.64	0.34	60.68	8.94	32.97
Tianjin	7.15	92.63	1.30	110.66	0.27	76.06	13.52	16.32
Hebei	9.21	54.68	1.03	54.82	0.28	63.17	2.75	3.98
Shanxi	5.74	86.87	1.06	87.54	0.28	64.2	1.87	4.47
Inner Mongolia	7.76	110.28	1.06	83.59	0.30	71.26	0.99	3.84
Liaoning	6.98	68.05	1.28	82.15	0.30	66.43	7.86	8.94
Jilin	7.44	70.53	1.73	116.62	0.32	68.7	3.37	7.9
Heilongjiang	6.78	66.80	1.37	87.90	0.31	71.36	2.83	5.8
Shanghai	8.03	111.21	1.02	103.69	0.25	67.29	9.41	24.59
Jiangsu	9.86	55.44	1.10	55.40	0.24	66.52	11.72	7.17
Zhejiang	10.5	60.55	0.94	53.74	0.24	63.25	3.7	5.05
Anhui	7.47	46.07	1.38	60.10	0.26	66.96	2.63	3.61
Fujian	12.61	60.88	0.96	57.90	0.24	72.11	22.43	4.95
Jiangxi	7.96	59.93	1.32	74.93	0.28	70.07	4.04	4.09
Shandong	9.36	48.40	1.24	58.25	0.26	62.13	6.23	3.57
Henan	9.63	50.69	1.36	65.43	0.29	60.68	2.13	2.93
Hubei	7.9	57.38	1.47	81.21	0.25	68.96	3.9	7.11
Hunan	7.36	43.71	1.27	53.81	0.29	69.19	3.75	4.49
Guangdong	10.86	86.45	0.97	77.12	0.26	59.56	21.45	4.57
Guangxi	8.43	69.82	1.04	68.53	0.25	71.98	6.55	3.23
Hainan*	8.00	102.84	1.24	121.42	0.24	63.57	18.91	3.43
Sichuan+Chongqing**	7.2	58.36	1.37	75.80	0.33	66.36	1.78	5.02
Guizhou	6.08	65.96	1.25	80.83	0.27	74.82	1.05	3.33
Yunnan	8.22	60.44	1.67	77.38	0.25	75.18	0.97	4.05

Tibet	7.29	94.61	0.62	64.47	N/A	N/A	1.93
Shaanxi	7.27	84.38	1.18	94.27	0.31	73.68	8.04
Gansu	6.1	84.00	1.12	91.05	0.31	70.55	4.49
Qinghai	6.53	90.32	1.37	122.49	0.28	74.78	3.97
Ningxia	7.27	93.19	1.19	107.64	0.28	78.57	3.84
Xinjiang	8.75	92.04	0.97	88.31	0.28	73.51	4.89

* Hainan province was given a province status in 1988 and was before this data part of Guangdong province.

** Chongqing city was given a municipality status in 1997 and was part of Sichuan province prior to this data. For the consideration of simplicity and data consistency, the statistic of Sichuan province and Chongqing city were aggregated from 1997 onwards. For more reasons by doing so, please refer to Data Description section.

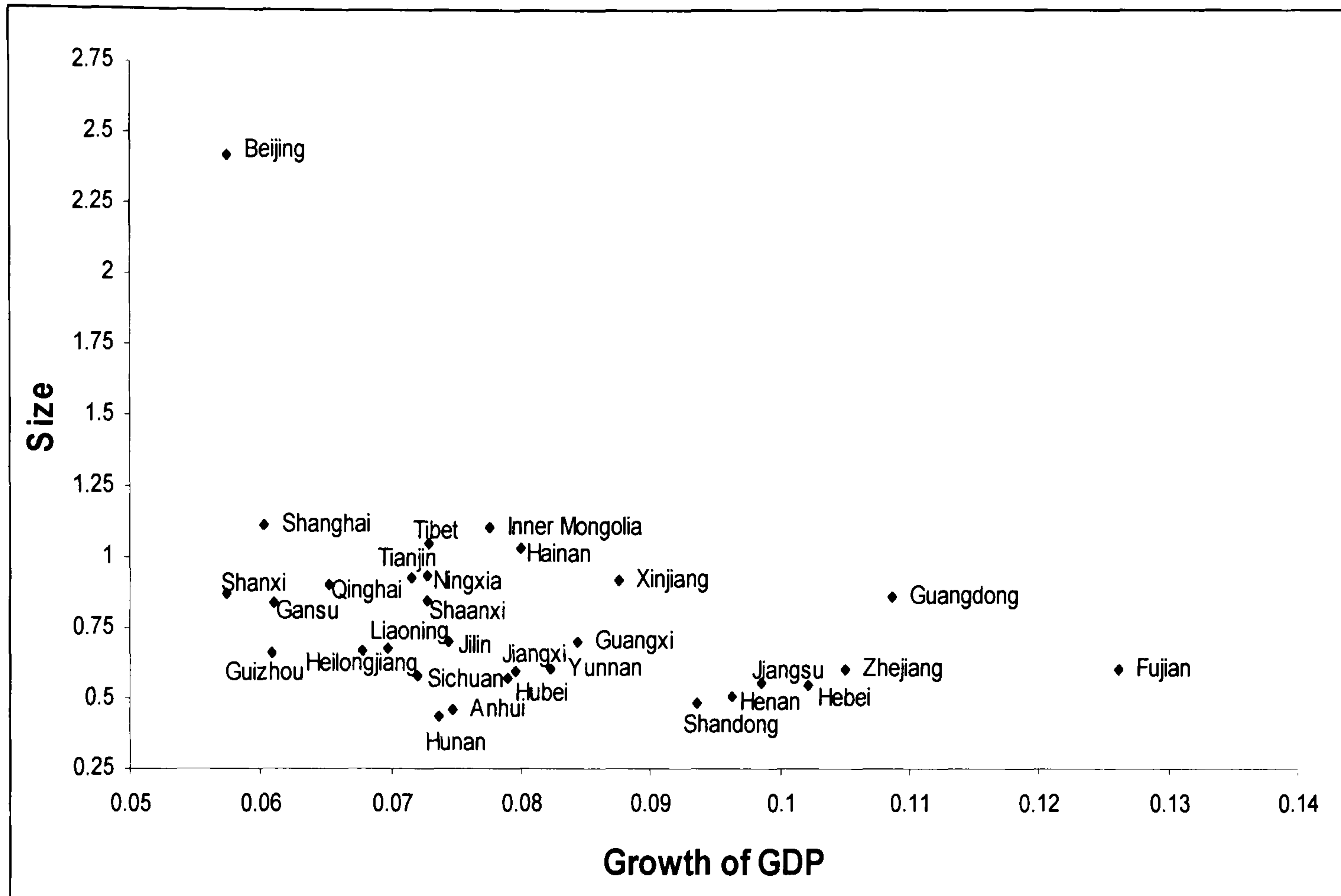
^{a, b} Data availability only covers the time series from 1990 to 2002.

SIZE – the size of the local banking sector; CENTRAL – central bank lending to the provinces; LGDP – the ratio of bank loans to GDP; CONCENTRATION – the Herfindahl index of banking sector to represent the banking market structure in the provinces; SOB – the performance of four state-owned banks with respect to the overall financial institutions; FDI – the percentage of FDI over total investment in fixed assets; Education – the ratio of higher education enrolment over secondary education enrolment.

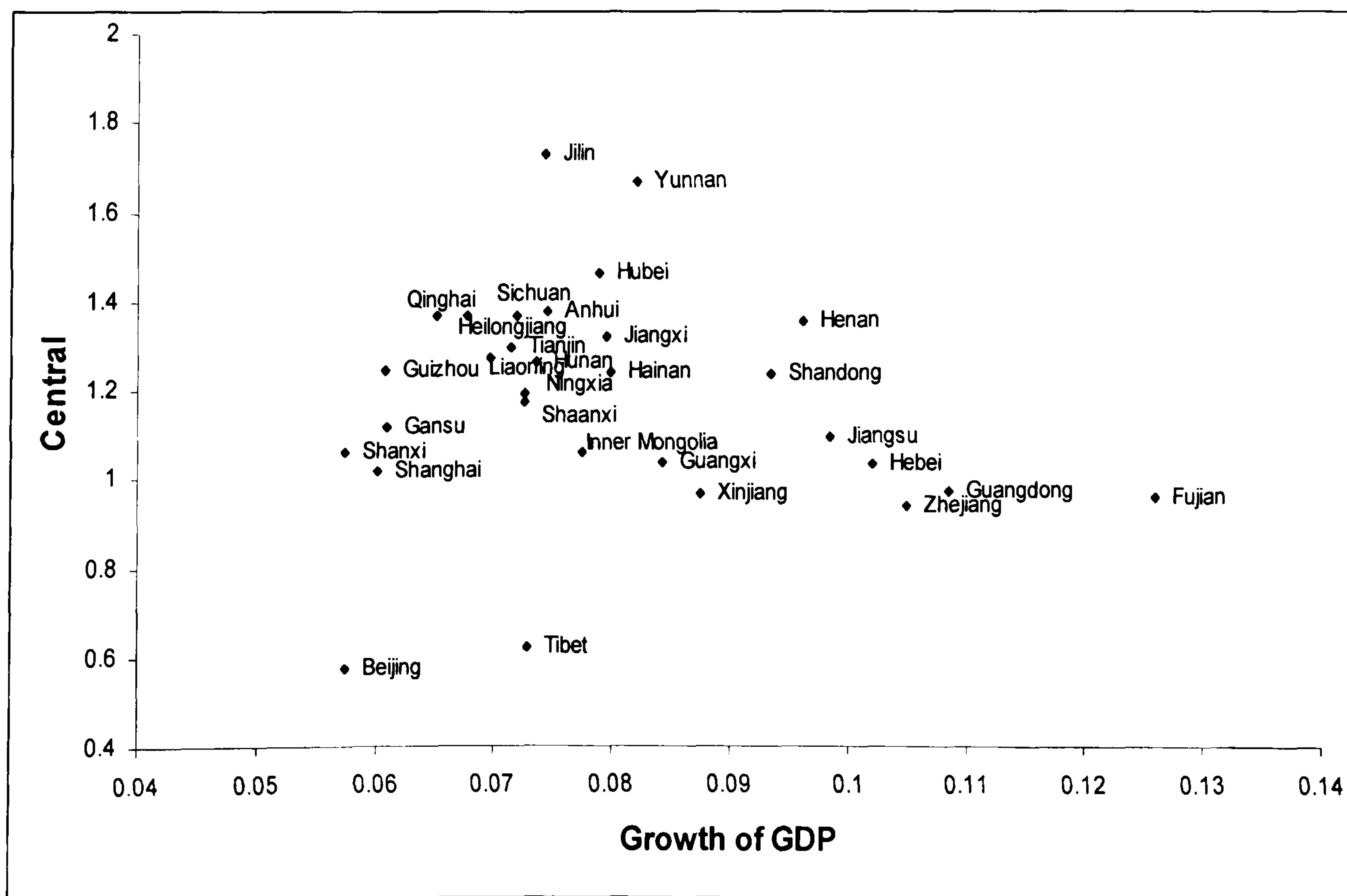
Source: see *Data Description Chapter*.

Figure 6.1: GDP growth and Five Banking Indicators (1985-2002, average value)

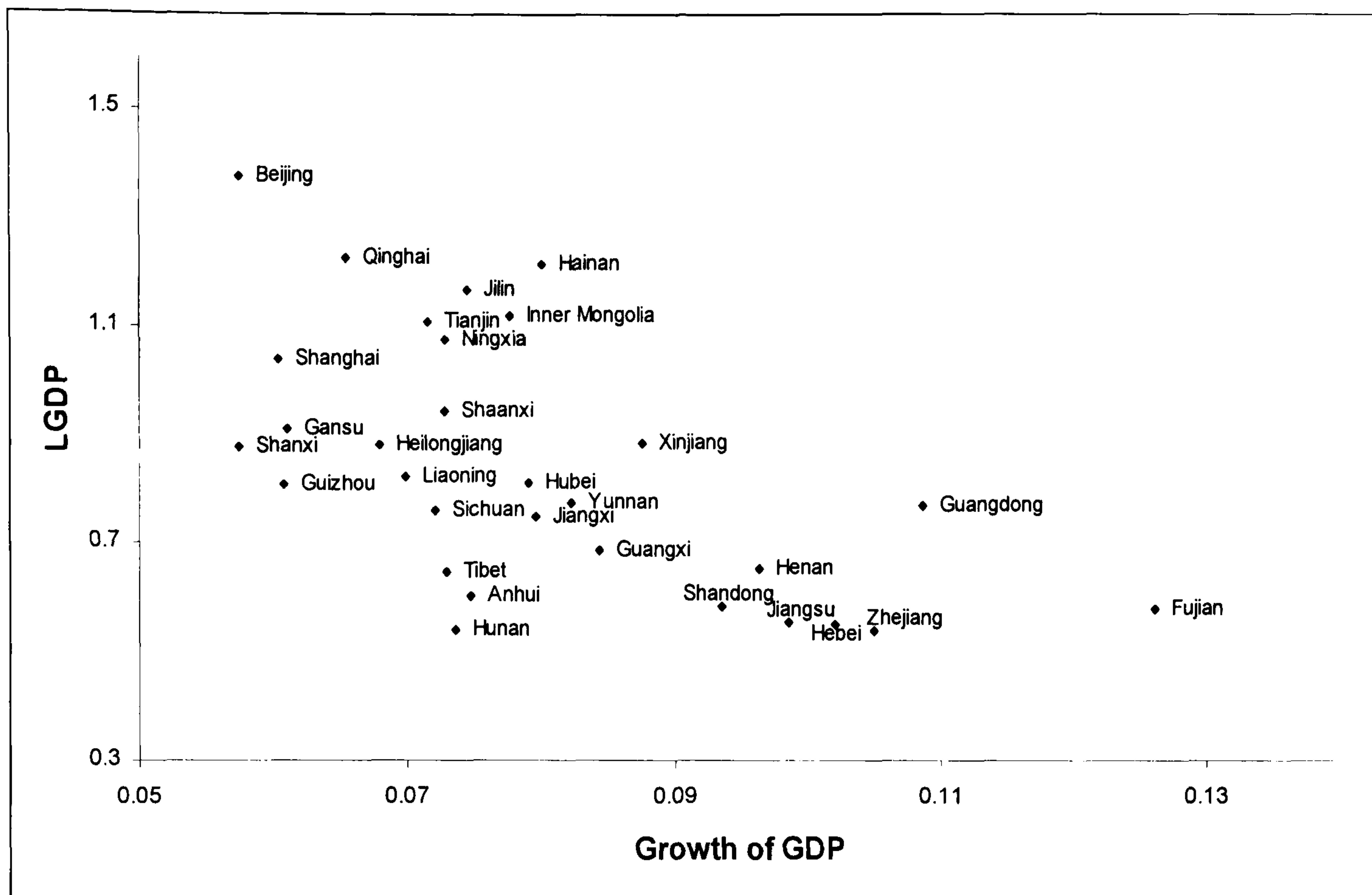
a. GDP growth vs. SIZE



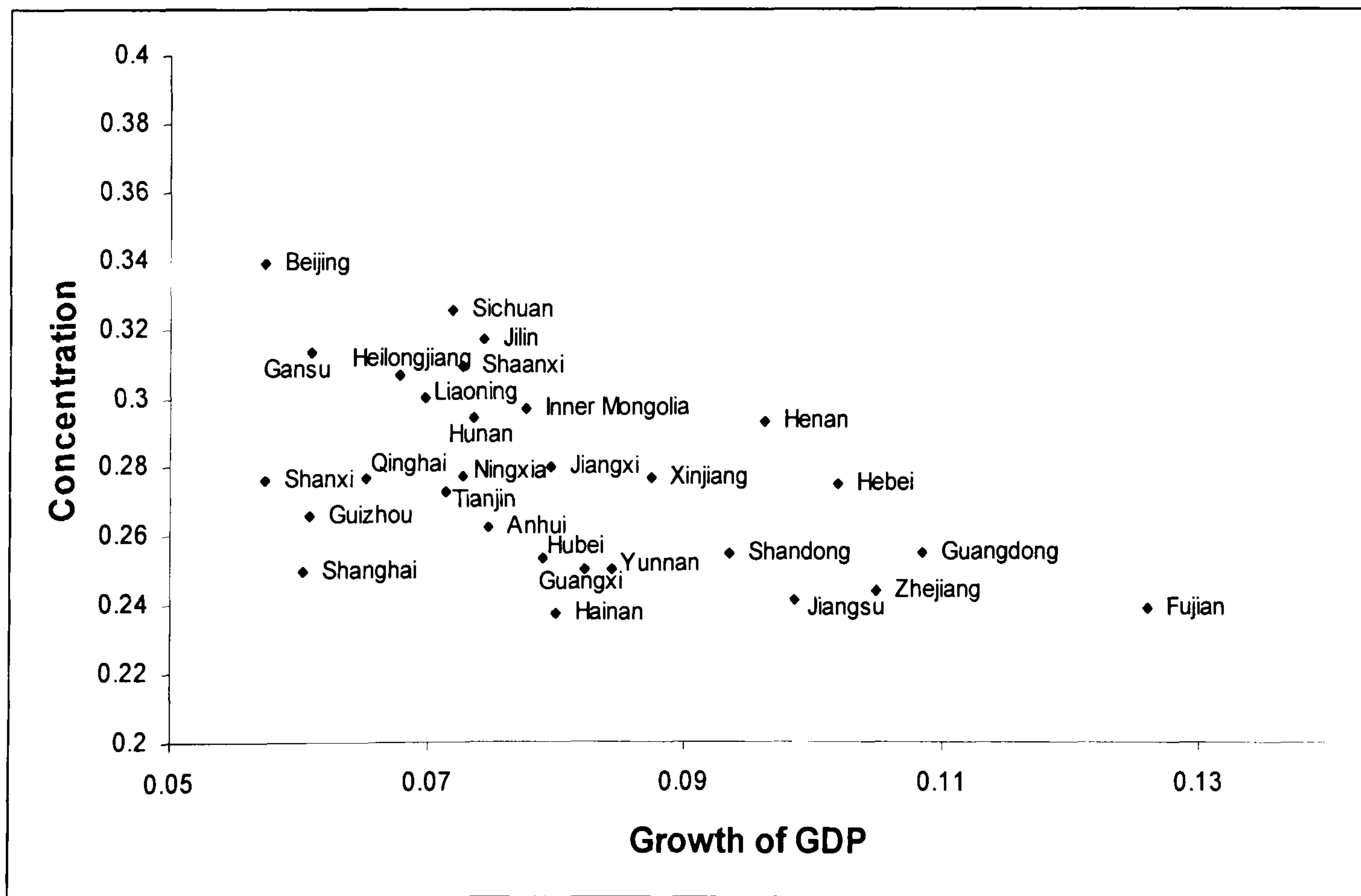
b. GDP growth vs. CENTRAL



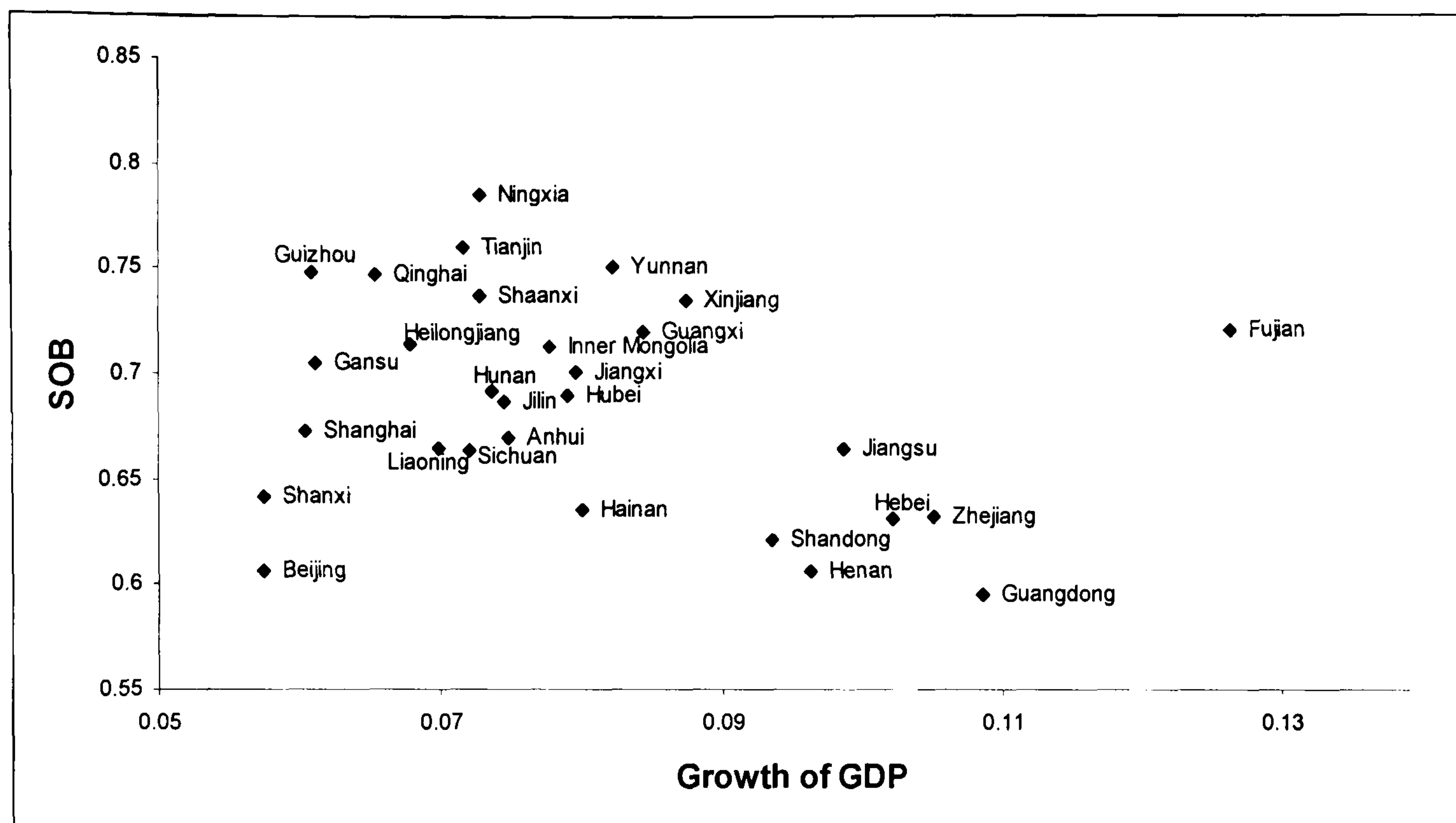
c. GDP growth vs. LGDP



d. GDP growth vs. CONCENTRATION (1987-2002, Tibet excluded)



e. GDP growth vs. SOB (1990-2002, Tibet excluded)



For instance, those four provinces with the lowest index 0.24 presents there should no more than 4 banks with even size in each of these provinces. In those extreme cases whose indices are over 0.3, on the other hand, the optimal number of banking firms is 3.

However, due to each state-owned bank operational speciality in different industrial sector authorised by the central bank, the branches of four state-owned banks had been launched in each province in order to serve the clients operating in corresponding sectors on the real side of economy. The other commercial banks, on the other hand, launched their branches almost in every province gradually without being restricted in their operations. In these circumstances, there are at least five to six unequal sized banks operating in each local financial market, where in most of the cases ICBC is the largest bank by attracting over 35 percent of total deposits and granting over 30 percent of total credits. Finally, we observe that there are nearly 80 percent of the bank credits assigned by the four state-owned banks in Yunnan province, compared with less than 60 percent in Guangdong.

As far as the overall size of the local banking sector is concerned, the municipalities of Beijing and Shanghai have the highest levels of deposits to GDP ratio, followed by

Inner Mongolia and Hainan, whose SIZE ratios are 110.3 percent and 102.8 percent, respectively. Their economic growth rates, however, appear to be slightly below the national average level except the one of Beijing (5.94 percent, the second lowest growth rate). Simultaneously, the fast growing economies in Fujian, Zhejiang and Shandong are associated with relatively smaller size of banking sectors. Thus, it has been found a negative relationship emerges between the size of banking sector and GDP growth (also see Figure 6.1(a)).

Generally speaking, central bank lending seems to be assigned to provinces with lower economic growth rate (Figure 6.1(b)). Intuitively, this relationship is rather weak both in terms of ‘goodness of fit’ and in terms of slope of the line. There is a negative correlation between the ratio of bank loans to GDP and the real GDP growth rate (Figure 6.1(c)). Associated with Table 6.4, we can see provinces of Jilin (1.73), Yunnan (1.67), Hubei (1.47) and Anhui (1.38) are the top four which benefit the most from central bank lending, but their economic growth rates are neither the highest nor the lowest. In the extreme case, provinces such as Zhejiang, Guangdong and Fujian, whose economic growth rates exceeded 10 percent annually, they received relatively little credit from central bank ($CENTRAL < 1$). Given to the lowest ratio of CENTRAL (0.58), Beijing’s deposits exceed by far its corresponding value of credit, thus suggesting that the capital city is a net contributor to the central bank resources.

A negative relationship between CONCENTRATION and the growth of economic output has been observed through the descriptive statistics. It suggests that a banking sector where dominated by several large state-owned banks/financial institutions is less efficient than a banking sector full with competition. Middle-growth provinces of Inner Mongolia, Jilin, Liaoning, Heilongjiang, Shaanxi, Sichuan and Gansu have a more concentrated banking market than the relatively developed provinces of Zhejiang, Jiangsu or Fujian.

Table 6.5 reports the correlations between the output growth and the banking indicators: a negative relationship is confirmed by measuring the banking sector development with the proxies of CENTRAL, LGDP, CONCENTRATION and SOB, while a weak but positive relationship has been identified between SIZE and growth.

Table 6.5: Descriptive statistics of five banking indicators: Correlations

	Size	Central	LGDP	Concentration	SOB
Growth rate of GDP	0.0168	-0.3959	-0.6028	-0.5251	-0.2701
Size		-0.379	0.7524	0.3688	-0.1168
Central			-0.0357	0.0372	0.7168
LGDP				0.5923	0.2258
Concentration					0.073

Meanwhile, we also discover a few interesting relations among the banking indicators. For instance, it is not surprising to find a strong and positive relationship between SIZE and LGDP, since the bank loans allocation simply depends on how large the credit resource is as measured by deposits. Moreover, the strong and positive relationship between SOB and CENTRAL provides the evidence that a higher degree of four-state-owned-bank concentration requires a stronger central-bank backup. Similarly, a relatively high rate of LGDP also indicates a high degree of concentration of the banking sector.

This statistical description suggests several preliminary results. First, the size of provincial financial intermediation does not necessarily have a firm relationship with the level of economic development, since the statistic correlation on averaged provincial data and panel data draws contradictory conclusion on this issue. Second, provinces with a lower rate of economic growth receive larger credit flows from the central government. Third, higher market concentration is associated with lower growth performance and a similar situation also applies to the degree of four state-owned banks credits. Fourth, given the largest size of banking sector and highest level of bank credits to GDP ratio while least reliance on credit subsidy from central government, Beijing, the capital city of China, has achieved a rather low growth rate, exhibiting a contradictory scenario to the general correlation between financial intermediaries and economic growth found in the rest of the provinces in China.

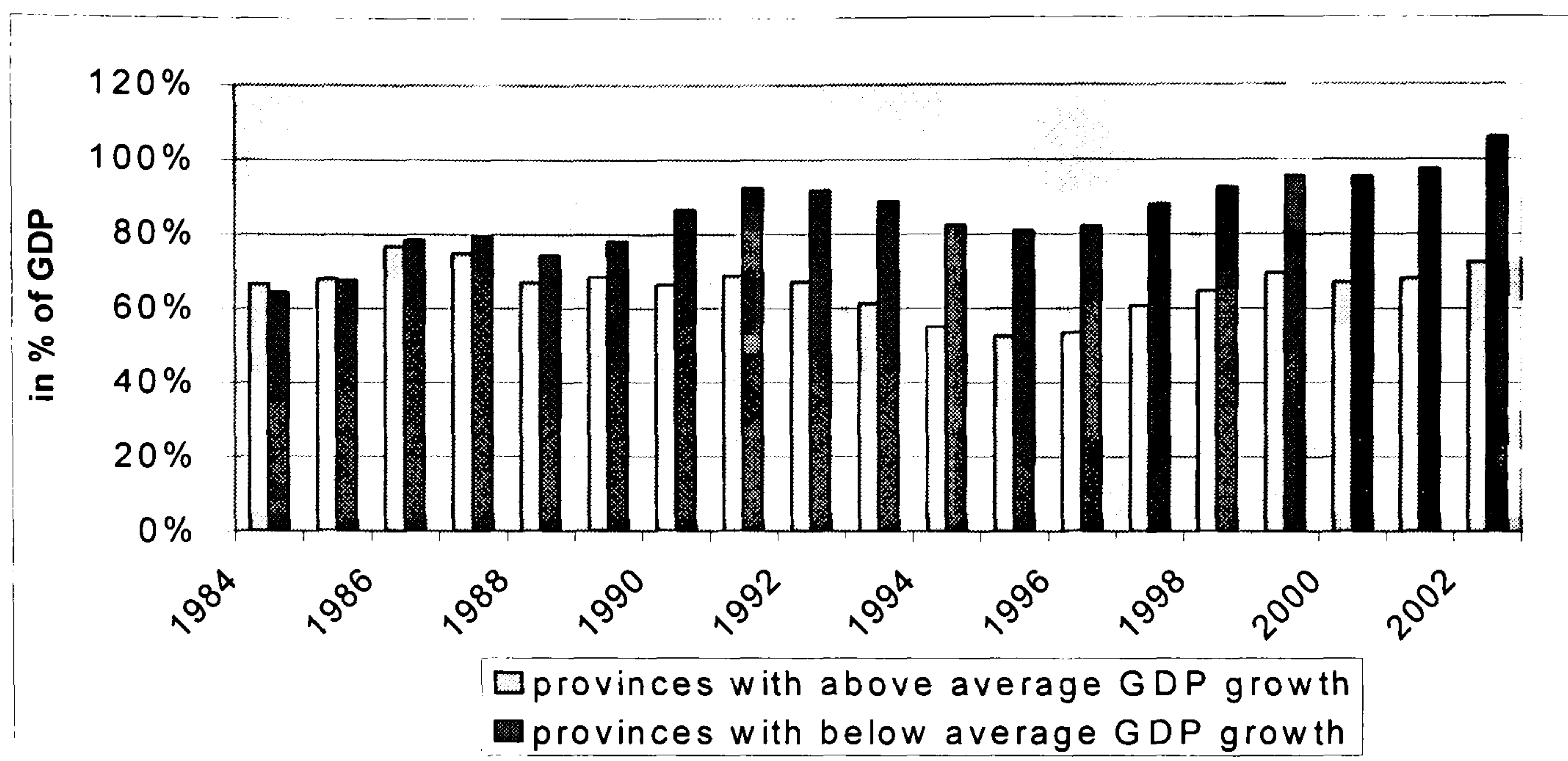
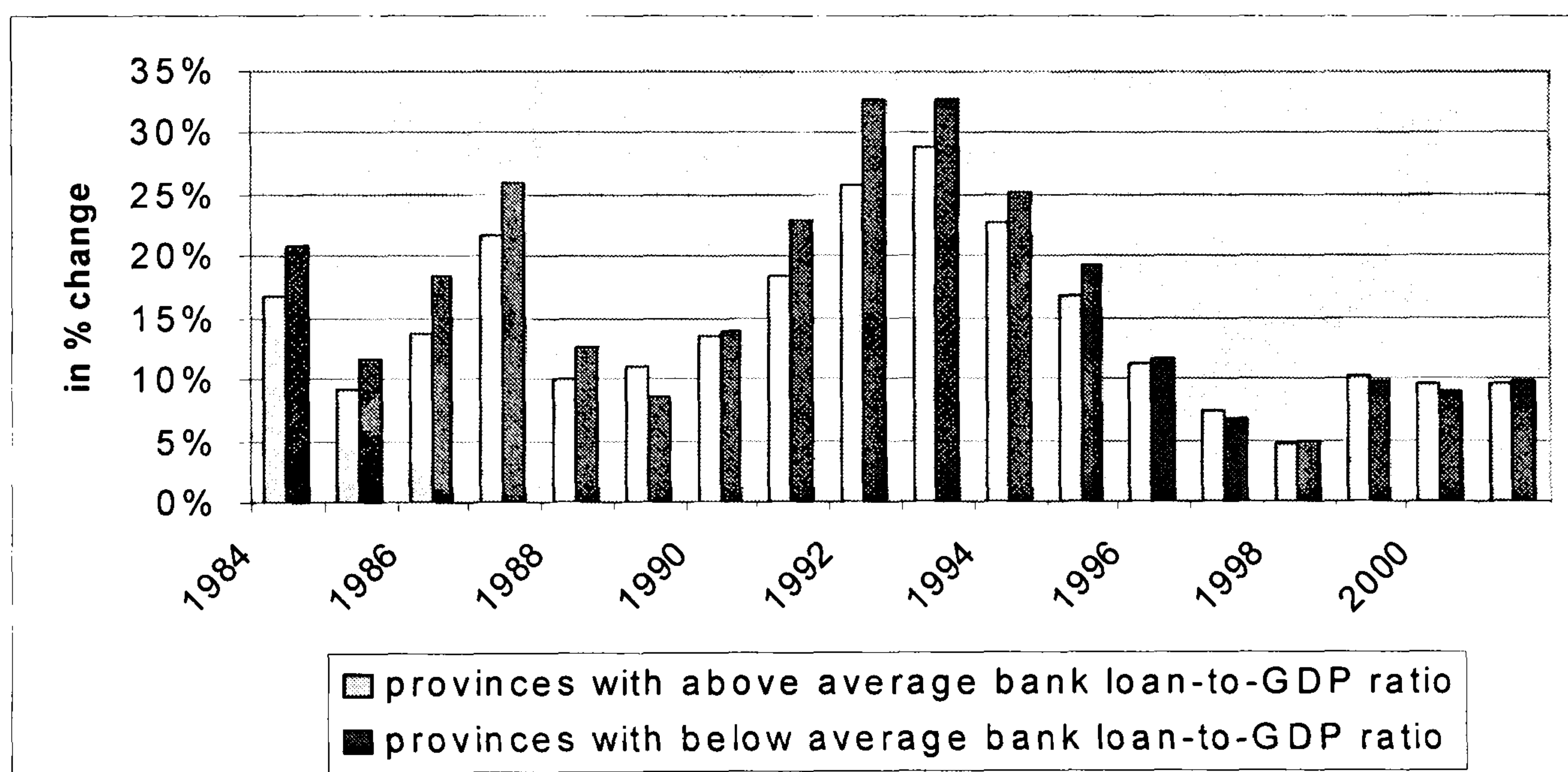
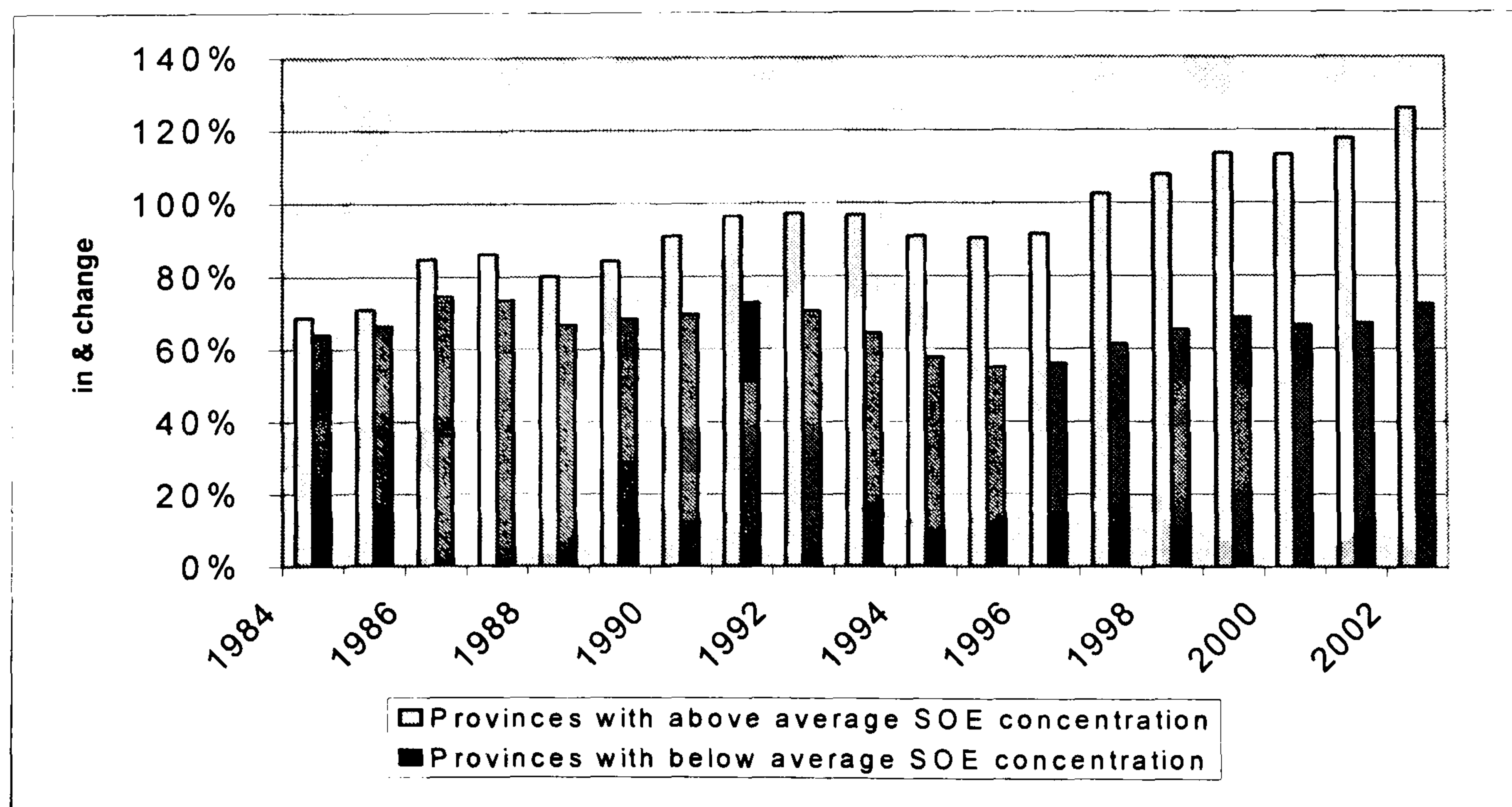
However, one has to keep in mind that these descriptive correlations cannot be interpreted as the hypotheses testing on the relationship between financial development and growth, between the state banking overall performance, the impact of the central government lending and the effect of bank concentration on provincial

real economic growth. In next section, we propose our research framework and derive our estimated equation, followed by the result interpretation and analysis.

6.5.2 Indicative Result

To get a sense of the role played by financial development in China's economic growth, provinces were grouped according to certain economic characteristics. Three groupings were made: into those with above average and below average growth, those with above average and below average levels of financial intermediation (as measured by the bank loan-to-GDP ratio) and those with above average and below average levels of SOE concentration. For the first grouping, the level of financial intermediation in the high growth group was compared with that in the low growth group, while similar exercises were conducted for the second grouping. This exercise produces the following results:

- Those provinces with above average GDP growth had bank loan-to-GDP ratios that were statistically lower (by up to 33 percent of GDP, and on average 19.6 percent of GDP) than below average growth provinces (Figure 6.2).
- Correspondingly, provinces with above average levels of financial intermediation experienced lower growth than those provinces with below average levels of financial intermediation. But this situation only remained until 1995, while since 1996 onwards, the growth difference between these two groups seemed to have narrowed down rapidly, which may indicate that the financial intermediation making a significant contribution to the regional economic growth (Figure 6.3).
- Provinces with above average concentrations of SOEs had higher bank loan-to-GDP ratios than those provinces with below average concentration of SOEs. This result indicates the pervasive phenomenon in China that bank loans are usually granted to the less productive SOEs due to the political reasons (Figure 6.4).

Figure 6.2: Financial Intermediation and Economic Growth (1984-2002)**Figure 6.3: Growth and Financial Intermediation (1984-2002)****Figure 6.4: Financial Intermediation and SOE Concentration (1984-2002)**

6.5.3 Empirical results – provincial panel analysis

Table 6.6 reports the estimates of Eq.6.4, using five banking indicators as the financial development variable individually (column 1a to 5a, respectively). In the last column 6a, we also exercise the hypothesis testing by including both LGDP and SOB, for the purpose of detecting the robustness of the effect of state-owned-bank credits. Due to the variations in data availability and accessibility when different banking indicator is deployed, the estimation procedure is conducted on various size of dataset, which is reported as the number of observations correspondingly in the final line of the table. Nevertheless, all results displayed in Table 6.6 firmly support the idea that the banking sector performance is not positively related to the local economic growth. More precisely, banking sector in China does not act the leading role in the financial-growth nexus in China's present context.

Apart from the estimation of banking indicators, industrial labour force and capital stock are also evaluated in each case where the estimated coefficients are exhibited in Table 6.6 synchronically. Prior to the analyses on the influence of banking sector, it is worthwhile to observe the estimated results on labour force and capital stock, as well as on those control variables. First of all, the dimension of capital stock growth are approximately remains the same. Secondly, in most cases, FDI and Education proxies are significantly and positively related to the national economic growth. Nevertheless, after including the banking indicators into the regression function, it is hard to find any correlation between structural change (measured by the weight of sectoral labour force) and output growth.

The liquidity indicator (SIZE) has no impact on economic growth, which is contradictory to the general cross-country estimated result of a positive relationship between the size of the financial sector and economic growth (Table 6.6, column 1a). As mentioned before, financial deepening during the reform period has been impressive at the national level, although not accompanied by an improvement in the allocation of savings; at the regional level, inferior provinces with a relatively lower growth performance are associated with a high ratio of deposits to GDP. Therefore, the implicit assumption that the size of the financial sector is positively correlated to the quality of financial services is questionable in the case of China. A high level of this

**Table 6.6: Banking sector development and Economic Growth: All Provinces
(Two-way Fixed Effect Model)**

Independent variables	Dependent variable: economic growth (net change of GDP)					
	1a	2a	3a	4a	5a	6a
GL	0.0077 (0.0598)	0.0192 (0.059)	0.0155 (0.0589)	0.009 (0.0598)	0.0162 (0.0581)	0.0138 (0.058)
GK	0.5083 *** (0.0626)	0.5117 *** (0.055)	0.5085 *** (0.0547)	0.5054 *** (0.0628)	0.5212 *** (0.0525)	0.5044 *** (0.0528)
FDI	0.0132 * (0.0079)	0.0022 * (0.0013)	0.0022 * (0.0012)	0.0241 ** (0.0093)	0.0017 (0.0014)	0.0027 * (0.0149)
EDU	0.0226 ** (0.0081)	0.0273 (0.1028)	0.0882 ** (0.0494)	0.0369 * (0.021)	0.0105 * (0.0074)	0.0667 * (0.0456)
WLM	0.0291 (0.0799)	0.0024 (0.0524)	0.0477 (0.0528)	-0.0215 (0.0796)	0.0247 (0.048)	0.0625 (0.0501)
WLS	0.0484 (0.0696)	-0.0164 (0.0261)	-0.036 (0.027)	-0.0598 (0.0692)	-0.0151 (0.0237)	-0.0372 (0.0253)
SIZE	0.0165 (0.0103)					
CENTRAL		-0.0135** (0.0063)				
LGDP			-0.0204* (0.0112)			-0.0229** (0.0115)
CONCENTRATION				-0.0006 ** (0.0003)		
SOB					-0.0079 *** (0.002)	-0.0806 *** (0.0195)
Provinces	30	30	30	29	29	29
Observations	540	540	540	493	377	377

Note:

1. All dependent and independent variables are calculated in log-differences. Independent variables are growth of labour force (GL), growth of capital stock (GK). Control variables include FDI (volume of FDI over total fixed assets investment) and Education (the annual growth rate of the ratio of enrolment in higher education institutions over the enrolment in secondary education schools) proxies; the weight of manufactory and servicing labour input over total labour force respectively (WLM & WLS).
2. SIZE – the size of the local banking sector; CENTRAL – central bank lending to the provinces; LGDP – the ratio of bank loans to GDP; CONCENTRATION – the Herfindahl index of banking sector to represent the banking market structure in the provinces; SOB – the performance of four state-owned banks with respect to the overall financial institutions; FDI – the percentage of FDI over total investment in fixed assets; Education – the ratio of higher education enrolment over secondary education enrolment.
3. The asterisk * (**) (***) represents the significance at 10% (5%) (1%) level, respectively.
4. When the fourth banking indicator CONCENTRATION is included, the number of observations reduces to 493 due to the exclusion of observations from Tibet and of year 1985 where this indicator cannot be calculated. The fifth banking indicator SOB is applied to all provinces except Tibet and with time span from 1990 to 2002.

indicator may not predict a high level of financial intermediation development. Park and Sehart (2001) reach a similar conclusion: they find an inverse relationship between the rate of financial intermediation and the level of economic growth among Chinese provinces, suggesting political factors other than economic ones play an important role in lending decisions.

The ratio of bank credit to GDP (LGDP) has negative impact on local economic growth, supporting the hypothesis that the banking sector does not allocate savings efficiently and that provinces with a more developed financial sector may not benefit from more efficient resource allocation. Nevertheless, the higher proportion of the loans assigned by state-owned banks (SOB) would further decrease the efficiency of the banking sector, thus worsening local economic performance. This result remains robust when the indicators of LGDP and SOB are adopted simultaneously (column 3a, 5a and 6a, respectively).

Theoretically, it is widely accepted that investment has a major and positive contribution to the economic growth. Based on the perception that most of the external investment funds are channelled by bank loans, it is believed that the increasing bank credits will undoubtedly lead to a faster economic growth. In other words, the bank credit allocation should have a positive impact on economic growth. However, the suspicion arouse that the above statement does not take the alternative investment resources into account, but rather concentrate on bank credits exclusively. Within the four major categories of investment fund sources in China, domestic bank credit is the second biggest fund source, while the first one is internal funds which take a share of over 60 percent of total funds. In the Chinese context, internal funds refer to extra-budgetary funds for investment received from central government ministries, local governments, enterprises and institutions, including their self retained profits. Meanwhile, this type of investment funds also includes capital raised through issuing bonds or equities by enterprises or financial institutions, funds raised through donations, and funds transferred from other units. In these circumstances, it can be argued that the more successful the enterprises are the more profits they earn. Consequently, the larger amount of retained profits will be contributed to the investment projects, resulting in the less reliance on the other fund sources including bank credits. By contrast, when a region is dominated by the weak performing

enterprises, they hardly raise investment funds by themselves, thus relying on bank loans heavily. Additionally, the launch of stock market in 1992 provided another significant channel for investment fund raising, which should dilute the importance of bank credit in raising investment funds.

Furthermore, the negative relationship may also be explained by the increasing proportion of Non-performing Loans (NPLs) with the successive expansion of bank credit. According to the state government, NPLs from four state-owned banks account for 20 to 25 percent of the banks' total lending; international observers estimate that the ratio actually exceeds 40 percent (Lardy, 1998, 2000). It is generally believed that the extensive amount of NPLs is the result of the directed credit lending (policy lending) granted under the pressure from both central and provincial authorities to favoured sectors and enterprise. Although the Commercial Bank Law assign commercial banks operational independence and freedom of choice in their lending decisions, the majority of the domestic banks lack the autonomy to choose their customers. Before 1998, the central government influenced the lending decisions of state-owned banks through its credit control plan. The plan not only set up a credit ceiling for the banks but also specified how funds should be used. The influence of this control plan had been passed onto the local branches when the specified quota was allocated from the headquarters. Directed lending is not unique in China's state-owned banks. Joint-equity commercial banks and city commercial banks are not immune from state interference as long as their major shareholders are local governments and state institutions. Banks with a close relationship with central and local governments tend to be more susceptible to political pressures in their lending decisions. Particularly city commercial banks, most of their predecessors were local city credit-cooperatives whose mission had been established as servicing local government and SOEs. According to an official survey, at the end of 2003, 17 city banks out of total 112 in the country had an average NPLs ratio of 43.9 percent.

Nevertheless, the impact of directed lending in China has been diminishing since the abolition of the credit plan in 1998. Moreover, four Asset Management Enterprises (AMEs) were established in 1999 and the NPLs with total face-value of RMB1400 billion were transferred from four state-owned banks and taken over by the four AMEs. In recent years, the central bank encouraged domestic bank to offer consumer

credit and to expand credit to private enterprises. All these efforts aimed at alleviating the commercial banks' burden, granting more freedom to commercial banks and stimulating them to act more cautiously on the market bases. However, these efforts have been hampered by the lack of credit-tracking tools, a national accounting standard and a sound legal framework including collateral and bankruptcy legislation. Wong and Wong (2001) pointed out that these instruments are essential for banks when they start to act as market entities while they were actually of little use when most bank credits are directed to SOEs.

Owing to the poor national accounting standard and the lack of credit history records, it is very difficult for domestic banks in China to obtain a fair and objective assessment on loan applications. Domestic banks do not have sufficient information to select trustworthy clients and to monitor their behaviour. The deficiencies of collateral and bankruptcy legislation further increase credit risks, which can explain why the banks that have been relatively free from policy lending still have been accumulating high NPL ratios. For instance, China Minsheng Bank had a low SOEs or policy lending: more than 85 percent of its credits went to the private sector in 1998 (Xiao, 1999). However, the bank's NPL ratio increased from 2 percent in 1997 to 10.9 percent in 1999 (China Merchants Bank, 1999). Consequently, the high credit risks resulted in the lower incentive to extend loans to privatised and new start-up enterprises, neither to individual consumer. Therefore, though the volume of bank credits expands rapidly, the poor quality of such credits and inefficient credit management impede the primary function of bank credit in channelling investment funds.

Similarly, the more credit a province receives from the central bank, the lower its growth performs (column 2a). Associated with the specific conditions in China, this phenomenon can be interpreted by the theory of soft-budget constraint which is a major problem in China. According to Kornai (1980), an organisation is said to have a soft budget constraint when it expects to be bailed out in case of financial trouble. In addition, the organisation raising funds depends on political connections and lobbying rather than success in terms of selling output and productive efficiency. The banking sector dominated by state-owned banks has been used as a quasi-fiscal instrument of government to bailout the unprofitable SOEs via delivering special policy loans

without concern about efficiency. The result has been a growing accumulation of NPLs. In compensation for their lack of autonomy, the SOEs were implicitly guaranteed bailouts by local government. Given the easy access to central-bank refinancing and the government's commitment to support the state sector, the budget constraint of the state banks is likely to be soft. Thus, the finding of a negative impact of central bank lending on local economic growth can be interpreted as a lack of incentives for the state banks to improve their management or base their lending decisions on efficiency criteria, as they expect the central bank to cover their losses. Furthermore, this result supports the idea argued by Park and Seht (2001) that the efficiency in state-owned bank management has not improved in the recent years and "that financial reforms in the mid-1990s have not reversed a worsening trend" (p.628).

Higher bank concentration is significantly associated with lower economic growth (column 4a). This result supports the idea that banking competition is likely to improve economic performance as found by Cetorelli and Gamberra (2001) using a cross-country sample. It may also imply that greater entry into the banking sector improves bank performance, which in turn improves resource allocation in the province and leads to higher local economic growth.

Meanwhile, we need to point out that these five banking indicators are closely interrelated as shown earlier in Table 6.5. One may argue that a high degree of concentration in banking sector implies that the provincial banking market is still largely dominated by the four state-owned commercial banks. The proportion of credit from four state-owned banks gives a more straightforward explanation on this point. Thus, as the state-owned banks mainly serve SOEs, it could be explained that a high level of state-owned bank credit is the sequence of the dominance of SOEs on the real side of the local economy. Correspondingly, the negative impact of the credit on growth can be explained by the poor performance of their clients. A high level of state-owned bank credit is also likely to be translated into a higher dependence on central bank lending to cover the balance between loans and deposits.

6.5.4 Empirical results – regional panel analysis

6.5.4.1 Descriptive Analysis

When we turn to the analysis on the relationship between economic growth and financial development within eight economic regions respectively, we first highlight the performance of banking sector in these sub-nations by exhibiting the computed ratio and rank of five financial indicators in Table 6.7. In general, the figures in Table 6.7 imply a fast growing region is usually associated with less reliance on central bank lending, lower level of banking sector concentration within a relatively large size of banking market.

The economic growth rates of three coastal areas, SCR, ECR and NCR, are taking the top three positions among eight regions, supporting the common perception that the coastal regions are richer and more developed than the interior provinces in China. The most striking result is that the ratio of loans from financial institutions to GDP is not always negatively associated with GDP growth. Given to the highest growth rate in SCR (nearly 10.5 percent annually), LGDP appears to be unexpectedly high (74.12 percent) over the sample period (1984-2002), staying on the fourth place. However, achieving the second highest GDP growth rate, ECR has the lowest LGDP ratio. Meanwhile, though the more competitive banking market should have higher contribution to the regional economic growth, the descriptive statistics shows that there is an extraordinary high level of banking sector concentration in NCR, with the index value of 0.272 and taking the third place. Nevertheless, these three regions all have a low proportion of state-owned-bank credits, and correspondingly, the banking sector operations are relying less on the central bank lending.

The GDP growth rate in NEZ has been the lowest in the country. The bank loans are equivalent to 90 percent of GDP in such highly concentrated banking market whose degree of concentration is the highest one (0.295). Meanwhile, credit is 1.39 times higher than deposits in the state banks. These indicators provide the evidence that the operation of banking sector in this region is unsatisfactory and consequently affecting the economic growth negatively. The three provinces in NEZ, Liaoning, Jilin and Heilongjiang, are the heavy-industry base of China. According to a recent survey, by the end of 2001, the economic output of SOEs in these three provinces accounts for 78.2 percent, 86.2 percent and 87.2 percent, respectively. The proportion of non-performing loans (NPLs) in NEZ is much higher than the national average level

Table 6.7: Banking indicators in Eight Economic Regions (1985-2002)^a

Regions	Ratio (on average)						Rank ^c					
	GDP Growth	SIZE	CENTRAL	LGDP	CONCENTRATION	SOB	GDP Growth	SIZE	CENTRAL	LGDP	CONCENTRATION	SOB
ECR	8.80%	70.28%	1.03	85.14%	0.232	63.56%	2	4	6	7	8	7
NCR	8.12%	81.69%	0.93	92.19%	0.272	65.48%	3	2	8	5	3	6
NEZ	7.07%	68.07%	1.39	112.12%	0.295	73.06%	8	5	1	1	1	1
SCR	10.49%	80.41%	0.98	103.64%	0.243	61.78%	1	3	7	3	7	8
SWZ	7.48%	64.98%	1.18	88.46%	0.262	68.39%	5	6	4	6	5	4
YZR	7.31%	51.12%	1.37	80.73%	0.260	69.76%	6	8	2	8	6	3
YR	7.67%	64.48%	1.25	100.25%	0.282	69.88%	4	7	3	4	2	2
NWZ ^b	7.16%	89.37%	1.06	111.53%	0.264	65.94%	7	1	5	2	4	5

Note:

ECR=East Coastal Region;
NWZ=Northwest Zone;

NCR=North Coastal Region;
SCR=South Coastal Region;

NEZ=Northeast Zone;
SWZ=Southwest Zone;

YZR=Middle Reaches of Yangtze River; YR= Middle Reaches of Yellow River.

^a The time span for the computation of CONCENTRATION is 1987-2002 due to the non-existence of CBC before 1987. The time span for SOB is 1990-2002 due to the unavailability of Overall Financial Institution information before 1990.

^b CONCENTRATION and SOB of NEZ is based on 4 provinces (Tibet excluded) and six categories of financial institutions instead of seven mainly due to the insufficient data of CBC.

^c The numbers from 1 to 8 are used to rank the scales of the banking indicators, where 1 stands for the most highest ratio and 8 for the least high one. The rest of them are in the order of precedence.

SIZE – the size of the local banking sector; CENTRAL – central bank lending to the provinces; LGDP – the ratio of bank loans to GDP; CONCENTRATION – the Herfindahl index of banking sector to represent the banking market structure in the provinces; SOB – the performance of four state-owned banks with respect to the overall financial institutions

Source: based on the calculation undertaken by the author, the original data are derived from the Almanac of China's Finance and Banking (*Zhongguo Jin Rong Nian Jian*), various issues.

by 12 percentage points. Therefore, another implication from this result is that a SOEs-dominated region is apparently associated with a high level of state-owned bank credits. Central bank lending, in these circumstances, needs to sustain at a high level in order to backup the state-owned bank granting loans. Undoubtedly, in such an extreme situation, a high ratio of state-owned-bank credit to GDP also indicates a high degree of concentration in banking sector.

Another prominent result is that as the second slowest growing region, NWZ has the biggest size of banking market, where the ratio of total deposits from state banks to GDP is nearly 90 percent. Theoretically, the bigger size the banking market has, the more fund resources are available to channel the investment, consequently leading to a higher economic growth. However, NWZ is likely to be the lowest growth region in China where the annual growth rate of real GDP per capita was 5.4 percent on average. Given a lower household income, the higher SIZE implies the investment channel in NWZ is more restricted than the other regions, where saving money as bank deposit is the unique channel for households and enterprises to deal with their surplus without any other efficient alternatives.

Accompanied with a moderate expansion rate in SWZ, the five banking sector indicators present medium ratio correspondingly. Regarding to the regions on the middle reaches of Yangtze River and Yellow River respectively, the proxy of financial deepening measured by bank deposits to GDP is the lowest (SIZE). In the loan market of YZR, the four state-owned banks take the second highest proportion in the credit assigning though the size of loan market is rather small. A similar but reverse phenomenon has also been found from the SCR and NWZ. After all, we may point out again that the statistical description strongly supports the idea that the concentration of state-owned banks in credit allocation is perfectly correlated with the central bank behaviour.

6.5.4.2 Econometric Estimation

Recalling the key assumption underlying the use of ratio of deposits to GDP as an indicator of financial development, the size of financial intermediary should be positively correlated to the provision and quality of financial services, given that the

primary function of financial intermediary is mobilising savings and allocating financial resources. Financial deepening in China does not raise growth rate, which has been shown from provincial panel data. Consequently, we could draw the conclusion that it is mainly due to the inefficient allocating resources.

Based on a set of more accurate criteria, those provinces sharing a close or similar natural resources and industrialisation level have been grouped into one economic region, by which means the differences between regions are more clearly stressed. Hence, bearing the variation between economic regions in mind, one may question that not only the growth pattern on the real economy side differentiate from each other, but also the financial intermediary development may vary considerably. Therefore, it is worth investigating whether these differences in financial intermediary sector will lead to different impact on regional economic growth performance.

Table 6.8 highlights the estimates of five banking indicators by applying Eq.6.4 to eight economic regions, exhibiting considerable variation across regions. Unlike the significant and robust estimation obtained on the provincial panel, the hypothesis testing on regional panel presents diversified results. It is interesting to find that unlike the lack of correlation observed from the provincial panel, the size of regional banking sector is positively correlated to the economic growth only in coastal regions (ECR, NCR and SCR), whose economic growth rates are the highest accompanied with largest pool of state bank deposits. Meanwhile, the loan to GDP ratio is identified to be positively related to the economic growth in ECR only, while the strongly negative correlation exists in NEZ, the zone with lowest growth rate.

In SCR and YR, the central bank lending is negatively related to GDP growth. However, the ratio of CENTRAL of SCR is not the lowest one. Within the three coastal regions, NCR has a highest bank concentration ratio. The statistic estimation shows a monopolistic banking market has a significant and negative impact upon economic growth (negative coefficient of CONCENTRATION). The last proxy of financial development, the proportion of state-owned bank credits, has been identified to have negative impact on output growth only in NCR and SCR. As we found out from Table 6.8, given to a medium size of financial intermediary sector, the rest of banking indicators drew an extreme picture for this region: the heaviest loans to GDP

Table 6.8: Banking sector development and economic growth – regional analysis (1985-2002)

Banking Indicators	ECR	NCR	NEZ	NWZ	SCR	SWZ	YZR	YR
SIZE	0.0396 * (0.0253)	0.0136 ** (0.0083)	-0.169 (0.1504)	-0.0188 (0.0653)	0.1434 ** (0.0564)	-0.0252 (0.023)	-0.2528 (0.1991)	0.047 (0.0755)
CENTRAL	0.0572 (0.06)	-0.011 (0.0291)	-0.0683 (0.1065)	0.0069 (0.0492)	-0.1114 ** (0.048)	0.0083 (0.0093)	0.1035 (0.5225)	-0.1081* (0.0586)
LGDP	0.0556 ** (0.0228)	0.0085 (0.019)	-0.177* (0.1025)	-0.0739 (0.0623)	-0.0459 (0.0668)	0.0324 (0.0469)	0.0477 (0.0955)	-0.1242 (0.0866)
CONCENTRATION	-0.0482 (0.1848)	0.0612 (0.2355)	-0.1558 (0.1411)	0.0036 (0.0058)	-0.0325 ** (0.0144)	0.0861 (0.0768)	-0.0216 (0.088)	-0.4671 ** (0.2051)
SOB	0.077 (0.202)	-0.0022 ** (0.094)	-0.032 (0.189)	-0.0023 (0.0019)	-0.0469 ** (0.027)	-0.2864 (0.2212)	-0.143 (0.114)	-0.1346 (0.0813)
Provinces included	3	4	3	5	3	4	4	4
Observations	54 (39)	72 (52)	54 (39)	90 (52)	54 (39)	72 (52)	72 (52)	72 (52)

Note:

ECR=East Coastal Region;
NWZ=Northwest Zone;

NCR=North Coastal Region;
SCR=South Coastal Region;

YZR=Middle Reaches of Yellow River.

NEZ=Northeast Zone;
SWZ=Southwest Zone;

The asterisk * (**) represents the significance at 10% (5%) level, respectively. The number of observations in parentheses refers to the one when LGDP and SOB indicator is included, where data are only available from 1990. Due to the missing variables, Tibet province has been excluded from NWZ when the CONCENTRATION and SOB indicators are taken into account in this region.

SIZE -- the size of the local banking sector; CENTRAL -- central bank lending to the provinces; LGDP -- the ratio of bank loans to GDP; CONCENTRATION -- the Herfindahl index of banking sector to represent the banking market structure in the provinces; SOB -- the performance of four state-owned banks with respect to the overall financial institutions. For simplicity, estimated result of neither input factors (labour force and capital stock) nor control variables has been displayed. But the results are available from the author based upon request.

ratio where the highest proportion comes from the state-owned banks sector; state bank credit is nearly 1.4 time higher than deposits; not too many financial institutions operate in this financial market because of either the intense risk or weak profitability of banks. None of these highest or strongest financial indicators have significant effect on economic growth, where the economic growth in this region remains the lowest.

It would be interesting to make a comparison between three most developed regions and the least developed one. Here, we emphasise the funding sources of the regional investment in fixed assets. As we analysed in an earlier chapter, China's economic growth is largely driven by high levels of investment. How these investments are funded and whether such funding is efficient or not are two crucial questions. According to the national bureau of statistic identification, there are five major resources to finance the investment projects on both aggregated national level and individual provincial level: state appropriation, domestic loans, self-raised funds, foreign direct investments (FDI) and the others, where the last one refer to the fund raised from other financial market such as issuing corporate bond/treasury or shares. In Table 6.9, we abstract the fund resources information of 1995 with the comparison of most recent three years, 2000-2002. Concerning the data consistency, the total investment fixed assets (TIFA) here is not the one referring to the overall amount of investment but rather the sum of investment in capital construction and innovation. For the consideration of simplicity, we combine the self-raising funds with the other fund resources.

Obviously, the major part of investments in each region has been derived from the retained profits and other non-fiscal transfers. Apart from that, the second significant contribution to the investment fund comes from domestic loans. The structure of investment fund resources generally remained the same. However, when we concentrate on the tendency of the change of each fund resource, we identify that the weight of reliance on different fund resource varies over time. For instance, self-raising funds play a more and more important role in NCR than in the other regions. Though the contribution from FDI declined since 1995 in all regions, the increasing trend appears in SCR in most recent years.

More attention will be paid on the structure of investment fund resource in NEZ.

Table 6.9: Total investment in fixed assets in four selected regions
 - East Coast Region (ECR), North Coastal Region (NCR), South Coastal Region (SCR)
 and Northeast Zone (NEZ)

Year	TIFA (RMB 100 million)	(1) State Appropriation as % of (1)	Domestic Loan as % of (1)	FDI as % of (1)	Self-raising Funds and others as % of (1)
ECR					
1995	1875.68	2.25	17.58	12.06	68.11
2000	3002.55	5.48	24.22	8.51	61.79
2001	3629.11	3.65	24.28	8.32	62.11
2002	4295.06	3.37	25.34	8.25	63.04
NCR					
1995	1737.33	6.39	19.94	14.25	59.42
2000	3031.07	7.37	24.17	5.69	62.78
2001	3268.62	8.26	18.06	6.17	67.50
2002	3922.05	6.10	18.01	4.36	71.54
SCR					
1995	1482.52	2.19	17.18	21.60	59.04
2000	2160.31	5.17	18.65	12.44	59.49
2001	2298.24	4.28	20.65	12.77	62.30
2002	2389.39	4.32	22.26	13.09	64.59
NEZ					
1995	1022.49	5.29	22.71	15.15	58.49
2000	1686.39	7.90	22.20	5.50	64.40
2001	1868.38	9.16	20.26	4.25	64.93
2002	2085.22	11.86	19.98	3.95	65.61

Source: Calculation results on the basis of Statistical Yearbook of China, issue 1996, 2001, 2002 and 2003. All data are termed in nominal terms

During the last decade, the proportions of both FDI and domestic loans in TIFA have kept decreasing. Contrast to the declining percentage of state appropriation in three coastal regions, there is the likelihood that the fixed-assets investment in NEZ relies more on the fiscal budgetary appropriation from the state government. Thus, to a certain extent, when the estimated results associated with the structural change in investment fund components, it is not very surprising to find no effect from the banking sector upon the regional economic growth, although the proxies of bank market performance in NEZ had a highest value. More interestingly, attention should be drawn upon the prosperous 'underground financial market' (UFM, the illegal financial market) in NEZ which can be interpreted another reason for the underperforming banking sector.

Since the People's Bank of China has strictly controlled interest rates for different

kinds of deposits, all banks and non-bank financial institutions operating in the financial market have no right to set their own competitive interest rate to attract customers. In China's deposit market, price competition has been ruled out. Though there are several banks operating all over the country simultaneously, people cannot benefit from a non-price competition market as they are facing with the exactly same offer. The relatively better option for them is to put their money into a bank with more explicit bailout protection by which means they feel more secure. However, as real interest rate keeps decreasing and eventually appears to be negative, saving money in the public financial institution is indeed wealth losing. In these circumstances, the negative interest rate becomes the incentive for households to withdraw their deposits from the banking sector and hunt for the profitable alternatives. Associated with the limited investment channels in China, it eventually stimulates the UFM.

UFM is not a brand-new market sector in China. It first appeared in the rural area of richer and developed coastal regions, including Zhejiang, Fujian and Guangdong. Since it operates in 'darkness', it is rather beyond the reach of central bank's supervision, neither is it constrained by legal rules and regulations. As it has been generally characterised as more risky, it usually attracts the deposits by offering interest rates much higher than the official ones. Meanwhile, most of their credit clients are those small- and medium-size firms that are not qualified to be served by big and more prudential banks and non-bank financial institutions. Hence, UFM in the earlier stage actually utilised the surplus financial funds and facilitated the local economic growth in a more or less positive way. However, as the UFM expanded rapidly and broadly, it undoubtedly threatened the security and stability of the official financial system and aggravated the overheating economic growth at the same time.

According to a City Bank's survey (2005), there about RMB 900 billion domestic household deposits flew away from domestic banks from May to October in 2004, where the major part was estimated to have been transferred into the UFM. Since the domestic economic statistic scheme is not able to cover the size and effect of UFM, the real picture of China's UFM is unknown. In early 2004, a nationwide quantitative research undertaken by Central University of Finance and Economics provided an interesting and remarkable insight of China's UFM. As a result, it has been identified for the first time that the scale of China's underground credit ranges from RMB740 to

830 billion, equivalent to 28.7 percent of the official credit market. Nevertheless, it is argued that the above figures are likely to be much underestimated. According to some previous local research and estimation, the underground credit volume in Guangdong province was approximately RMB500 billion, while in Wenzhou city, the most developed metropolitan in Zhejiang, the underground credit volume exceeded RMB150 billion. Furthermore, Lu Lei, the senior analyst from China Merchants Bank, pointed out that the internal funds of enterprises, particularly of those non-SOEs, could have been neglected where the main proportion is believed to be channelled from UFM⁹.

A number of interesting findings have been drawn from this survey. Among of many, the most striking one is that the largest size of UFM is not in coastal developed provinces such as Fujian and Zhejiang, but rather appears in NEZ. In particular, the UFM in Heilongjiang is equivalent to over 50 percent of the official financial market, the biggest one in China, while the second biggest locates in Liaoning with a size over 40 percent. Unlike the UFM in east and south regions substantially facilitating the development of private-owned enterprises, the existence of UFM in NEZ is largely associated with the ‘underground economy’ (firms or enterprises running illegal business) in local province. Currently, transferring credits among enterprises is prevalent in NEZ. Partly due to the long-term relationship with banks and/or benefiting from government’s implicit bailout, the well-known and sophisticated SOEs have no difficulty in obtaining credits from banks. The other types of enterprises, especially the underground economic entities, however, have been strictly ruled out of the credit market. In these circumstances, the large SOEs established a certain transferring credit club where they can re-assign their bank credits to those club members who are unable to gain loans from banks by receiving a certain amount of guarantee fees, usually as much as 10 percent of the loans. In fact, it is believed that the large enterprises were absorbing credits from official credit markets on behalf of the unqualified credit by charging high and illegal commission from the latter one. It is obvious that whenever the financial chain breaks, both SOEs and the banks allocating credits to those SOEs will suffer while the state economy is the ultimate victim and the local government has to take the responsibility to pay back all the

⁹ Wang, Chenbo, ‘China’s underground financial market nearly RMB 1000 billion’, *China News Weekly*, published on website www.sinc.com.cn, financial news column, 20th January 2005, <http://news.sina.com.cn/c/2005-01-20/11254893676s.shtml>

serious consequences.

According to the analysis report on this survey, the impact of UFM varies over the regions. In Zhejiang, Jiangsu, Fujian and Guangdong, where private-owned enterprises have been playing a more and more important role, UFM operates in a mature market mechanism, characterised as well disciplined, more standardised and having higher reputation than official banking sector. Thus, the local economic growth is attributed to the development of UFM by over 20 percent. By contrast, in NEZ, particularly in Liaoning province, UFM has been found severely harming the local economic growth by nearly 30 percent.

Therefore, the descriptive analysis on NEZ (presented in Table 6.7 and 6.9) and the estimated result in Table 6.8 are not difficult to interpret. Both LGDP and SOB stay at the highest level in NEZ, while the importance of domestic loans in TIFA declined gradually. Based on the finding from the UFM survey, it can be explained that the large SOEs in NEZ increasingly achieved credit allocation from banks, mainly from state-owned banks. Instead of using the credits to fund the investment projects or expands the production operation, more and more bank credits have flowed into risky and gamble UFM in forms of transferring credit club. Since UFM and underground economy is rather clandestine and out of the monitor of the authority, their activities and effects are hardly taken in account. Obviously, it is unsurprising to find no contribution from the banking sector expansion, but rather deterioration, towards economic growth in NEZ. Moreover, if the UFM could have been thoroughly identified and taken into the national economic statistics scheme, the negative impact of banking sector development would be distinguished in NEZ.

6.6 Statistic analysis – direct financing and indirect financing

Various studies (see Demirguc-Kunt and Levine, 1996 for a review) have shown that as economies develop, investment financing tends to evolve from internal self-finance (retained profit), to external finance including intermediated debt finance and finally to direct capital markets for debt and equity. In general, internal self-finance remains the dominant financing source in most companies in most countries. Nevertheless,

external finance also plays a virtual role in funding the enterprises investments project. In recent years, China's equity market has developed. The emergence of bond market and stock market marks that the financial transaction activities begin to operate according to the market rules, and show enormous market vitality and its development level becomes the important standard measuring the marketisation of capital in a country.

Raising funds through issuing corporate bonds developed significantly during the period of 1980s. The market for corporate bonds no longer limited to those small enterprises and rural ones: SOEs, collective enterprises with good economic returns, as well as Sino-foreign joint ventures also entered the bond market. In 1990s, within the two major financing measures in China's capital market, Chinese companies are keener to raise investment fund through equity financing rather than through debt financing. In most of the mature capital market, enterprises prefer to raise funds by internal financing first, than borrowing outside alternatively; while issuing stock should be the ultimate choice when the former two alternatives are not applicable¹⁰. By contrast to this common law of the order of financing decision, Chinese enterprises prefer the opposite way (Zhang, 2002). Going public is the most favourite choice of Chinese companies when they consider of financing. Non-listed companies are struggling with going public to raise funds while those listed companies enjoy splitting more and more new shares. Indicated in Table 6.10, the development of China's corporate bond market is sluggish and even shrinking.

The rapid development of the stock market is also reflected in the changing ratio between funds raised through stock sale and added volumes of bank loans. This ratio in fact indicates the financing structure in the whole capital market and the financing situations in the securities market, and also indirectly reflects the effects that different means of financing may bring about in the field of enterprise ownership structure, operation achievements, and restraints on operator's behaviour. There is a steady growth both in the ratio between funds raised in China's stock market and added volumes of credits, and in the ratio between funds raised in stock market and added volumes of state-owned bank loans, which indicates that the proportion of direct financing is increasing, funds raised through stock sale is playing more and more

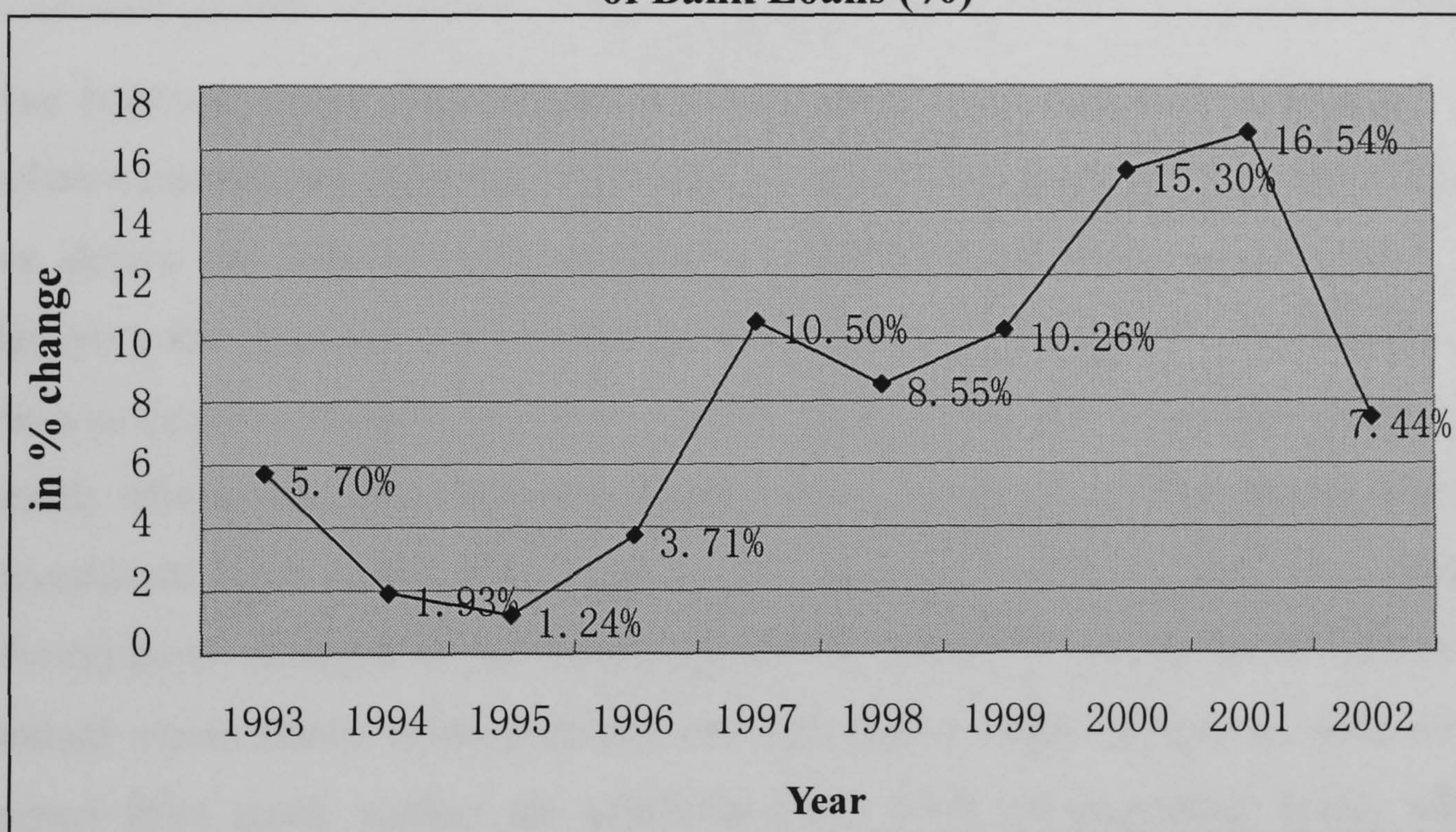
¹⁰ See Myers and Msjluf, 1984.

Table 6.10: Corporate bond financing and domestic equity financing, 1991-2002.

Unit: RMB100 million

Year	Corporate Bond Financing	Domestic Equity Financing
1991	249.9	5
1992	683.71	50
1993	235.84	276.41
1994	161.75	99.78
1995	300.8	85.51
1996	268.92	294.34
1997	255.23	856.06
1998	147.89	778.02
1999	158	896.83
2000	83	1540.86
2001	147	1182.15
2002	325	779.75

Source: China's Security and Future Statistic Yearbook, 2003, p.17, 19.

Figure 6.5: Ratio of Domestic Raised Capital in Stock Market to Added Volumes of Bank Loans (%)

Source: China Securities and Futures Statistical Yearbook, 2003, pp.19.

important role in the capital formation, and the free flow and efficient allocation of capital are upgrading (Figure 6.5). A mechanism of "voting with one's feet" is gradually strengthened, and the capital market is becoming more and more active.

Before we carry out the causality test between stock market development and economic growth, we attempt to examine the impact of the stock market upon the regional economic growth. The current available stock market information on

provincial level is the regional raised capital of A-shares from Shanghai and Shenzhen Stock Exchanges, which can be retrieved back to 1991¹¹. Instead of using the raised capital as the indicator of stock market development, we propose to interpret the original research hypothesis as the impact of direct financing from provincial capital market financial on economic growth. The distinction between direct and indirect financing in China's capital market has been made in earlier section. Direct financing includes capital raised by issuing both shares in stock market and corporate bonds in bond market; while indirect financing refers to bank credit allocation exclusively. The main idea behind this is to investigate the development of direct financing (stock market and corporate bond market) in respect to the expansion of bank credit market.

The hypothesis testing will be accomplished by using the estimated model (Eq.6.4) illustrated in the previous chapter, where concerning the impact of banking sector on economic growth. Unlike the financial intermediary indicator, Z_{it} , being measured by five banking sector indicators in previous section, it has been substituted by the relative importance of direct financing. To gauge the significance of direct financing, we derive the ratio of direct financing to indirect financing as the proxy. Before applying the data into the hypothesis testing process, additional explanation on this ratio calculation needs to be further addressed. Unlike the accumulated data of bank credit allocation, the information of direct financing is the annual amount of investment funds raised from stock market and bond market. Thus, bank credit data should be re-arranged as the annual increment simply by taking the difference of the annual accumulated value between two successive years. Moreover, data of capital raised from stock market are available since 1991 on provincial basis, while the time-span of data of funds collected from corporate bond issuing only covered 12 years from 1987 to 1998. Hence, data for provincial direct financing has been compiled from 1987 to 1998, which includes corporate-bond funds only before 1990 while stock market capital has been taken into consideration from 1991 to 1998. In order to utilise the available data source thoroughly, we define direct financing into two ways: the first one include funds raised from both corporate bonds and stock market from 1987 to 1998, denoted as CBS; while the second one refers to the capital raised from stock market from 1991 to 2002, denoted as STK. Correspondingly, we

¹¹ The capital raised from stock market includes funds raised via both IPO and non-first issuing (share rights issued).

Table 6.11: Stock Market Development and Economic Growth: All Provinces
(Two-way Fixed Effect Model)

Independent variables	Dependent variable: economic growth (net change of GDP)	
	1a (1987-1998)	2a (1991-2002)
GL	0.0107 (0.0526)	0.0093 (0.058)
GK	0.5693*** (0.0551)	0.6008*** (0.0658)
FDI	0.0066 (0.0103)	0.0118** (0.0053)
Education	0.0619* (0.0372)	0.1731 (0.2128)
WLM	0.0442 (0.0721)	0.0319 (0.0848)
WLS	0.0611** (0.0273)	0.0524*** (0.0091)
CBSBL	0.0197 (0.0126)	
STKBL		0.0077 (0.0065)
Constant	0.0355** (0.0149)	0.0387** (0.0175)
Hausman Test (p-value)	0.013	0.08
Provinces	30	30
Observations	360	360

Note:

1. The asterisk ** (***) represents the significance at 5% (1%) level respectively.
2. All dependent and independent variables are calculated in log-differences. Independent variables are growth of labour force (GL), growth of capital stock (GK). Control variables include FDI and Education proxy, the weight of manufactory and servicing labour input over total labour force respectively (WLM & WLS).
3. CBSBL is the ratio of capital raised from both stock market and bond market to bank credit allocation. STKBL is the ratio of capital raised from stock market only to bank credit allocation.

obtain two proxies of direct financing, named CBSBL and STKBL respectively, which are defined as the ratios of CBS over Bank Loans (BL) and STK over BL.

The empirical result has been derived based on two-way fixed effect model and was reported in Table 6.11, using two stock market development indicators – CBSBL and STKBL, respectively (column 1a and 2a). Neither of these two indicators is significantly correlated with the economic growth, indicating that it is hard to find any influence from direct financing on economic growth. Given that the bank credit market remains as the major financial source, direct financing market appears to be shrinking in most recent year, which further enhances the burden of banking sector. In

these circumstances, it is undoubted to find that direct financing in terms of the development of stock market (with bond market as well) did not contribute to the economic development in respect to the rapid rise of bank credit allocation.

6.7 Summary

This chapter mainly investigated the economic growth pattern in China by using panel data technique – the combination of cross section and time serial data. The empirical framework was established on a classical economic growth model, which contains the growth input factor, financial factors and other control variables. The weight of sectoral labour force (manufactory and servicing sector) has also been taken into account in order to capture the impact of the structural change on economic growth.

This result indicated that the major contribution to the national economic growth is the substantial capital stock accumulation, while less commitment comes from the growth of labour force. During the economic and financial reform period, production factors have significantly shifted from lower productivity sector (such as agricultural sector) to the higher one (such as manufactory and servicing sectors). Nevertheless, it seems it is the servicing sector that mostly benefits from such structural change. Meanwhile, the empirical finding that there is significant and positive effect of FDI on national economic growth is consistent with most existing empirical studies. In addition, the vital contribution of educational level enhancement indicates the improvement in the quality of human capital is another essential resource attributed to the productivity increase.

The role of financial sector in form of banking industry in economic growth process has been carefully illustrated in both provincial panel and regional panel. We first introduced five alternative indicators corresponding as closely as possible to the ones used in cross-country analysis: (1) SIZE – the ratio of total deposits (of Overall Financial Institutions) over GDP, (2) CENTRAL – the ratio of loans to deposits of the State Banks, (3) LGDP – the ratio of loans to GDP, (4) CONCENTRATION - a Herfindahl index of banking sector to present the provincial banking market structure and competition intensity and (5) SOB – the credits from four state-owned banks to the credits from total local financial institutions.

Then we illustrated the relationship between real GDP growth and each financial intermediation indicator by statistical description. The statistical result showed that these five indicators were all negatively related to GDP growth, despite the rather weak relationship discovered between CENTRAL and economic growth. Meanwhile, we also discover a few interesting relations among the banking indicators, such as the strong and positive relationship between SIZE and LGDP, SOB and CENTRAL, LGDP and CONCENTRATION. This statistical description suggests several preliminary results. First, the size of provincial financial intermediation does not necessarily have a firm relationship with the level of economic development, since the statistic correlation on averaged provincial data and panel data draws contradictory conclusion on this issue. Second, provinces with a lower rate of economic growth receive larger credit flows from the central government. Third, higher market concentration is associated with lower growth performance and a similar situation also applies to the degree of four state-owned banks credits.

Unlike the common findings obtained from the cross-country analysis supporting the positive correlation between financial intermediaries' development and economic growth, this empirical study discovered that none of these five banking indicators was positively correlated with the economic growth, indicating that China's banking sector has not statistically generated any contribution to the economic development. Particularly, it is unusual to find that the increasing bank credit volume has no impact upon the GDP growth whilst the other four banking indicators are negatively correlated to the economic growth. The result firmly provided the evidence that, associated with the worsening credit quality in terms of the increasing volume of non-performing loans, the over concentration of credit resource distribution in such a state-owned-bank-dominated banking sector obviously hampered the efficiency of credit allocation hence impeding the economic growth.

In regional panel, the positive relationship has been found between the size of banking sector measured by deposit over GDP and the regional economic growth in South Coastal, North Coastal and East Coastal regions. It has also been noticed that the loan to GDP ratio is positively related to the economic growth in ECR only; while it is highly negatively related to the economic growth in the least developed region –

Northeast Zone, though the proportion of bank credits over GDP (LGDP) is the highest one within these eight regions. Furthermore, the survey undertaken on the scale and function of UFM found out that the dramatic expansion of UFM in NEZ has produced seriously negative impact on the stability of official financial system and regional economic growth.

Finally, it is hard to find any influence from direct financing (measured by the ratio of stock market and corporate bond marketing financing over the credit market financing) on economic growth. Given that the bank credit market remains as the major financial source, direct financing market appears to be shrinking in most recent year, which further enhances the burden of banking sector. In these circumstances, it is undoubted to find that direct financing in terms of the development of stock market (with bond market as well) did not contribute to the economic development in respect to the rapid rise of bank credit allocation.

Chapter 7: Financial Market Development and Economic Growth in China – Granger-causality tests

7.1 Introduction

The preceding discussion has concentrated on the effect from banking sector upon economic growth using panel data technique. However, given the rapid development of China's stock market, the analysis of the financial-growth nexus in China would be incomplete without paying attention to China's stock market. Meanwhile, the controversy concerning the direction of causality between financial market and economic growth is far from settled (for details, see the relevant literature survey in Section 2.4.2.2).

As far as stock market is concerned, Levine (1991) and Benchivenga, Smith and Starr (1996) emphasise the positive role of liquidity provided by stock exchanges on enhancing the productivity growth via facilitating investment in longer-run and higher-return projects. Share prices determined in exchanges and other publicly available information help investors make better investment decisions. Better investment decisions by investors mean better allocation of funds among corporations and as a result, a higher rate of economic growth. The promotion of stock market in China has received considerable support from many economists based on two reasons. First, the stock market is treated as a means of complementing the effects of China's credit markets by providing alternative channel of raising investments funds for firms who could not access to the credit markets (Cho, 1986; Li, 1994). Second, the development of stock market is also seen as an essential means of reforming China's large state-owned enterprises (SOEs) (Xiang, 1998). It is believed that the transforming SOEs into shareholding companies can reduce their dependence on debt finance and improve the corporate governance.

However, other economists have criticised the promotion of China's stock market (see, for instance, Singh, 1990; He, 1994). They point out that the successful bank-based development experiences in countries such as Germany and Japan provides good counter examples to the idea that development requires a stock market. On such basis,

they argue that stock market is unnecessary institution for achieving high level of economic growth; China could be better off by concentrating on reforming the existing banking system exclusively. Meanwhile, several economists (see, Singh, 1993 and 1995; Singh and Hamid, 1992) argue that relatively small amounts of funds for investment are raised through the stock market even in countries such as UK and USA. The stock market serves to allow those who have established successful firms to sell part of their company and release wealth for themselves. Furthermore, they believe that the intrinsic problems of stock market, such as the high degree of volatility and speculative feature, would negatively influence the stability of economic development and increase the vulnerability.

China's stock market did not exist until 1990 when the Shanghai Stock Exchange was established. During the development lasting for a decade and a half, China's stock market expanded rapidly and overwhelmingly. However, most studies conducted on Chinese stock market either make the comparison with western developed stock market, or focus on analysing its functions theoretically. Empirical work relating to China on the nexus of stock market-economy development is seldom undertaken. It is rare to find the studies on either the comparison between stock market and banking sector or their joint-contribution on economic growth. The most current available empirical work has been undertaken on the basis of cross-country estimation.

In this chapter, we present further evidence concerning the debate over whether financial development leads economic growth in a Granger-causality test by using VAR model technique. Particularly, our interest not only focuses on banking sector, but also extends to the performance of stock market in the process of China's economic development. We first undertake the hypothesis test against the causality nexus between banking sector development and national economic growth by using annual aggregated data (1952-2003) in Section 7.2. Followed by a descriptive analysis over three types of stock market development indicator (size, liquidity and volatility) in Section 7.3, Section 7.4 examines the causality direction between the economic growth, measured by the industrial value-added (IVA), and each stock market development indicator. The same technique will be applied to the whole financial market combining both stock market and banking sector in Section 7.5. Section 7.6 summarises the key empirical findings.

7.2 The role of banking sector development in economic growth – annual aggregated data

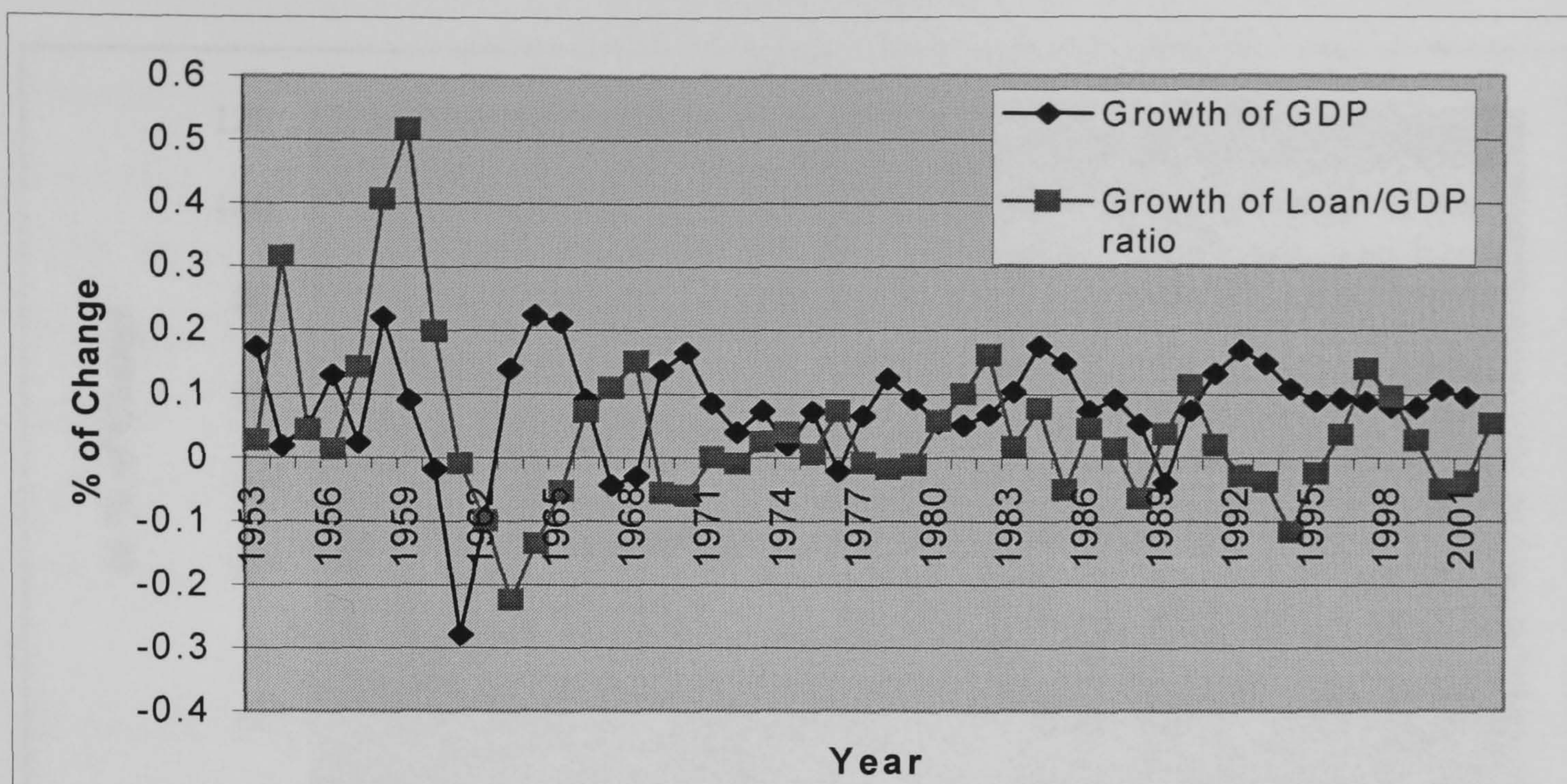
Since Schumpeter made the first statement about how financial transactions take central stage in economic growth in 1911, various studies, including both theoretical and empirical ones, have been worked on the correlation between economic growth and financial intermediaries during the past half century. Though it is unlikely to find a unique conclusion on the cause-effect relationship between these two elements, the important role of financial intermediaries has often been illustrated and widely accepted.

In general, the fundamental frictions that give rise to financial intermediaries are either of a technological or an incentive nature: the former prevents individuals from having access to economies of scale, while the latter occurs because information is costly and asymmetrically distributed across agents. Hence, financial intermediaries are able to relax these frictions given their primary functions (see Section 2.3.3). It is clear that rapid increasing investment is the engine behind China's current economic boom.

How these investment activities have been effectively fuelled is an interesting issue associated with the performance of financial intermediaries which is worth investigating. Ideally, the combination of both banking sector and stock market will provide a more complete picture in respect to the study on the role of entire financial intermediaries. However, since China's stock market did not exist until 1992, it will be an essential limitation of having few observations (using aggregate annual data in this section) when the econometric technique is applied. In these circumstances, this section only presents a brief concern on the state aggregated credit market (banking sector) given the sufficient observations.

7.2.1 Descriptive analysis

During the sample period (1952 – 2003), the growth of ratio of Outstanding Bank Loan over GDP and growth of GDP moved on a different path (see Chart 7.1). However, the conclusion could not be drawn that the financial development negatively

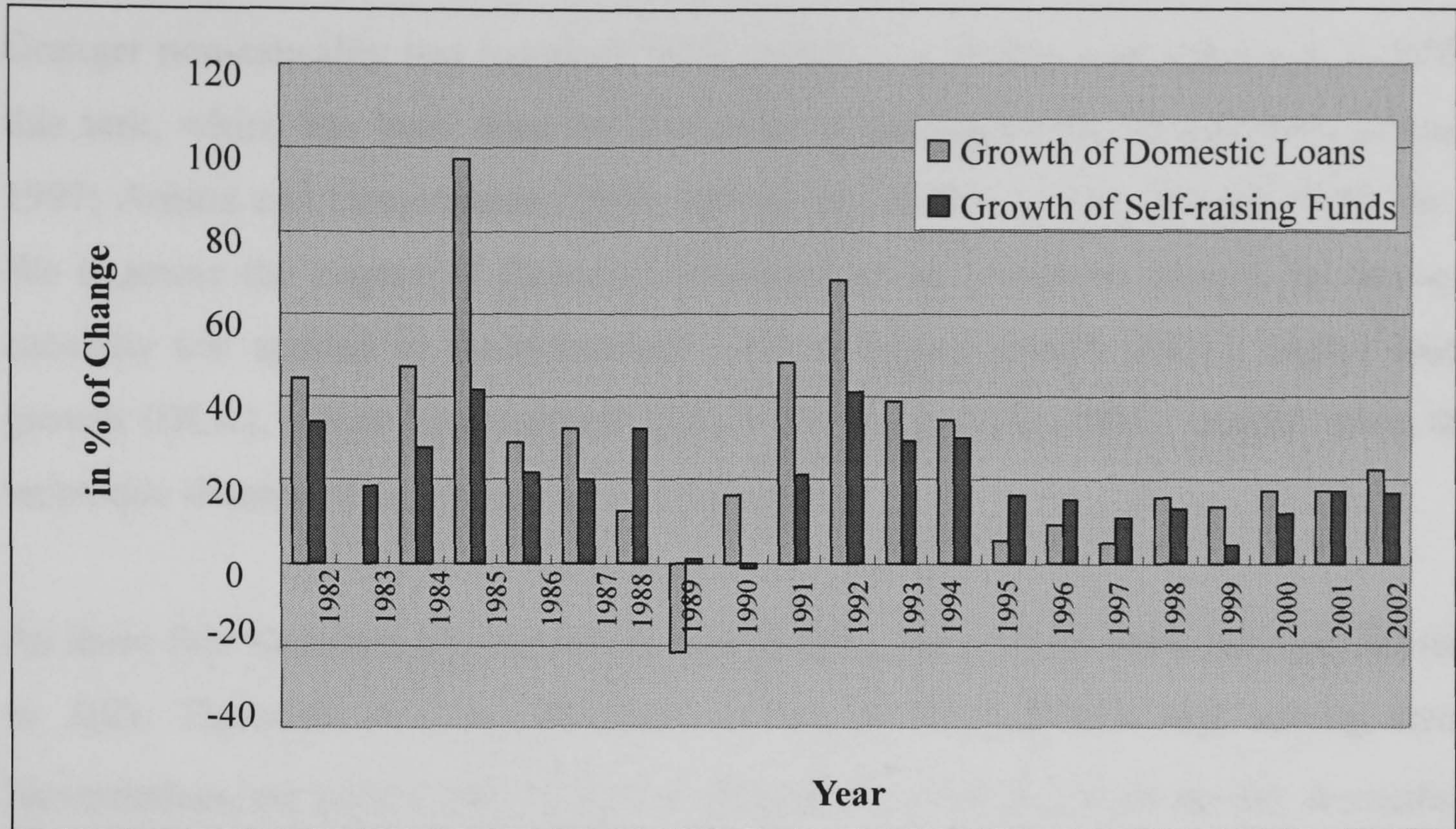
Chart 7.1: Growth of Real GDP vs. Growth of Loan to Nominal GDP ratio

Source: author's calculation based on the official statistic derived from *China Statistical Yearbook*, various issues.

influenced the economic growth. One of the reasons is the different growth rate of GDP and Bank Loans. The raw data indicates that the growth of GDP is faster than the growth of Bank Loan granted. Hence, in those years where real GDP grew in a high speed, the growth of financial ratio actually declined. Since mid-1990s, China's economic growth has been driven by the domestic demand expansion which is a result of investment from both government sector and corporate sector.

The Government sector investment apparently takes the major portion of the total investment amount, in particular those large infrastructure construction projects. In the corporate sector, the sources of total investments in fixed assets (TIFA) include state budgetary appropriation, domestic loans, foreign investments and self-raising funds, where the last category has always been the biggest source (over 60 percent) of TIFA, including retained profits, funds raised from issuing equities and other sources.

Although domestic loans is the second biggest source, its growth rate maintained higher than that of self-raising funds in most years during the past two decades (see Chart 7.2). The main exception arose in 1995-1997, when China's stock markets experienced a rapid expansion: overall 554 companies successfully realised IPO in these three years; the annual growth rate of capital raised via share issuing was 110

Chart 7.2: Growth of Domestic Loans vs. Growth of Self-raising Funds

Source: author's calculation based on the official statistic derived from *China Statistical Yearbook*, 2003, pp.187.

percent, 244 percent and 190 percent, respectively¹. The rise of stock market capitalisation indicates that the stock markets have provided an important channel for domestic enterprises. Consequently, the success in IPO reduced the companies' reliance on domestic bank loans immediately for their investment funds while the self-raising funds increased dramatically.

Given China's particular background, financial sector development is more likely to support the economic growth rather than taking the leading position. We will further examine this statement by undertaking some statistical analysis with econometric techniques. Due to the primitive nature of China's capital market, the limited channel of raising investment funds restricts the majority of funds are stemmed from bank loans, especially from big four stated-owned commercial banks. Therefore, we use bank credit (BC) to roughly proxy the financial development and define it as the growth of the ratio of bank loans granted by overall national banks to GDP (in logarithm), where the definition of National Banks was provided in the Data Description section (Section 4.3.1.3, Chapter 4).

¹ Figures are obtained by author's calculation based on the official statistic derived from the *China Securities and Futures Statistical Yearbook*, 2003, p.36 & 156.

7.2.2 Statistic analysis

Granger non-causality test based on VAR model is a widely used approach to fulfill this task, which has been done by a number of scholars (see, for instance, Levine, 1997; Arestis and Demetriades, 1997; Levine and Zervos, 1998; Ahmed, 1998; etc.). We examine the impact of financial development on economic growth by Granger causality test applied to the quivariate VAR in output growth (DLY), capital stock growth (DLK), labour force growth (DLL) and bank credits (BC), mainly using the technique illustrated in Section 4.2.3, Chapter 4.

As these four variables are termed in growth form, they are all stationary and subject to $I(0)$. Therefore, it is not necessary to test the cointegration rank among them. Nevertheless, we need to determine the optimal order for this VAR model. According to the lag selection statistic result, we find that both Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) select order 1, which has been further confirmed by Likelihood Ratio statistics². In order to identify the Granger causality relationship between financial development and economic growth, we are interested in carrying out the following two sets of null hypothesis test:

Hypothesis One (H_0^1): Finance development does not Granger-cause economic growth, including two sub-hypotheses – bank credit expansion (BC) does not Granger cause capital stock growth (DLK) and BC does not Granger cause output growth (GLY);

Hypothesis Two (H_0^2): Economic growth does not Granger-cause financial development, including two sub-hypotheses – GLK does not Granger-cause BC and GLY does not cause BC.

Capital stock growth is the major contribution to the national GDP growth (see ECM analysis in Chapter 5), which is mainly derived from the rapid expansion of fixed assets investment. Most of these investment projects are funded by bank loans. Thus, we not only concern about the cause-effect nexus between bank loans expansion and GDP growth, but also consider the causality direction between bank credits and capital stock growth. The test result has been summarised in Table 7.1.

² For simplicity, the statistics result for order selection procedure is not reported in detail here.

Table 7.1: Granger-causality Result and Direction of Causality – annual aggregated data

	LR statistic (VAR(1))	Reject null hypothesis (H_0)
H_0^1 : Financial development does <i>not</i> Granger-cause economic growth		
BC respect to DLK	1.5929	No
BC respect to DLY	4.2114	No
H_0^2 : Economic growth does <i>not</i> Granger-cause financial development		
DLK respect to BC	12.3544**	Yes
DLY respect to BC	8.6578*	Yes

Note: BC = Bank Credits; DLK = Capital Stock Growth; DLY = Output Growth. * indicates significant at the 5 percent level and ** at the 1 percent level.

Testing H_0^1 is equivalent to imposing the condition that the coefficient of the lagged values of BC in the block of equations explaining the variable DLK or DLY is zero. The log-likelihood ratio (LR) statistic, which has an asymptotical χ^2 distribution, is 1.5929 when testing for the non-causality of the bank credit expansion in the growth of capital stock. We obtain LR statistic of 4.2114 when testing for the non-causality of the bank credit expansion in output growth. Neither of them is significant at 5 percent critical value, indicating H_0^1 cannot be rejected.

A similar exercise is carried out towards H_0^2 – the economic growth does not cause financial development. LR statistic is 12.3544 (significant at 5 percent level) when testing for the non-causality of the capital stock growth in bank credit expansion; and the LR statistic is 8.6578 (significant at 1 percent level) when testing for the non-causality of the output growth in bank credit expansion. Therefore, H_0^2 that economic growth does not Granger-cause financial development has been fully rejected.

Summing up the result from the above Granger causality testing, there is evidence that financial development is unlikely to be the leading factor to the economic growth, while the ‘demand-following’ is the actual feature of financial development termed by Patrick (1966). The empirical findings are well explained by the performance of

China's financial sector. The financial market in China, dominated by banking industry, is still far away from being mature and sophisticated. Prior to the implementation of financial reform, China's banking sector is the pure subordinate institution of the state authority rather than a profit-oriented entity. The bank was forced to play the role as a cashier of the Ministry of Finance: collecting the profits from enterprises and allocating the state funds to each individual industry and enterprises in accordance with the very specific plan. Though the establishment of a two-tier banking system was the major progress achieved in the earlier stage of financial reform, banking sector remained functioning with characteristics of plan-oriented economy. Hence, there is a strong likelihood that the banking sector in China is supporting the economic growth by political or administrative means.

Expanding the analysis on this point, the data sample has been separated into two sub-samples, 1952-1978 and 1979-2003, to testify the consistency of Granger-causality relationship across the financial reform period. The statistic result is displayed in Table 7.2 where we can find the financial development kept playing the 'demand-following' role in economic growth in pre- and post-reform era. However, something slightly different from the findings based on the whole sample is that in post-reform stage, it is unlikely to find any cause-effect nexus between financial development and capital stock growth in either pre- or post-reform period. It indicates that in the post-reform stage, the bank loans is not the device stimulating investment, meanwhile, the increase of investment does not necessarily enhance the demand for bank loans. This result can be partly explained by the innovation and diversification of financial market in China, particularly the introduction of stock market provides another important channel for enterprises raise investment funds.

7.3 Economic growth and Stock market development indicators

7.3.1 Economic growth indicator

Economic growth indicator used in this research is IAV, which is a level value computed on monthly basis. The most ideal one, however, is the monthly GDP value while this type of statistics has not been available until 2000. Nevertheless, adopting

Table 7.2: Granger-causality Result and Direction of Causality on two separated period: 1952-1978, 1979-2003

	1952-1978		1979-2003	
	LR statistic (VAR(1))	Reject null hypothesis (H ₀)	LR statistic (VAR(1))	Reject null hypothesis (H ₀)
<i>H</i> ₀ ¹ : Financial development does <i>not</i> Granger-cause economic growth				
BC respect to DLY	1.5598	No	1.9963	No
BC respect to DLK	1.1965	No	1.3915	No
<i>H</i> ₀ ² : Economic growth does <i>not</i> Granger-cause financial development				
DLY respect to BC	11.0723**	Yes	6.4584*	Yes
DLK respect to BC	13.4753**	Yes	2.2824	No

Note: BC = Bank Credits; DLK = Capital Stock Growth; DLY = Output Growth. * indicates statistic result is significant at the 5 percent level and ** at the 1 percent level.

IAV as the most relevant and suitable substitution is based on the following two considerations. First, as we analysed in previous chapter, China is a rapidly developing country staying on the transitional stage into an industrialised economy. Hence, IAV can be treated as a good proxy to measure economic growth. Second, the implicit initial task for China's stock market establishment was to exploit another fund channel to finance SOEs, particularly those state-owned industrial enterprises. Additionally, there are over 65 percent of the listed companies are operating in industrial sector. In these circumstances, when we examine the causality relationship between stock market and economic growth, IAV is a more appropriate indicator instead of GDP to measure the economic performance.

When we use monthly level data, the regular growth rate computed by first-order difference of raw data is no longer useful because of the seasonal effect. Therefore, the monthly growth rate is calculated by comparing the data of same month between the current year (t_0) and the previous year (t_{-12}). Meanwhile, the raw data of IVA are termed in current price, indicating that it is necessary to remove the inflation effect from the original value of IVA before computing its growth rate. Among a number of price indices available for use as a deflator, the Ex-factory Price Indices of Industrial Products (EFPI) has been selected as the most relevant.

Nevertheless, the major weakness is that no monthly-based deflator is available to deflate the monthly raw IVA data correspondingly and thus applying one single annual price index throughout the whole year is rather arbitrary. In order to obtain the real value of monthly IVA, it is vital to find the appropriate monthly deflator that is the monthly EFPI computed based on certain assumption. It is plausible to assume that the increase of price remains at the same rate in each month during a year time, i.e. at the monthly equivalent of the annual rate. Consequently, the annual increment of EFPI has been equally divided into 12 portions. Correspondingly, the real value of monthly IVA is calculated by deflating the normal value with monthly EFPI.

Devising indicators for stock market development is not an easy task at all. Ideally, such an indicator should simultaneously reflect liquidity, volume of transactions, informational efficiency, degree of concentration, volatility, depth, legal and institutional and other factors that determine the overall performance of a stock exchange. Based on the work done by a number of researchers (for instance Levine, 1991; King and Levine, 1993; Demirguc-Kunt and Levine, 1996; Levine and Zervos, 1998), we are going to define six stock market development indicators categorised into three aspects: size, liquidity and volatility.

7.3.2 Stock market development indicators

Unlike most of the other cross-country analysis produced upon the effect of stock market, which mostly used annual-based or quarterly-based data, this empirical work mainly focuses on the China's stock market exclusively constituted on monthly-based data. Given the short history of China's stock market development (less than 15 years), the limitation of data is always the crucial problem in terms of both quality and availability, which highly constrains many researchers from constituting quantitative examination against the nexus of stock market and economic growth. Similarly, we should also bear the data restriction in mind when we conduct this study and we try to maximise our sample data by extending the time range to the monthly basis, covering as long period as possible for both financial market and economic growth indicators. In this section of empirical work, the data sample is the period from 1995M1 to 2004M12. In addition, given that the major task of this study is to investigate the effect of domestic financial market upon economic growth, B-share (share issued and

traded aboard³) and H-share (shares issued and traded in Hong Kong stock market) statistical information has been removed from the aggregated statistics.

As we mentioned in Chapter 3, the most abnormal characteristic of Chinese stock market is high proportion of non-circulating shares. Stock rights owned by listed companies are artificially divided into two categories, namely, circulation stocks and non-circulation stocks. These are further partitioned into state-owned stocks, corporate stocks, public stocks and stocks sold by a given listed companies to its own staff members, which are different from one another in mobility and in rights and interests for the owners. The proportion not meant for circulation accounts for about 70 percent of the list companies' aggregate capital stock. Consequently, different market size will lead to different dimension of other indicators associated with market size. The statistics summary of stock market indicators has been displayed in Table 7.3.

1. Size. Capitalisation is used to measure the size of the stock market and equals the value of listed domestic shares on domestic exchanges divided by total economic output. In terms of economic significance, the assumption behind market capitalization is that market size is positively correlated with the ability to mobilise capital and diversify risk. Due to the highly concentrated non-tradable state-owned share, capitalisation will be defined into two ways. The first one is the ratio of the overall value of listed domestic shares over IVA (OC), while the second one is yielded by substituting the overall value by tradable shares value (TC). Moreover, since the statistics of capitalisation is the market value at the end of month; while IVA is the accumulated stock value of a certain period, a whole calendar month in this study sample. Therefore, the validity of a ratio yielded by a time-point variable and stock value is questionable. Due to the restriction of data availability, the optimal solution to improve this situation is to use the average value of market capitalisation obtained by the beginning and end value of monthly capitalisation.
2. Liquidity indicators. While economists advance many theoretical definitions of "liquidity", analysts generally use the term "liquidity" to refer to the ability to

³ Although the B-share market has been opened to domestic residents since 2000, the transaction of B-share should be transacted in either US dollar or HK dollar. Meanwhile, B-share market remains isolated from A-share market.

Table 7.3: Summarised statistics – monthly data (1995M1-2004M12)

	Maximum	Minimum	Mean	Standard Deviation	Observations
Output Growth (GIVA)	0.3859	-0.1536	0.1006	0.1176	120
Overall Market Capitalisation (OC)	28.248	1.771	12.099	6.205	120
Tradable Capitalisation (TC)	9.260	0.424	3.699	2.082	120
Turnover (Overall shares) (TNOC)	0.420	0.016	0.107	0.082	120
Turnover (Tradable shares) (TNOC)	1.579	0.054	0.377	0.308	120
Value Traded (VT)	4.869	0.046	1.175	0.905	120
Volatility (VOL)	0.083	0.006	0.017	0.011	120
Financial Depth	2.059	-0.149	0.742	0.442	120
Bank Credit	0.413	-0.985	0.052	0.169	120

Note: Output growth = growth of IVA; Overall Market Capitalisation = the averaged value of overall domestic shares as a share of IVA; Tradable Capitalisation = the averaged value of tradable domestic shares as a share of IVA; Turnover (Overall Shares) = value of the trades of domestic shares as a share of overall market capitalisation; Turnover (Tradable Shares) = value of trades of domestic share as a share of tradable market capitalisation; Value Traded = value of the trades of domestic shares as a share of IVA; Volatility = measure of daily percent change of Shanghai composite price index; Financial Depth = the monthly change of M2 as a share of IVA; Bank Credit = the monthly change of overall financial institution credits as a share of IVA.

easily buy and sell securities. A comprehensive measure of liquidity would quantify all the costs associated with trading, including the time costs and uncertainty of finding a counterpart and settling the trade. We simply use two measures of realized stock trading.

First, Turnover (TN) equals the value of the trades of domestic shares on domestic exchanges divided by the value of list domestic shares. Turnover measures the volume of domestic equities traded on domestic exchanges relative to the size of the market. High turnover is often used as an indicator of low transactions costs. Importantly, a large stock market is not necessarily a liquid market; a large but

Hence, we only focus on the information of A-share in our empirical study exclusively.

inactive market will have large capitalisation but small turnover. Due to the two different ways to gauge market capitalisation, we obtained two types of TN correspondingly. The first one, denoted as TNOC, is yielded by using overall market size as denominator; while the second one is computed by replacing overall market size by tradable market size as denominator and termed as TNTC.

The second measure of market liquidity is Value Traded (VT), which equals the value of the traded of domestic shares on domestic exchanges divided by IVA. Theoretical models of stock market liquidity and economic growth directly motivate VT while not a direct measure of trading costs or the uncertainty associated with trading on a particular exchange (Levine, 1991; Bencivenga *et al.*, 1995; Levine and Zervos, 1998). VT measures trading volume as a share of national output and should therefore positively reflect liquidity on an economywide basis. Demirguc-Kunt and Levine (1996) also identify the VT may be importantly different from TN: VT captures trading relative to the size of the economy, while TN measure trading relative to the size of the stock market. Thus, a small but liquid market will have high TN but small VT.

Nevertheless, Levine and Zervos (1998) argue that since stock markets are forward looking, VT has a potential drawback and hence the prices effect should be taken into account. Stock prices will rise today based on the anticipation of large future corporate profits. As a result, the increasing price will lead to the rise of stock transactions value and thus raise VT. The same effect will also occur to the market capitalisation. However, the liquidity indicator would increase without a rise in the number of transactions or a fall in transaction costs. In these circumstances, there are two ways to gauge to the prices effect. First, both capitalisation and VT indicators are included together in the regressions. The idea is that after controlling for capitalisation, if VT remains significantly correlated with growth, the conclusion can be drawn that the price effect does not influence the relationship between VT and growth. The second way to measure the importance of the price effect is to examine TN. The formula of TN explicitly wipes out the price effect because the stock prices enter into both the numerator and denominator of TN. If TN is positively and robustly associated with economic growth, then this implies that the price effect is not dominating the relationship

between liquidity and long-run economic growth.

3. Volatility indicator (VOL) is simply measured by calculating the standard deviation of the daily percentage changes in the Shanghai composite share price index, while the daily index used for the computation is the average of start-of-day point and end-of-day point.

7.4 The role of stock market development in economic growth

7.4.1 Descriptive analysis

China speeded up the development of the securities market during its reform process. When China established its stock market in Shanghai and Shenzhen respectively in 1990 and 1991, there were only 10 listed enterprises; by the end of 2004, the listed companies in China had reached 1377 (1236 with A-share only companies⁴), with a total market value amounting to RMB3.7 trillion, and a negotiable market value of RMB1.2 trillion. The speedy development of the stock market not only provided a strong support of funds for China's economic growth, but also remarkably promoted the marketisation of capital in China.

Nonetheless, it is noticed that Chinese enterprises rely more on raising funds from the stock market than from the corporate bond market. Companies were not allowed to issue corporate bonds until 1987, while only SOEs were qualified to do so. Chinese enterprises raised RMB151.1 billion from the stock market in 2004 and RMB24.5 billion from the bond market. The proportion of raised funds from bond issues was only about one-fifth of that from stock issues.

Both Shenzhen and Shanghai have a task not faced by Hong Kong or by the New York Stock Exchange. That task is to help to turn state-owned enterprises into joint stock

⁴ A-share only companies refer to those companies only issue A-share (termed in RMB) in domestic stock exchanges, i.e. Shanghai Stock Exchange and Shenzhen Stock Exchange. By contrast, a small group of companies are authorised to issue B-share denominated in RMB but traded and purchased in foreign currencies (usually in USD and HKD) strictly by foreign investors. Meanwhile, some companies are also authorised to issue H-share in Hong Kong Stock Exchange (termed in HKD). For more detail on China's stock share classification, see Section 4.3.3 in Chapter Four.

enterprises and to increase the privatisation of the economy. China has been able to avoid the disasters of the Russian experience in massively privatising its industry where the corruption and opportunism among the politicians and businessmen created a new group of billionaires with little of the benefits of privatisation going to the public at large.

China's stock market has been regarded as a financing channel for SOEs from its very inception, a clear distortion of the intended function of a stock market. In order to finance SOEs, the government has implemented very tight controls over the listing of companies. Securities regulatory organisations are responsible for stipulating listing standards and examining and approving the listing of publicly traded companies. The financing of SOEs by the government and its efforts to maintain a leading position for its holdings in SOEs has led to the prominent issue of disconnect between shares and rights. The inequality between the majority shareholder in SOEs (including their administrative institution and parent company) holding illiquid shares and other shareholders (individual households) with liquid shares is widely viewed as a structural drawback that needs to be resolved quickly.

The severe results caused by this structural drawback can be presented in the following three aspects. First, given the excessively small volume of the negotiable shares (less than 35 percent of the overall shares), the major portion of the tradable shares of individual stock can be easily concentrated into the hands of a few dominating private traders. Associated with the media promotion and word-of-mouth transmission among the small and medium sized investors, the share price would be pushed up to an incredibly high level, which results in the seriously distorted share price⁵. Since the market is full of speculative transactions, the stock market function of distributing resource efficiently has been hampered dramatically.

Second, as nearly all the largest shareholders were state entities, state holding enables the government, especially the local government, to remain involved in, and even

⁵ A good example here is the rapid price rise of Yi'an Technology (*Yi'an Keji*, stock code 000008) from RMB26 to RMB126 per share within 70 transaction days (25/10/99-17/02/00); while the share price experienced a stunning collapse afterwards down to RMB8.52 per share on January 28, 2002. Yi'an Technology is a typical small-sized share in China's stock market – with overall 72 million shares; while only 35 million shares are tradable (less than 50% of the total share volume). The investigation conducted by CSRC discovered that in these circumstances, the abnormal share price fluctuation was apparently manipulated by four big corporate shareholders (together possess

dominated, firms' decision making in both enterprises operation and management personnel appointment. In these circumstances, maximising profits is not the virtual incentive for managers to commit their efforts as their career promotion is hardly related to the company's business performance. As a result, the mergers-and-acquisitions (M&A) function is ineffective in China's stock market. In western developed stock markets, managers' incentive is highly associated with the company performance usually reflected in the share price. The declining share price conveys the information that the company would become the M&A target. Consequently, managers have also been placed under the threat of losing their positions. However, the state entities' intervention in China's listed companies, associated with the lack of rules governing takeovers, results in the violation of M&A function, which affect the corporate governance reform negatively.

Third, it has been also widely observed that the largest shareholder of listed companies, usually the parent SOEs, use the listed companies to siphon the investment funds raised from the stock market to benefit itself. Consequently, it is undoubtedly the case that the raised funds have been misused or vanished 'mysteriously'. Small and medium sized investors' wealth has been seized by a few privilege groups and/or individuals under the disguise of raising investment funds from stock market; thus the interest of small and medium sized investors has been largely violated.

7.4.2 Statistic analysis

Although Levine and Zervos's study (1998) implies a causality direction from stock market to economic development, stronger evidence is required for the existence and the direction of a causality relationship as such. Based on Granger's (1969) definition of causality, we therefore choose to employ Sims (1972) test which as been further developed by Toda and Yamamoto (1995), Zapata and Rambaldi (1997) and Rambaldi and Doran (1996).

Prior to conducting the causality tests, it should be borne in mind that the stationarity issue is the crucial premise to guarantee the reliability of the regression analysis. Based on this consideration, we will first conduct the unit root test against each

time-series variable by using ADF test. For each of the variables we were unable to reject the null hypothesis that they were integrated of order one ($I(1)$)⁶.

Since the data are not seasonally adjusted, the generalised and conventional method has been introduced to filter the seasonal effect, which is simply adding dummy variables into the estimated function as control variables to capture the seasonal effect. As we are using monthly data, 11 dummy variables have been created, denoted as $S_i = 1$, where $i=M1, M2, M3\dots M11$ (M =month) for each month while the 12th month has been treated as the base month. The causality test result has been listed in Table 7.4.

One difficulty of using current month IVA (t_0) and the IVA of the same month but in previous year (t_{-12}) to compute the growth rate of IVA is that it tends to generate a great deal of serial correlation from the following consideration: the observation t_0 - t_{-12} and the observation t_1 - t_{-11} considerably overlap in having the period t_0 to t_{-11} in common, and hence are likely to be highly correlated. Therefore, Durbin-Watson (DW) test is employed concerning of the serial correlation issue. Given the DW upper bound (D_u) critical value at 1 percent significant level is 2.034 with 22 regressors (excluding intercept) and 120 observations, the diagnostic tests results are higher than the critical value, indicating that the null hypothesis of no serial correlation cannot be rejected. Therefore, the estimated result is valid and reliable.

The following VAR model is estimated:

$$Z_t = a + \sum_{i=1}^k \Phi_i Z_{t-i} + \sum_{j=1}^{11} b_j S_j + \varepsilon_t, \quad (7.1)$$

where $Z_t = \begin{bmatrix} GIVA \\ STMT \end{bmatrix}$ (STMK is the set of stock market development indicators);

$$a = \begin{bmatrix} a_1 \\ a_2 \end{bmatrix} \text{ and } \Phi_i = \begin{bmatrix} \Phi_{11}^i & \Phi_{12}^i \\ \Phi_{21}^i & \Phi_{22}^i \end{bmatrix}; S_j \text{ is the dummy variable for certain month } j$$

($j=1,2,\dots,11$) to capture the seasonal effect, which has been treated as exogenous variables in the VAR model. To test the hypothesis of no Granger causality from stock market development (STMK) to output growth (GIVA), we test

⁶ The numbers of the lags in the tests were determined using AIC and SBC. Results are not reported here for

$H_0 = \Phi_{12}^1 = \Phi_{12}^2 = \dots = \Phi_{12}^k = 0$, where Φ_{12}^i are the coefficients of STMK in system 7.1. To test the hypothesis of no Granger causality from output growth to stock market development, we test $H_0 = \Phi_{21}^1 = \Phi_{21}^2 = \dots = \Phi_{21}^k = 0$, where Φ_{21}^i are the coefficients of GIVA in system 7.1.

Since modified WALD test (MWALD) statistic has an asymptotic χ^2 distribution in a VAR($k + d_{\max}$) (Toda and Yamamoto, 1995), we need to identify k (the lag length of the VAR model) and d (the maximal order of integration suspected in the system) first. Based on the lag length selection criterion – AIC and SBC, we found the optimal order of VAR model for each case, which is reported in the second column in Table 7.4. As far as d_{\max} is concerned, we have specified each variable in VAR model is $I(1)$. Hence, d equals one in this VAR model.

From the statistics test result (Table 7.4), it can be seen that there is certain correlation between stock market development and economic growth. However, this causality nexus has only been discovered from economic growth to stock market development rather than in the opposite direction. Meanwhile, this result is only valid and robust by using in terms of capitalisation since MWALD statistic results are highly significant at 5 percent and 1 percent level by using total market capitalisation and tradable market capitalisation respectively. When using the liquidity and volatility indicators as proxy to measure stock market development, no causality relationship has been found. Hence, it can be concluded that stock market size is the result rather than the cause factor of industrial output growth.

It is clear that the share price volatility has inevitably affected the stock market capitalisation (OC and TC) and the value traded (VT). Levine and Zervos (1998) suspect that the significant relationship between VT and economic growth (GIVA) would have been substantially influenced by the share price volatility. This consideration should also be born in mind when we operate the Granger-causality testing in China's context. Therefore, including both capitalisation and value traded indicators together in our VAR model is a similar approach suggested by Levine and Zervos. Though the direct Granger-causality relationship between value traded and

Table 7.4: Stock market development and economic growth: Granger-causality estimated result

Direction of Causality	Lag length (k)	Log-likelihood Ratio	DW statistic
Stock Market Development ⇒ Economic Growth	OC → GIVA	k=12 $\chi_{13}^2=24.0799$ (0.131)	2.1619
	TC → GIVA	k=12 $\chi_{13}^2=34.0226^*$ (0.071)	2.1645
	TNOC → GIVA	k=8 $\chi_9^2=10.4973$ (0.312)	2.0486
	TNTC → GIVA	k=9 $\chi_{10}^2=11.4013$ (0.327)	2.0536
	VT → GIVA	k=6 $\chi_7^2=5.2693$ (0.627)	2.0816
	VO → GIVA	k=9 $\chi_{10}^2=7.4283$ (0.684)	2.092
Economic Growth ⇒ Stock Market Development	GIVA → OC	k=12 $\chi_{13}^2=45.5498^{**}$ (0.04)	2.1102
	GIVA → TC	k=12 $\chi_{13}^2=58.3313^{***}$ (0.00)	2.0501
	GIVA → TNOC	k=8 $\chi_9^2=12.308$ (0.196)	2.0790
	GIVA → TNTC	k=9 $\chi_{10}^2=15.6305$ (0.111)	2.0863
	GIVA → VT	k=6 $\chi_7^2=10.6585$ (0.154)	2.1601
	GIVA → VO	k=9 $\chi_{10}^2=8.3074$ (0.599)	2.0914

Note:

1. GIVA = Output growth; OC = Overall Market Capitalisation; TC = Tradable Capitalisation; TNOC = Turnover (Overall Shares); TNTC = Turnover (Tradable Shares); VT = Value Traded; VO = Volatility. For the details of calculation of each variable, please refer to Section 7.3.2 and Table 7.3.
2. The pair of numbers in the parentheses in third column is the p-value. The subscript of χ^2 statistics is the optimal order of VAR model (i.e. k+d). The asterisk * (**) (***) represents the significance at 10 percent (5 percent) (1 percent) level.
3. DW critical value at 1 percent significance level is 2.034 (with 22 regressors and 120 observations).

growth is not statistically significant, we are still interested in detecting the relationship after eliminating the price volatility effect.

Table 7.5: Causality nexus between market size and market value traded

	Log-likelihood Ratio (k=6)	Reject null hypothesis (H ₀)
<i>H</i> ₀ : Stock market size does <i>not</i> Granger-cause value traded		
OC respect to VT	9.2335	No
TC respect to VT	11.6892	No
<i>H</i> ₀ : Value traded does <i>not</i> Granger-cause stock market size		
VT respect to OC	16.1403 *	Yes
VT respect to TC	18.8173 **	Yes

Note: OC = Overall Market Capitalisation; VT = Value Traded; TC = Tradable Capitalisation. k is the lag length of VAR model. The lag length selection procedure is based on AIC and SBC criteria which have not been reported here for simplicity, but are available on request from the author. The asterisk * (**) represents the significance at 5 percent (1 percent) level.

Table 7.6: Causality nexus between output growth and market value traded (tradable capitalisation is treated as control variable)

	Log-likelihood Ratio (k=12)	Reject null hypothesis (H ₀)
<i>H</i> ₀ : Market value traded does <i>not</i> Granger-cause output growth		
VT respect to GIVA	49.7227 *	Yes
<i>H</i> ₀ : Output growth does <i>not</i> Granger-cause market value traded		
GIVA respect to VT	35.5857	No

Note: VT = Value Traded; GIVA = Output growth. k is the lag length of VAR model. The lag length selection procedure is based on AIC and SBC criteria which have not been reported here for simplicity, but are available on request from the author. The asterisk * represents the significance at 1 percent level.

We first testify the direct causality relation between stock market size and value traded (Table 7.5). When testing the hypothesis that capitalisation (OC & TC) determines the value traded (VT), log-likelihood ratio yields 9.2335 and 11.6892 for OC and TC respectively, indicating a high probability of not rejecting the hypothesis. In the reverse causality relation test, log-likelihood ratio is 16.1403 and 18.8173 for OC and TC respectively, which is highly significant. Therefore, we can draw the conclusion that capitalisation is a result rather than the cause effect of value traded.

In the second step, we add tradable capitalisation (TC) as a control variable into the causality test VAR model between growth and market value traded. The result is displayed in Table 7.6. It is found that the value traded is the significant leading factor to output growth (Log-likelihood ratio = 49.7227, $p < 1$ percent), while the reserve direction between these two indicators does not hold given that the statistic result (35.5857) failed to pass the hypothesis test at any significance level. Thus, comparing with the no direct causality effect between value traded and growth (Table 7.4), the conclusion could be drawn that after controlling the market size, value traded is found to be the leading factor rather than the result of economic growth. In other words, since value traded determines the size (capitalisation) of stock market while the size (measured by tradable capitalisation) has been identified as a weak leading factor of economic growth, it could be interpreted that the value traded causes output growth indirectly mainly through the its influence on market size.

These empirical findings support the hypothesis that China's stock market is established to raise fixed assets investment funds for enterprises, particularly for SOEs. However, the performance of China's stock market is primitive and less sophisticated in channel capital efficiently. Moreover, the proposed solution for corporate governance issue has not yet been implemented successfully due to the existence of majority state shareholder in listed companies. In such instance, many economists argue that China's stock market is more likely to become a gambling site breeding numerous speculative activities and financial scandals.

7.5 Causality nexus between Financial Market Development and Economic Growth

In this subsection, we investigate the Granger-causality relation between the entire financial market development and economic growth where we take both stock market and banking sector together into account. To test this causality hypothesis, we use a VAR model based on the vector V_t , where

$$V_t = \langle Output_t, BC_t, STMK_t \rangle$$

Economic growth is defined as the growth rate of real IVA. TC and VT are two key

STMK indicators which we have been defined and tested in the previous subsection – tradable capitalisation and value traded. From the statistic result in previous section, we notice that a significant feedback relationship has been found between market value traded and economic growth after setting the tradable capitalisation as a control variable. In these circumstances, we conduct the causality test between financial market development and economic growth in two steps:

Step 1: use BC and TC together to capture the performance of entire financial market;

Step 2: introduce VT into the estimated system while treat TC as control variable, thus using BC and VT to capture the performance of entire financial market.

To gauge the banking sector development, we mainly follow the idea of Levine and Zervos (1998) by using bank credit (BC) as the proxy. In Levine and Zervos study, they define BC as the ratio of loans made to the private sector by commercial banks and other deposit-taking banks to GDP. Meanwhile, they also argue that using M1/GDP or M2/GDP in the econometric modelling is inappropriate since these two indicators measure only financial depth but they do not measure whether the liabilities are those of banks, the central banks or other financial intermediaries, nor do they identify where the financial system allocates capital. In other words, they suggest that there is no theoretical relationship between this ratio and economic growth but, instead, it depends on the functions carried out by the financial sector. They propose that bank credit is useful in measuring financial development because it isolates “credit issued by banks, as opposed to credit issued by the central bank or other intermediaries and by identifying credit to the private sector, as opposed to governments” (*ibid*, p.542-43). However, in this empirical study, BC is no longer suitable to be defined in such way since we concentrate on the industrial sector rather than the whole economy. Hence, we propose to use ratio of bank loans allocated by overall domestic financial institutions to industrial enterprises over IVA to proxy the banking sector development. Moreover, since bank loans are an accumulated stock value while IVA is measured by newly increment of industrial output on monthly basis, the ratio of BC computed by using these two variables is implausible. Therefore, we amend bank loan into the monthly increment amount by taking the first-order difference of the original value.

According to a seemingly unrelated regression approach adopted by Rambaldi and

Doran (1996), our estimated VAR model takes the form:

$$V_t = A_0 + \sum_{i=1}^k A_i V_{t-i} + \sum_{j=1}^{11} B_j S_j + \varepsilon_t \quad (7.2)$$

where: Step 1: $V_t = \langle \text{Output}_t, BC_t, TC_t \rangle$; Step 2: $V_t = \langle \text{Output}_t, BC_t, VT_t, TC_t \rangle$;

S_j is the dummy variable for certain month j ($j=1,2,\dots,11$) to capture the seasonal effect, which has been treated as exogenous variables in the VAR model;

A_0 is an identity matrix.

In Step 1, A_i is three by three matrices of coefficients which can be termed as

$$A_i = \begin{bmatrix} A_{11}^i & A_{12}^i & A_{13}^i \\ A_{21}^i & A_{22}^i & A_{23}^i \\ A_{31}^i & A_{32}^i & A_{33}^i \end{bmatrix}, \text{ where } i=1,2,\dots,k;$$

similarly, A_i is four by four matrices of coefficients.

To test the hypothesis of no Granger causality from financial development to economic growth, we test $H_0 : \alpha_i^{(12)} = \alpha_i^{(13)} = 0$ or $\alpha_i^{(12)} = \alpha_i^{(13)} = \alpha_i^{(14)} = 0$ in two steps respectively, where $\alpha_i^{(12)}$, $\alpha_i^{(13)}$ and $\alpha_i^{(14)}$ are the coefficients of BC_{t-1} to BC_{t-k} , TC_{t-1} to TC_{t-k} and VT_{t-1} to VT_{t-k} in system (7.2). To test the hypothesis of no Granger causality from economic growth to financial development, we test $H_0 : \alpha_i^{(21)} = 0$, where $\alpha_i^{(21)}$ are the coefficients of Output_{t-1} to Output_{t-k} in system (7.2).

The MWALD-statistics result is exhibited as Table 7.7. In Step 1 where the financial market performance was measured by BC and TC jointly, the statistic result indicates that there is evidence of one-way causality from economic growth to financial development in China. However, it is more interesting to find that a two-way causality nexus has been observed when the stock market performance is gauged by market value traded while controlling the tradable market size as information set. This empirical result is in sharp contrast to those of Levine (1997) and Rajan and Zingales (1998) who take a cross-sectional approach. They conclude that financial development promotes to economic development and that reverse causation is unlikely to occur. Meanwhile, this empirical finding is also contrast to the conclusion drawn by Shan, Morris and Sun (2001), who argue that the it is hardly to believe that 'financial

Table 7.7: Causality nexus between financial market development and economic growth

	Log-likelihood Ratio	Reject null hypothesis (H_0)
H_0 : Financial development does <i>not</i> Granger-cause economic growth		
Step 1: BC and TC respect to GIVA (k=10)	25.8607	No
Step 2: BC and VT respect to GIVA (k=12)	52.2863 *	Yes
H_0 : Economic growth does <i>not</i> Granger-cause financial development		
Step 1: GIVA respect to BC and TC (k=10)	37.9672 **	Yes
Step 2: GIVA respect to BC and VT (k=12)	69.4963 ***	Yes

Note: BC = Bank Credits; TC = Tradable Capitalisation; GIVA = Output growth; VT = Value Traded. k is the lag length of the corresponding VAR model.

The lag length selection procedure is based on AIC and SBC criteria which have not been reported here for simplicity, but are available on request from the author.

The asterisk * (**) (***) indicate the statistic is significant at 10 percent (5 percent) (1 percent) level.

development leads economic growth when financial sectors are less developed than in the West' (p.450).

Given the limited investment channels available to households, savings are highly concentrated in either banking sector or stock market. At the same time, investment projects (particularly the fixed assets investment) are mostly funded by rapid increase of bank credits allocation, and investment funds collected from stock market through share transaction. As a result, the dramatic increase of capital stock is the major contribution to the entire economic growth. Hence, the empirical findings in this research are convincing: financial development seems leading to economic growth in the context of China to some extent.

7.6 Summary

This chapter examines the Granger-causality nexus between financial development and economic growth by adopting the VAR model analysis technique. Our emphasis has been focused on banking sector development first (Section 7.2), followed by the

concentration on stock market individually (Section 7.4), then examining the whole financial market by taking both banking sector and stock market performance into account (Section 7.5).

By adopting the annual aggregate data sample, no evidence can be found to support the hypothesis that China's banking sector has been playing a leading role in the process of economic growth. In order to testify the consistency of Granger-causality relationship across the economic reform period, data sample has been separated into two sub-samples, 1952-1978 and 1979-2003. The statistic result indicated that the financial development kept playing the 'demanding-following' role in economic growth in pre- and post-reform era. However, in the post-reform stage, the increase of investment does not necessarily enhance the demand for bank loans, which is more or less associated with the innovation and diversification of financial market in China providing another important channel for enterprises raise investment funds.

Further evidence on the relationship between stock market development and economic growth has been provided by the empirical study result based on the Granger-causality test. In order to gauge the development of China's stock market, five indicators have been employed from three aspects – size, liquidity and volatility. The estimated results only concluded one-way causality relation in China's context, indicating that economic growth (measured by IVA) is the Granger-cause of the stock market size (capitalisation) while the reverse causation is unlikely to occur. Meanwhile, there no causality relationship exists between stock market development and economic growth when in term of market liquidity and volatility.

After adding tradable capitalisation as a control variable into the causality test VAR model between growth and market value traded, the statistic result found that the value traded is the significant leading factor to output growth while the reverse direction between these two indicators does not hold. Since value traded determines the size (capitalisation) of stock market while the size (measured by tradable capitalisation) has been identified as a weak leading factor of economic growth, it could be interpreted that the value traded causes output growth indirectly mainly through the its influence on market size.

The causality relationship was finally examined on the basis of the whole financial market, in which circumstance the ratio of bank credit assigned to industry sector to IVA was adopted to be the proxy for banking sector development. The estimated result further confirmed that financial development is the effect rather than cause of China's economic growth when tradable capitalisation of stock market was adopted. Moreover, a bio-direction (two-way) Granger-causality nexus has been observed when market value traded entered the VAR model while market size was controlled as information set, though the feedback effect (financial development is Granger-cause factor of economic growth) is significant at just 10 percent level.

Chapter 8: Policy Implications

The policy implications for both China's banking sector and stock market and for economic growth are discussed in this chapter, based on the empirical results derived in Chapters 5, 6 and 7.

8.1 Implications for economic growth pattern

This empirical study first investigated the economic growth pattern in China on both an aggregated level (Chapter 5) and a provincial level (Chapter 6). By using time-series aggregated level data, it has been indicated that growth of economic output is largely based on the capital stock accumulation, while the contribution from labour force input is less economically significant. However, it has been observed that the efficiency of the rapidly accumulating investment is rather low, resulting in the lower productivity of capital stock. In Chapter 6 Section 6.4, the contribution of input factor growth to the real sector growth has been examined by using the cross-province and time-series panel data. As a result, positive influence from growth of capital stock has been found while the change of labour did not produce any contribution to the overall output growth.

It has been discussed thoroughly in Chapter 5 that in the present statistics scheme, labour input is measured in terms of the number of persons employed rather than person-hours worked due to the lack of information. Hence, there is a strong likelihood that the actual person-hours worked per worker have increased rapidly in the post-reform stage despite the low growth rate of number of worker employed. Consequently, it suggests that the coefficient on labour input may be biased upwards given the understating growth of the effective labour force.

Furthermore, the statistical result also indicated the dramatic changes in employment and investment structures, which is the major contribution to the rapid economic growth. First, there is an increasing surplus of labour force released from agriculture partly due to the increased labour productivity and the shortage of land. Second, an increasing number of workers and staff employed by state-owned enterprises (SOEs)

became unemployed due to the market liberalisation and fierce competition from the private sectors. Third, employment and investment have been shifted or diversified away from agriculture to manufacturing and services, and from heavy and defence-based industries to light industries.

China is on its transition process to be an industrialised country while the Tertiary Sector is also expanding rapidly. Dramatic structural change results in the continuing large differences in both labour and capital productivity across sectors, suggesting that China still has great potential for further efficiency gains through continued structural change. To realise this potential, many restrictions on the intersectoral movement of resources need to be removed. For example, government should encourage the development of rural enterprises, urban industry and service sectors which will help to absorb the surplus labour forced out from agriculture sector. In addition, the *Hukou* system (household registration system), the key factor in the fragmentation of the labour market, should be abolished gradually, which encouraging the labour force shifts and the mobility of educated people among regions.

More attention should be paid to the education industry to enhance the labourer quality and productivity. The goal for education should be raising enrolment in higher education as well as the lower levels of education. In the short run, this policy would delay the population studying in universities from entering the employment sector and promote expenditures in higher education as well as promoting the development of the education sector. In the long run, this policy would undoubtedly improve the quality and the productivity of the labour force.

Based on the findings of lower efficiency of capital investment, the policy implications should focus not only on the volume of investment, but also on improving its quality and efficiency. Given that China is a rapidly developing country with limited energy resources, the future economic growth should depend on using the resources more efficiently. In order to economise resources, the crucial issue is to stop the repetitive construction projects regardless the actual capacity. For instance, there was a fierce car industry competition among the provinces during the later 1990s as car industry has been regarded as a leading industry. At least one car manufactory has been built in each province. In these circumstances, the local government offered

many privileges to support the car production. However, this repetitive construction led to the huge waste of human resource and raw material while the competition seriously hampered the achievement of the economics of scale.

By inspecting the investment efficiency, the conclusion can be drawn that the investment in China is severely underutilised and generating a huge waste on resources (for details, see Section 5.5). Meanwhile, it has been found that most of the enterprises have not yet considered about using environmental resources. In order to chase the maximum profit and high growth speed, they would rather sacrifice the environmental protection. In these circumstances, to achieve the goal of coordinated and sustainable development, it has been argued that the concept of 'Green GDP' should be introduced to the economic growth statistics, which implies that the speed of GDP growth is not the only indicator to measure the development, while substantial consideration should be focused on the environmental protection.

Green GDP includes integrated environmental and economic accounting systems and attempts to measure the actual amount of environmental pollution. The system also attempts to account for the cost of environmental losses and adjust GDP calculations to match those losses. In other words, China's future sustainable economic growth should not be based on undermining environmental protection. Thus, Green GDP reflects not only the economic growth rate, but also the quality of growth. Nevertheless, the major difficulty of adopting Green GDP system is setting the prices for environmental costs as well as formulating the related laws and regulations, which will cost at least three to six years to establish an initial framework of the Green GDP (People's Daily Online, 15/09/2004).

8.2 Improve the quality of bank loans

In Section 7.2.2, the causality test on financial development, measured by the ratio of bank credit granted over GDP level, and the real sector growth was undertaken using the annual aggregated data. The result indicated that financial development in terms of bank credit allocation in China is unlikely to be the leading factor to the economic growth, while 'demand-following' is the actual feature of financial development.

Furthermore, considering the influence of financial reform, causality test has been conducted in two separated sub-samples respectively, where the result indicated that the financial development remained as the effect of both economic growth and capital stock accumulation robustly, while in post-reform stage no causality relationship existed between bank credit increment and capital stock growth.

Hence, this empirical result implies that banking sector remained functioning with characteristics of plan-oriented economy. In the pre-reform stage, only one bank existed in China which had acted as a cashier of the Ministry of Finance: collecting the profits from enterprises and allocating the state budget to each individual industry and enterprises in accordance with the very specific plan. After the implementation of financial reforms, the funding for SOEs' basic construction investment was changed from state budget grants to bank loans. However, due to the long-term relationship between SOEs and state-owned banks, the credit allocation to SOEs has been largely interfered by state and local governments political instruction, which resulted in the soft budget constrain leaving a heavy burden on China's banking system in terms of the huge amount of non-performing loans. Bank loans are mostly granted on the basis of local government's preferences in order to enhance their political achievements associated with individual governor's career promotion.

Apart from the causality test on aggregated level, the correlation between banking sector development and real sector growth has also been inspected by using the panel analysis technique in Section 6.4, where the banking sector performance was gauged by five indicators. The positive but insignificant coefficient of liquidity indicator – the size of financial sector, measured by banking deposit over GDP, indicated no correlation with economic growth, which runs counter to the general cross-country estimated result of a positive relationship. In addition, the significantly negative relationship has also been noticed existing between the ratio of bank credit to GDP (LGDP) and local economic growth, which is unlikely to support the hypothesis that bank credit allocation has contributions to capital investment thereby fostering the real sector growth.

The negative correlation can be interpreted in two ways. On the one hand, since bank credit is not the unique fund resource of capital investment, the negative relationship

could be attributed to the increasing proportion of other investment resources. Within the four major categories of investment fund sources in China, domestic bank credit is the second biggest fund source. The most important fund resource is internal funds, taking a share of over 60 percent of total funds, where self-retained profit is the major component. In these circumstances, it can be argued that the more successful the enterprises are the more profits they earn. Consequently, the larger amount of retained profits will be contributed to the investment projects, resulting in the less reliance on the other fund sources including bank credits. By contrast, when a region is dominated by the weak performing enterprises, they hardly raise investment funds by themselves, thus relying on bank loans heavily. Additionally, the launch of stock market in 1992 provided another significant channel for investment fund raising, which should dilute the importance of bank credit in raising investment funds.

On the other hand, the negative relationship could also be interpreted as the increasing proportion of Non-performing Loans (NPLs) with the successive expansion of bank credit, which deteriorates the overall bank credit quality. It is generally argued that the extensive amount of NPLs is the result of the soft budget constrain in terms of directed credit lending (policy lending) granted under the pressure from both central and provincial authorities to favoured sectors and enterprise via the credit quota plan. Furthermore, it has been noticed that due to the lack of credit-tracking tools, a national accounting standard and a sound legal framework including collateral and bankruptcy legislation, the volume of NPLs keeps accumulating after the credit quota plan was abolished in 1998.

Additionally, owing to the poor national accounting standard and the lack of credit history records, it is extremely difficult for domestic banks in China to obtain a fair and objective assessment on loan applications. Hence, China's commercial banks are reluctant to extend loans to privatised and new start-up enterprises given that these enterprises are not under the bailout protection scheme, and so appear to be of higher risk than their SOE counterparts. However, these non-state-owned market entities have played a substantial role in national economic growth increasingly yet their development has long been restrained by lack of funds. Therefore, it is further evidence for the negative relationship between bank credit allocation and economic growth.

Correspondingly, the policy implications derived from these empirical findings can be focused on the following three aspects. First, a set of international accounting and auditing standards should be adopted and applied to the entire financial industry, including bank and non-bank financial institutions, which helps to classify the true level of existing NPLs. Second, take stronger actions to end policy lending by state-owned commercial banks (SOCB) and other government interference with application of strict commercial standards in bank lending. One obvious step would be to shift more of this lending to the policy banks, while leaving the commercial banks operating strictly according to market discipline in terms of less political intervention but more profit-maximising orientation. Third, the severe information asymmetry appears to be the essential handicap during the credit assessment. Thus, it is necessary to establish the credit grade system and create a database where keeping a detailed record over debtor's credit information. This database should be accessible by both state administrative office and commercial banks, which will be helpful for monitoring and assessing the credibility of loan applicants. Though it is a huge workload which requires the joint effort from various departments as well as the technical support from both hardware facility and software exploration, once the establishment is completed, it will substantially reduce the information cost while enhance the transparency of bank-corporate relationship.

8.3 Encourage competition within banking sector

From the empirical analysis illustrated in Section 6.5, higher bank concentration has been found significantly associated with lower economic growth. This result supports the idea that banking competition is likely to improve economic performance as found by Cetorelli and Gamberra (2001) using a cross-country sample. It may also imply that greater entry into the banking sector improves bank performance, which in turn improves resource allocation in the province and leads to higher local economic growth.

Meanwhile, SOB – the indicator used to gauge the performance of big four SOCB in respect to the overall financial institutions – is defined as the credits from four

state-owned banks to the credits from total local financial institutions and has been identified as negatively correlated with economic growth. This result implies that the credit market dominated by SOCB is unlikely to channel funds efficiently thereby hampering the economic performance. Partly due to the lack of competition and the implicit protection from state government, the SOCBs, the absolute dominant player in the financial system, appear to be most secure place for Chinese people to hold bank deposits. There is little necessity for state banks to strive for deposits, and consequently, they hardly make prudential decision on credit allocation since these loans have been either guaranteed by government's protection or under the direct of government. Moreover, a high level of state-owned bank credit is also likely to be translated into a higher dependence on central bank lending to cover the balance between loans and deposits, affecting the efficiency negatively. Thus, it is unsurprising to find a negative impact of central bank intervention upon real sector development.

Based on these empirical results, introducing competition into the banking sector is a plausible way to dilute the concentration of SOCBs and push them to behave according to market discipline. This can be included the openness to both foreign and domestic competitor. It is widely believed that in general, the entry of foreign banks provides a vital motivation for China's banking sector to speed up the domestic financial reform. In addition, domestic banks will benefit from the entry of foreign banks in terms of improving corporate governance, stimulating the financial product innovation and enhancing the customer service quality. Particularly, the conventional operation concept in China's banking sector is purely interest-based. By fostering the cooperation with foreign banks, the foreign advanced and mature financial product portfolio will be a good example for domestic banks pursuing the product innovation, eventually catching up in high-end banking services such as investment banking instruments and fee-based services.

Apart from opening the market to foreign banks, the openness towards the domestic competitors is also important. A more active strategy should be pursued to encourage the development of joint-stock banks, city banks, and other newer banks and to promote the constructive downsizing of the SOCB. In particular, regulatory constraints discriminating against the other banks need to be ended. City banks could be authorised to expand their business beyond their current jurisdictions. While likely

to remain the largest players for the foreseeable future, the SOCB will inevitably decline in importance and a more explicit strategy to manage this downsizing could help in improving their performances. One proposal, advocated by a senior official of the PBC, is to eventually divide the current SOCB into a larger number of regionally oriented large banks. Another possibility would be to transform current SOCB into bank holding company type entities controlling several subsidiary banks focused on major areas (Nam et al., 2001). Some of these units might then at a future point be transformed into wholly independent new banking entities.

8.4 Encourage the establishment of Local Private-owned Banks (LPOB)

In order to highlight the different influence of financial development among regions, the 30 provinces have been grouped into eight economic zones where the provinces within each zone share the similar natural resources and industrialisation level. In these circumstances, the banking sector performance has been investigated within each zone. The empirical result indicated that the impact of financial intermediaries' development on economic growth only statistically existed in three most developed regions, while no finance-growth nexus has been found in the other regions. In particular, given the credit market characterised as largest LGDP ratio, highly concentrated banking institutions and overwhelming SOCB credit allocation, it is unlikely to find that the economic growth in Northeast Zone (NEZ) has been benefited from such a financial environment.

By comparing the structure of investment fund resources of NEZ with the structure of the three most developed regions, it has been discovered that the investment in fixed assets in NEZ increasingly relies on the state appropriation, while the proportion of domestic loans apparently declined in recent years. Therefore, this could be one interpretation of the empirical result of no impact from banking sector on the real sector growth. Apart from that, the abnormally prosperous 'underground financial market' (UFM) in NEZ can be interpreted as another reason for the underperforming official banking sector.

UFM first existed in a number of developed coastal regions, which was mainly

functioning as a complementary fund resource to facilitate the local small and medium sized enterprises (SMEs) development. The positive contribution from UFM in those regions has been noticed in a survey operated by Central University of Finance and Economics in 2004. This survey also explores that the largest size of UFM exists in the least developed region – NEZ, where the existence of UFM is largely associated with the ‘underground economy’ (firms or enterprises running illegal business) in local province. It has been argued that the expansion of UFM severely influence the stability of official financial market. As a result, it is observed that the existence of UFM produces a negative impact on the local economic growth. More detail on the feature and effect of UFM has been discussed in Chapter 6, Section 6.5.3.

In these instances, eliminating the impact from illegal credit market will be the essential advantage of setting up LPOB. Due to the critical constraint imposed on SMEs when they tend to access to the legal credit market, they had to seek for investment funds from UFM. Since the development of UFM is out of control and supervision of state government, interest rates have been set much higher than the official level. A recent survey indicates that the average monthly interest rate in Wenzhou’s UFM was up to 0.96 percent at the end of 2004; where in some individual cases even climbed up to 1.8 percent, which was much higher than the official level 0.39 percent. Most of the credit clients in UFM are SMEs that are not qualified to be served by big and more prudential banks and non-bank financial institutions. In these circumstances, it appears that the existence of UFM has a more or less contribution to fuelling the development of SMEs. However, it occurs that the uncontrollable expansion of UFM will eventually undermine the stability of the financial market and consequently results in the society turbulence. Hence, instead of bearing the risk of the explosion of UFM’s potential threats, the foundation of LPOB is a practicable way to legitimise the private financial institutions. In these circumstances, LPOB appears to be a vital banking sector participant, serving SMEs efficiently while operating under the official monitoring.

Setting up LPOB is a plausible way to dilute the extreme concentration of SOCBs thereby facilitating the development of SMEs more efficiently. This proposition is aroused based on the strong interrelationship between the private-owned firms and private-owned banks operating in the same area. Since both entities share the same

culture and customs, additionally, LPOBs are SME-oriented while their business strictly focuses on the local area, it is convincing that LPOBs have a more comprehensive understanding on local SMEs' performance than other banks do, including SME's virtual business risk, profitability and financing requirement. Moreover, since LPOBs are apparently profit-driven market entities, they have incentives to maximize their profits. Neither central nor local state government will take the responsibility to their losses in any instance that the borrowers could not amortize their loans. From this point of view, LPOBs will be more careful and rational than SOCBs in assigning credits. The establishment of Zhejiang Commercial Bank in July 2004 is the first LPOB in China, whose shareholders are 15 private-owned enterprises.

Nevertheless, opponents of LPOB criticise the development of LPOB on the grounds that it is poorly controlled and monitored given to the lack of sound and transparent administrative mechanism and legal system. Regardless the motivation of financing SMEs' development, it has been argued that the intrinsic feature of LPOB is chasing maximum profit. In order to maximise profit, LPOB is believed to be risk adventurer and make less prudential decision. There are many concerns that the efficiency of LPOB will be unexpectedly affected once the privilege groups get involved where they take the advantage of LPOB as a platform to maximise their own profits; meanwhile, how to prevent the major shareholders of LPOB abuse their rights in credit allocating on behalf of their own interests is another prior consideration. Therefore, the opponents insist that without a sound supervision mechanism, establishing LPOB can be dangerous, generating financial instability.

8.5 Implications for stock market development

Chapter 7 examines the effect of stock market development upon economic growth. In order to gauge the development of China's stock market, five indicators have been employed from three aspects, including size, liquidity and volatility. The estimated results only concluded one-way causality relation in China's context, indicating that economic growth (measured by industrial value-added) is the Granger-cause of the stock market capitalisation while the reverse causation is unlikely to occur. Meanwhile,

there no causality relationship exists between stock market development and economic growth in term of market liquidity and volatility. Hence, it implies that the existence of China's stock market has not yet channelled the investment fund resource efficiently.

The inefficient functioning of China's stock market mostly stems from the distorted feature of the market since it was launched in 1991. This distorted feature is mainly embodied in two aspects: the characteristics of centralised planned economy and lack of sound and powerful legal and monitoring mechanism, where these two aspects are inter-correlated.

China initiated its economic reform since 1978, aiming at switching the economy pattern from a centralised one to a market-force driven one. In financial sector, banking system has undergone a prominent reform in terms of configuration reconstruction and operation discipline changes. Meanwhile, the launch of China's stock market has been termed as another milestone during the financial reform process. However, before establishing a sound legal environment, the launch of China's stock market is the preference of state authority rather than a product introduced on a market basis. In these circumstances, the operation of stock market has been conducting under the state government's control and plan. In addition, without an efficient monitoring mechanism, the majority shareholder's violation behaviour and speculative activities are extremely severe thereby further deteriorating the market efficiency.

China's stock market was established to facilitate the reform of SOEs at a time when the government found it increasingly costly to pursue its policy of lending or subsidising SOEs. It was proposed that establishing a stock market provided an important investment channel for individuals while handing the responsibility for SOE monitoring over to more efficient institutions and individual investors.

In the early stages, the number of stocks to be listed was constrained by the quota system, where the State Planning Committee implemented the overall balance of the quota allocation at both provincial and industrial level. The quota system was not abolished until 2000. Additionally, state intervention is the vital determinant to the performance of stock market. In particular when the stock market experienced the

downturn, state government would step into by promulgating certain policies to stimulate the market transaction. Hence, it has been stressed that China's stock market is not operating fully under the discipline of the market. In such a market, the distribution of investment sources is undertaken on the basis of government's design rather than driven by the market forces. Thus, the efficiency of stock market in channelling investment funds is undermined.

Unlike the stock markets in other countries where shares have been categorised into ordinary share and preferred share, the corporate shares in China have been segmented into three forms: state shares, legal person shares and public individual shares. The more unusual phenomenon is that only the public individual shares are tradable where the proportion counts for around 30 percent of the total volume. This fundamental drawback leads to the serious consequences for the stock market as follows.

First, the small volume of tradable shares offers a chance for pursuing speculation activities which results in the price distortion. Second, the tremendous amount of non-trading shares unjustly distributes the rights among shareholders. Third, it also limits the function of stock markets as a mechanism to evaluate the management performance of listed companies. Meanwhile, mergers and acquisitions appear to be impossible because of the price distinction. Finally, the isolation of tradable and non-tradable shares leads to the over-concentration of stock rights, and consequently the supervision and decision making mechanisms are apparently ineffective. The parent company, by taking the advantage of being as the major shareholder of the listed subsidiary company, siphons investment funds raised from the stock market from its subsidiary, while this kind of behaviour is unobservable to the individual shares. In these circumstances, solving the problem of non-tradable state/legal person shares is the prior issue in developing China's stock market.

Under the present condition, it is impossible to raise a huge amount of money to make all the state shares and legal person shares listed on the market. Almost RMB1000-1500 billion (USD122-183 billion) would be required to inject into the market in order to activate state/legal person shares based on their current market value. Some scholars propose that issuance of new stocks should be suspended for a few years so as to ensure the task of activating non-tradable shares accomplished first.

This may not be the best and most realistic solution as it has been argued that the suspension of issuing new stocks could not only slow down SOE reform inevitably, but also affect the pace of entire economic reform adversely. However, this objection statement is also questionable as its emphasis remains on raising money to finance SOE as much and fast as possible from issuing shares in stock market. The initial function of stock market is to enhance the efficiency while improving the principle-agent relationship by introducing the external monitoring from the outside shareholders and potential threats of mergers and acquisition. Without eliminating the influence of non-tradable shares, the issuance of new shares while remaining the large proportion of state/legal person shares non-tradable would only accumulate the problem like rolling the snow ball. Thus, the fact that more and more companies (both SOE and private-owned firms) going public is an inevitable tendency during the process of financial market liberalisation. Ceasing the issuance of new shares is not a wise decision to cope with the historical problems. It is plausible to encourage the non-SOE go-public while stopping issuing non-tradable shares.

Meanwhile, a number of alternatives have been raised to eradicate the problem. The first suggestion is transferring the state/legal person shares into preferred shares. The idea is that preferred shares enjoy two 'priorities': one is priority of reaping dividends while the other is residual claimant. Hence, it is believed that preferred shares can help to change the structure of ownership and consequently solving the problem of the over-concentration of shareholders. Furthermore, the preferred shares can be traded on the markets which can dilute the enthusiasm on speculative profits by transferring original shares often on the markets. However, the question again focuses on the price setting on the preferred shares: who will pay for the price difference between the current market value and the original face value of the non-tradable shares. The second possibility is to establish specialised investment funds which mainly pursue the transaction of state/legal person shares, especially state shares. The investment funds could be sponsored by state-owned non-financial institutions or raised from the public. Recently, the prevailing debate focuses on the pension funds could take this responsibility, suggesting that the minimum proportion of the funds invested in trading of state shares must be no less than 55 percent.

Another option can be changing the state/legal person shares into employee shares,

which is derived from the rationale of employee ownership scheme. In China, issuing and transacting employee shares is not a brand-new issue. Similar as the tremendous price difference of state/legal person shares in comparison with the public tradable shares, in order to beneficiate employees, the purchase price of employee shares is much lower than the transaction price in the secondary market. Hence, most of the employees sold their shares immediately when the restrictions over trading these shares have been removed. In such instances, the initial intent of issuing employee shares as an incentive and award to the employees' participation and commitment has been distorted. Thus, it is necessary to establish a new employee stock ownership scheme which ties employees', particularly the manager's pension and bonus with the firm's long-term development, which can be useful to correct the short-term behaviour of Chinese worker shareholders.

Generally speaking, no matter which solution will be finally adopted, the successful implementation has to be backed up by a sound and powerful legal and monitoring mechanism. As Tam (1991) stresses in his description work on the existence and development of China's capital market, China already possesses many necessary conditions for capital market development expect the missing key factor: a well defined property rights systems, with a constitutional and legal framework to protect the claims of economic agents and enforce their responsibilities (p.525).

Chapter 9: Conclusions

9.1 Introduction

The financial-growth nexus has been widely discussed during the last few decades, both theoretically and empirically. The financial intermediation was ignored in the earlier economic growth model until it was identified as playing an essential role in the real sector performance first by Schumpeter (1911). Apart from the examination on the relationship, the direction of causality between financial development and economic growth has also been extensively investigated by using firm-level and/or industrial-level data of cross-country, though the empirical results have not yet offered any clear-cut answer upon this issue. Furthermore, the launch and expansion of stock market in many less developed countries (LDCs), as a crucial part of domestic financial liberalisation (DFL) process, attracted substantial interest vis-à-vis the impact of the stock market behaviour on the real sector growth.

This thesis has attempted to investigate the influence of financial development on economic growth in China principally by examining the banking sector and stock market performance. Due to the ignorance or little effort placed on China in the most existing empirical studies, this thesis employs a consolidated dataset covering 30 provinces for 18 years to conduct the panel technique. Meanwhile, a monthly dataset of 10 years has also been established to explore Granger-causality tests of the financial development and economic growth linkages.

The rest of this chapter is organised as follows. Section 11.2 provides a summary of the findings of this study including the existing literatures on financial-growth nexus as well as the specific empirical findings achieved by the researcher individually. Section 11.3 discusses the limitation of the study. Section 11.4 focuses on issues

important for the future research.

9.2 Summary of the research findings

9.2.1 A synopsis of theoretical findings

Chapter 2 essentially surveyed the most existing theoretic and empirical literatures on financial-growth nexus issue. Following Keynes's General Theory, the macroeconomics literature largely ignored the potential link between output behaviour and the performance of credit market. Based on the debate over the central importance of money in the Great Depression, the significance of all other aspects of the financial system was deemphasized (see, Fisher, 1933; Friedman and Schwartz, 1963; Mishkin, 1978). Soon after the importance of financial structure (the form of financial intermediary) within the financial/real nexus was aroused by Gurley and Shaw (1955), Modigliani and Miller (1958) derived the formal proposition that real economic decisions were independent of financial structure. Similarly, the irrelevance of financial intermediation has also been suggested by Hall and Jorgenson (1967), Brock and Mirman (1972).

On a micro level, Alkerlof's idea about 'lemon' problem (1969) has been widely applied to explain the effect of asymmetric information upon credit market (Jaffee and Russell, 1976; Stiglitz and Weiss, 1981; Mankiw, 1986) and equity market (Myers and Majluf, 1984; Greenwald, Stiglitz and Weiss, 1984). Thus, Fama (1985) states that by taking the advantage of gathering information about borrowers, banking institutions are the most efficient intermediaries to minimise the informational distortions. Similar evidence has also been provided by Diamond (1984).

Derived from the simplest endogenous growth model (AK model), the potential effect of financial development on economic growth has been illustrated from three aspects:

1) reducing the leakage of investment resources and funnelling savings to firms; 2) increasing the overall capital productivity; 3) altering the saving rate.

The functional approach proposed by Levine (1996) describes the macroeconomic consequences of the existence and the development of the financial structure as a whole and not of each particular financial instrument or market separately. This approach highlights the relationship between financial structure – the mix of financial instruments, markets and institutions – and the provision of financial services. In particular, it focuses on the quality of functions performed by financial sector, which includes 1) mobilising savings; 2) acquiring information and allocating resources; 3) diversifying and pooling risks and 4) monitoring managers and exerting corporate control.

Chapter 2 also studied the role of stock market during the DFL process. Some economists suggest that stock market can be understood as a good complement of credit markets in DFL process, while some of them propose that stock markets have much more significantly positive effect on economic growth than credit markets do. Meanwhile, an increasing research observed that the stock markets in LDCs are likely to perform worse since these emerging markets lack of well-defined regulation and adequate monitoring. Correspondingly, economists suggests that the financing pattern of developing country firms should be emphasising less on the share issuing but more largely relying on the retained profit.

9.2.2 A synopsis of existing empirical findings

Various empirical works can be found on the identification of the relationship between financial development and economic growth, particularly country-case study and econometrical statistics are two major approaches adopted by researchers. The empirical work in the early stages was mainly conducted with case study method. As the econometrical techniques being improved gradually, more and more evidence has

been provided through the statistical analysis approach.

Cameron *et al.* (1967) scrutinised the historical relationship between banking development and the early stages of industrialisation for England, Scotland, France, Belgium, Germany, Russia, and Japan, thus drawing the conclusion that the banking system plays a positive, growth-inducing role. By comparing industrial and capital market development in Brazil, Mexico and the United States between 1830 and 1930, Haber (1991, 1996) finds that the differences in capital market development had a significant influence on the rate of industrial growth.

The development of financial intermediaries was first introduced into cross-country statistic analysis by Goldsmith (1969), who found that rapid economic growth is often accompanied by dramatic financial development. Although Goldsmith's finding has been treated as a corner stone, several critiques have been made about this study, such as the limited data sample and the ignorance of other influential factors. After Goldsmith, a flourishing body of empirical work aiming at testing the sign and magnitude of financial depth on economic growth based on an estimated model where the economic growth is a function of a set of control variables and financial depth indicator.

The pioneering empirical study on financial-growth nexus was carried out by King and Levine (1993a, b and c). They find that there is significantly and strongly a positive relationship between each of the four financial development indicators (the size of financial intermediaries; the degree to which the central bank versus commercial banks are allocating credit; share of total credit allocated to private non-financial firms and the ratio of credit to private non-financial enterprises to GDP) and the three growth indicators (long-run real per capita growth rates, capital accumulation and productivity growth). The similar result has also been obtained by Murinde and Eng (1994), Neusser and Kugler (1996), Al-Yousif (2002). Nevertheless, Fernandez and Galetovic (1994) point out that if the King and Levine's observation

sample is split between OECD and non-OECD countries, the positive correlations become insignificant for OECD countries. Meanwhile, several researchers insist that finance is a relatively unimportant factor in economic development (Lucas, 1988; Dornbusch and Reygue, 1989), while some economists discovered a negative relationship existing in the Latin American countries (De Gregorio and Guidotti, 1995).

Although a positive correlation between growth and indicators of financial development was largely discovered in both cross-country/section study and panel analysis, the study on causal relationship between these two variables remained untouched until the first attempt taken by Gupta (1984). By operating the research with relatively small sample covering 14 developing countries, Gupta concludes that the causality cannot be described as simply as either 'supply-leading' or 'demand-following'. However, he expands the causality patterns influentially with bidirectional causality: both financial development and economic growth complement each other, which is similarly suggested by Demetriades and Hussein (1996), Kul and Khan (1999). Moreover, the causality pattern has a tendency to vary with countries and more specifically with the outcomes of financial reforms implemented (Jung, 1986; Habibullah, 1999; Demetriades and Hussein, 1996; Arestis and Demetriades, 1996).

Nevertheless, Beck and Levine (2002) stress that omitting stock market development makes the empirical studies incomplete and less convincing. An influential study done by Levine and Zervos (1998) indicates that initial measures of stock market liquidity and banking sector development are both strong predictors of economic growth. However, after controlling the other variables, Levine (1999) stresses that the striking importance of bank development could be the result of impediments to the development of equity markets or political intervention.

Within the context of domestic financial liberalisation, the role of stock market has

been examined thoroughly again. A number of influential empirical researches have been done to examine the effects of stock market on the financing of corporate growth (see as Je Cho, 1986; Mullin, 1993; Levine, 1990, 1996; Singh, 1997), indicating that the development of stock market does not assist the economic growth as predicted, but rather undermines the effects of the higher real interest rates arising from FL. Therefore, it has been suggested that LDCs would have been better off by reforming and expanding their existing banking-dominated financial system rather than by too much emphasis on the establishment of stock markets during DFL (Singh, 1997).

9.2.3 A synopsis of individual empirical results

9.2.3.1 Estimated result on economic growth pattern

In Chapter 5, the production function, the conventional Cobb-Douglas model, is applied in the context of China by using time-serial data on aggregated state level from 1952 to 2002 for the purpose of investigating the productivity of two main input factors – human capital and physical capital. By exploring the benefit of ECM, both short-term dynamic and long-term equilibrium of economic growth in China have been thoroughly demonstrated. The statistical result provided significant evidence that China's economic growth is driven by the swiftly accumulated capital stock attributed to the rapid increase of fixed assets investment.

The contribution to the national economic growth can be illustrated in two aspects: capital stock accumulation and improvement of labour force productivity. It has been asserted that the dramatic increase of savings and FDI are two major investment sources. The contribution of labour input to GDP growth is statistically modest. It has been argued that this result is underestimated which stems from the bias in measurement of labour growth on one hand. On the other hand, the changes in the quality of labour and the intensity of work have been treated as another factor to the underestimated contribution from the labour force input.

In Chapter 6, the economic growth pattern in China was studied by using panel data technique – the combination of cross section and time serial data. The empirical framework was established on a classical economic growth model, which contains the growth input factor, financial factors and other control variables. The weight of sectoral labour force (manufactory and servicing sector) has also been taken into account in order to capture the impact of the structural change on economic growth.

The estimated result indicated that the major contribution to the national economic growth is the substantial capital stock accumulation, while less commitment comes from the growth of labour force. During the economic and financial reform period, production factors have significantly shifted from lower productivity sector (such as agricultural sector) to the higher one (such as manufactory and servicing sectors). Nevertheless, it seems it is the servicing sector that mostly benefits from such structural change. Meanwhile, the empirical finding that there is significant and positive effect of FDI on national economic growth is consistent with most existing empirical studies. In addition, the vital contribution of educational level enhancement indicates the improvement in the quality of human capital is another essential resource attributed to the productivity increase.

9.2.3.2 Estimated result on financial-growth nexus – banking sector

The role of financial sector in form of banking industry in economic growth process has been carefully illustrated in both provincial panel and regional panel. Five indicators have been introduced to replace the existing ones which are not applicable on China's provincial level: (1) SIZE – the ratio of total deposits (of Overall Financial Institutions) over GDP, (2) CENTRAL – the ratio of loans to deposits of the State Banks, (3) LGDP – the ratio of loans to GDP, (4) CONCENTRATION - a Herfindahl index of banking sector to present the provincial banking market structure and competition intensity and (5) SOB – the credits from four state-owned banks to the credits from total local financial institutions.

Then we illustrated the relationship between real GDP growth and each financial intermediation indicator by statistical description. The statistical result showed that these five indicators were all negatively related to economic growth. The descriptive data analysis of these five indicators suggests that the size of provincial financial intermediation does not necessarily have a firm relationship with the level of economic development, while provinces with a lower rate of economic growth receive larger credit flows from the central government. Moreover, higher market concentration is associated with lower growth performance. Similarly, more credits granted by state-owned banks also result in the lower growth rate.

Unlike the common findings obtained from the cross-country analysis supporting the positive correlation between financial intermediaries' development and economic growth, this empirical study discovered that none of these five banking indicators was positively correlated with the economic growth, indicating that China's banking sector has not statistically generated any contribution to the economic development. Particularly, it is unusual to find that the increasing bank credit volume has no impact upon the GDP growth whilst the other four banking indicators are negatively correlated to the economic growth. The result firmly provided the evidence that, associated with the worsening credit quality in terms of the increasing volume of non-performing loans, the over concentration of credit resource distribution in such a state-owned-bank-dominated banking sector obviously hampered the efficiency of credit allocation hence impeding the economic growth.

By dividing the overall provinces into eight regions, the financial-growth nexus has been further investigated on regional level. The estimated result exhibited a positive relationship between the size of banking sector and the regional economic growth in three coastal regions. It has been also noticed that the loan to GDP ratio is positively related to the economic growth in East Coastal Region only, which is in contrast to the estimated result obtained from the provincial panel data. Nonetheless, the most striking finding is that the development of banking sector did not statistically correlate

with the economic growth in the least developed region – Northeast Zone (NEZ), though the ratio of bank credits over GDP is the highest within the eight regions. Furthermore, the survey undertaken on the scale and function of underground financial market (UFM) found out that the dramatic expansion of UFM in NEZ has produced seriously negative impact on the stability of official financial system and regional economic growth.

The role of the banking sector in economic development process has also been examined by adopting Granger-causality method and operating the aggregated level data (Chapter 7). During the entire sample period, no evidence can be found to support the hypothesis that China's banking sector has been playing a leading role in the process of economic growth. In order to testify the consistency of Granger-causality relationship across the financial reform period, data sample has been separated into two sub-samples: 1952-1978 and 1979-2003. The statistical result indicated that the banking sector development in terms of the expansion of credit allocation is the effect rather than the cause of the national economic growth in pre- and post-reform era. However, in the post-reform stage, the increase of investment does not necessarily enhance the demand for bank loans, which is more or less associated with the innovation and diversification of financial market in China providing another important channel for enterprises to raise investment funds.

9.2.3.3 Estimated result on financial-growth nexus – stock market

Given the rapid development of China's stock market, the analysis of the financial-growth nexus has been applied to China's stock market in Chapter 7. China's stock market was established to facilitate the reform of state-owned enterprises (SOEs) at a time when the government found it increasingly costly to pursue its policy of lending or subsidising SOEs. It was believed that by establishing a stock market it would provide an important investment channel for individuals while handing the responsibility for SOE monitoring over to more efficient institutions and individual

investors.

However, given to the government's reluctance to privatise, most of the listed companies have ownership structure where the state is the absolute majority shareholder and many individual constitute the minority shareholder. Such an ownership makes it impossible for small investor to carry out efficient monitoring. Moreover, when trading the state-owned shares is forbidden at the exchanges, it substantially widens the gap between majority shareholder's interests and those of individual investors. Since the essential conflict between the majority shareholder's interest and that of minority individual shareholders remains unresolved, more and more severe problems associated or derived from this essential conflict have been propagated which further deteriorate the market deficiencies. As a result, when state government can no longer stimulate the investors' participation and enthusiasm, the stock market apparently starts shrinking.

The relationship between stock market development and economic growth has been provided by the empirical study result based on the Granger-causality test. In order to gauge the development of China's stock market, five indicators have been employed from three aspects, including size, liquidity and volatility. The estimated results only concluded one-way causality relation in the context of China, indicating that economic growth (measured by IVA) is the Granger-cause of the stock market capitalisation while the reverse causation is unlikely to occur. Meanwhile, there is no causality relationship existing between stock market development and economic growth when in term of market liquidity and volatility.

After adding tradable capitalisation as a control variable into the causality test VAR model between growth and market value traded, the statistic result found that the value traded is the significant leading factor to output growth while the reserve direction between these two indicators does not hold. Since value traded determines the size (capitalisation) of stock market while the size (measured by tradable

capitalisation) has been identified as a weak leading factor of economic growth, it could be interpreted that the value traded causes output growth indirectly mainly through the its influence on market size.

The causality relationship was finally examined on the basis of the whole financial market, in which circumstance the ratio of bank credit assigned to industry sector to IVA was adopted to be the proxy for banking sector development. The estimated result further confirmed that financial development is the effect rather than cause of China's economic growth when tradable capitalisation of stock market was adopted. Moreover, a bio-direction (two-way) Granger-causality nexus has been observed when market value traded entered the VAR model while market size was controlled as information set, though the feedback effect (financial development is Granger-cause factor of economic growth) is significant at just 10 percent level.

Last but not the least, it is hard to find any influence from direct financing (measured by the ratio of stock market and corporate bond marketing financing over the credit market financing) on economic growth. Given that the bank credit market remains as the major financial source, direct financing market appears to be shrinking in most recent year, which further enhances the burden of banking sector. In these circumstances, it is undoubted to find that direct financing in terms of the development of stock market (with bond market as well) did not contribute to the economic development in respect to the rapid rise of bank credit allocation.

9.3 Contribution of the empirical study

This study contributes to the existing literature in two main facets. First, the economic growth pattern of China has been investigated by taking the sectoral shift (presented by the weight of labour force of manufactory and servicing sector respectively) into account. Thus, this empirical framework enables us to evaluate the impact of

structural change on economic growth. In these circumstances, the sectoral factor contribution to the overall economic growth has been examined. Furthermore, the rapidly increasing disparity between the coastal regions and interior provinces stimulates the concerns on the growth variation in different regions in China. Instead of using the conventional three-economic-zone classification (East, Middle and West Zone), the newly introduced eight-economic-region classification has been adopted. Thus, the three-sector growth model has been examined in eight economic regions individually.

Secondly, the financial-growth nexus in the context of China has not only been examined in banking sector (with panel estimation technique), but also been explored in stock market development (with Granger-causality analysis). Eventually, the causality direction has been studied by jointly considering both banking sector and stock market. The estimated result robustly supports the hypothesis that China's financial sector development is the Granger effect of the economic growth, i.e. demand-following role of financial market, while neither the Granger cause (supply-leading) hypothesis nor bidirectional causality hypothesis is tenable.

Currently, cross-section and time-series analysis has been widely applied on cross-country basis. The application of panel technique by using the statistical data of one single country – China, conversely, is rarely explored. Hence, the empirical study in this thesis provides a valuable attempt by establishing a large consolidated dataset consisting of 30 provinces (except Chongqing municipality) and 18 years (from 1984 to 2002) for the first time. Moreover, given the unavailability of the data, three prevailing banking development indicators are not applicable in our empirical study. Therefore, we introduced five alternative banking indicators to measure China's banking sector development on provincial level, concerning the size of the banking sector, the level of governmental intervention on banking sector, the importance of bank credits relative to the other fund resources in financing corporate investment, the competition intensity in banking sector and the performance of the four state-owned

banks respect to the overall financial institutions.

9.4 The limitations of the study

The study result would be improved if the limitation in this research could be eliminated. The short time period examined in the relationship between the stock market development and economic growth is the first weakness in this empirical research. Particularly in the Granger-causality analysis, the study only covered ten years monthly data (1995M1 to 2004M12). This time span is relatively short to conclude the causal direction between stock market development and economic growth. It is therefore recommended to replicate this study after a longer period of time to give a better view and enable more accurate conclusions to be reached.

Second, the measurement of several key variables is based on certain assumptions. Capital stock has not yet been adopted as a major item in the current statistical scheme, while the concentration has been emphasised on capital investment expenditure. As computing the reasonable capital stock value is essential to be able to undertake the statistical estimation, the calculation is conducted based on certain assumption and simplifications (see Section 4.3.2). Thus the computed capital stock value is likely to be a mismeasurement. Similarly, given the unknown monthly inflation rate, the real monthly IVA is not observable but has to be substituted by the most plausible manipulated outcome (see Section 7.3.1).

9.5 Suggestions for future research

Given the small coefficients on labour discovered, further exploration of the role of labour in the growth process should be concerned. Particularly, it is argued that the labour force contribution has been considerably underestimated due to the downward

bias in the measurement of labour growth. Therefore, a better way to evaluate the more accurate effect of labour force input should re-compile the labour force data by person-hours worked instead of by number of persons employed. Furthermore, the seasonal movement of the labour force between agricultural sector and manufacturing sector, agricultural sector and servicing sector is another major stimulus to be considered.

The future research can further explore the effects of the changes in the Chinese financial system on economic growth and development. This empirical study, like many others, mainly concentrated on the financial development in 'monetary' sense rather than in 'real quality' term. Therefore, it is possible to address the question whether the resources have been optimally channelled into financial services. Hence, in order to measure the efficiency of financial sector, another four indicators deserve highest consideration: 1) the share of manpower employed in the financial system, 2) the educational level of manpower employed in the financial system, 3) the share of the financial system in the national accounts of GDP and 4) the number of banks and branches per capita, which are useful to measure the operating costs of financial system. Such variables have been compiled and published by NBSC. However, only national aggregated data are available. The regional level ones should be obtained by conducting primary data collection via survey or questionnaire in each individual province, particularly the share of manpower employed, the educational level of manpower and the number of banks and branches.

Additionally, the decision-making power of local governments (and local party committees) on the performance of China's listed firms can be measured and taken into account in the regional financial-growth nexus examination. Meanwhile, since China's A-share stock market is opening to overseas investors gradually, the effect of QFII (Qualified Foreign Institutional Investors) scheme, described as a milestone move in the reform process of China's stock market, on real sector performance is worth studying. Given to the share price and share rights distortion originating from

the isolation between tradable and non-tradable shares, activating non-tradable shares will generate a substantial impact on the stock market performance and consequently on economic growth, which provides another appealing issue for further research.

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