Finance-growth Nexus in China: A Channel Decomposition Analysis

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論文

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Abstract

This study aims to reassess the finance-growth nexus debate in China, and consequently illustrate the channels through which financial development gives impact on China's economic growth after 1978. Specifically, this study addresses two channels through which the effects operate, i.e., physical capital accumulation and productivity improvement. The study adopts an approach called channel decomposition which combines the conventional accounting framework and regression analysis.

The empirical analysis, using a panel dataset of Chinese provinces between 1980 and 2004, argues that: (1) the relationship between financial development and economic growth in China tends to be a long-run one; (2) the direction of causality between financial development and economic growth has presumably run from the former to the latter in China; (3) the impacts induced by various measures of financial system exert on economic growth are different, and the channels through which they give impact on the growth are different as well; (4) the existence of inter-regional heterogeneity in the context of China's finance-growth nexus tends to be sensitive to the selection of financial variables.

Keywords: financial development, economic growth, nexus, channel decomposition

1. Introduction

It is now commonly accepted that financial development exerts positive impact on a country's economic growth. However, regarding Chinese case, the empirics have not been able to provide unequivocal conclusions[1]. This study aims to reassess the finance-growth nexus debate in China. In particular, the study emphasizes the channels through which financial development effects Chinese economic growth. We will propose an analytical framework which may overcome four shortcomings observed in the literature, and consequently make the attempt to give conclusive remarks on the finance-growth nexus debate.

This study complements the literature in the following four aspects. First, the study

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addresses the issue of time span in the discussions of finance-growth relationship. Secondly, the study systematically investigates the relationship between financial development and two 'primitive'[2] components of economic growth, namely physical capital accumulation and efficiency improvement. Since one primary drawback in growth regressions is the lack of concern of causality, the methodology at least to some extent ameliorates the concern. Thirdly, a broad range of measures are included to capture various aspects of China's financial development after 1978. Fourthly, in addition to the analysis at the national level, the study also sheds light on the inter-provincial heterogeneity of finance-growth nexus by splitting the sample provinces into two groups, i.e., coastal provinces and inner provinces.

The remainder of the paper is organized as follows. Section 2 provides a brief review of the literature. The section goes further to address several possible reasons causing the discrepancies in the findings of previous empirical studies. Section 3 presents our analytical framework and the results of empirical investigation. Exactly, the section adopts a methodology called 'channel decomposition exercise'[3] which combines the accounting approach and regression analysis. Finally, section 4 provides the summary of the main findings.

2. Literature Review on Finance-Growth Nexus

2.1 Finance-Growth Nexus: A Brief Review[4]

The efforts to identify the empirical evidence of finance-growth relationship can date back to the pioneering study of Goldsmith (1969)[5]. Especially, huge empirical studies have emerged since the 1990s. Put briefly, those studies have mostly concluded that financial development positively contributes to the economic growth, although more country-specific researches are required to explain the heterogeneity across the countries. Those studies can be roughly divided into two lines. While cross-country studies usually start with the priori assumption that finance influences growth, time series studies are largely devoted to finding the causality patterns suggested by Patrick (1966)'s hypotheses[6].

With respect to the cross-country studies, influential works including King and Levine (1993), Levine and Zervos (1998), Levine et al (2000), Beck et al (2000), and Beck and Levine (2004) provided strong evidence for the positive relationship between financial development and economic growth[7]. In addition, they found that the initial level of financial development predicts the subsequent values of economic growth, capital accumulation and productivity improvement. However, Andersen and Tarp (2003), after splitting the full cross-country sample used in Levine et al (2000) into regional sub-samples, found that the correlation is negative or statistically insignificant in poorest countries albeit significantly positive correlation in full sample. Similarly, Ram (1999), using a sample of 95 countries, found that despite the significantly positive association between

financial development and economic growth in pooling data, the individual-country and sub-sample cross-country analyses did not support the evidence.

With respect to the time-series studies, the empirics exerted substantial variations across countries. Demetriades and Hussein (1996), after examining the patterns of finance-growth relationship in 16 countries, detected a bidirectional causal relationship between finance and growth in about half of the sample countries, but unidirectional causal relationship from growth to finance in others. The consequent studies including Arestis and Demetriades (1997), Luintel and Khan (1999), Shan et al (2001) and Shan (2005) also found various patterns of causality across their sample countries[8].

2.2 The Finance-Growth Nexus in China: Divided Views

Recently, finance-growth nexus in China has attracted much of the attention of economists. Table 1 presents a summary of selected studies regarding the debate. Obviously, the empirical evidence based on these studies is inconclusive.

Similar to the cross-country studies, the Chinese case studies have also applied two approaches:

(1) Growth regressions based on the panel datasets of Chinese provinces.

The studies applying this approach ran regression models which incorporate the indicator(s) of financial development as additional explanatory variable(s) to explain various aspects of economic growth. Dynamic panel techniques, especially GMM techniques, have been frequently used in recent studies to control for the simultaneity bias. The conclusions of these studies showed mixed picture. The early studies including Aziz and Duenwald (2002) and Boyreau-Debray (2003) found little support for the positive relationship between financial development and economic growth in China. The recent studies, on the other hand, showed rather encouraging pictures.

(2) VAR model and Granger causality test.

Among the time-series studies, Shan et al (2001), Chang (2002), Fan et al (2005) and Shan (2005) used quarterly data which covered a short time period, mostly covering the period from late 1980s to late 1990s. The study of Liang and Teng (2006) was an exception which used annual data covering long time period from 1952 to 2001. The results of these studies again are conflicting. Shan et al (2001), Shan (2005) and Liang and Teng (2006) found unidirectional causality from economic growth to financial development, while Chang (2002) found neither direction of causality. Meanwhile, Fan et al (2005) found the feedback relations among financial depth, banking sector development and growth.

2.3 Sources of Discrepancies in the Empirics

As mentioned above, the empirics from both cross-country studies and Chinese case studies presented rather ambiguous pictures

Table 1 Summary of Selected Studies on the Finance-Growth Nexus of China

Author(s)	Dataset (Time span)	Financial variable(s)	Growth variable(s)	Methodology	Major findings
Panel Regression Studies:					
Aziz and Duenwald (2002)	Provincial panel (1988-1997, annual).	1. Bank loans/GDP 2. Bank loans to non-state sector/ GDP	1. Growth rate of real per capita GDP 2. Investment/GDP 3. TFP	Fixed-effects panel regressions.	Positive correlation between growth and financial intermediation, but the association is more apparent than real.
Boyreau-Debray (2003)	Provincial panel (1990-1999, annual)	1. Bank deposits/ GDP 2. Loans/ deposits of state-owned banks 3. State-owned banks credit/GDP 4. Bank concentration index	ln (real per capita GDP)	Dynamic panel regressions (GMM).	Bank credit has negative impact on provincial economic growth.
Liang (2005a)	Provincial panel (1990-2001, annual).	1. Loans/GDP 2. Bank competition 3. Share of private credit	Growth rate of real per capita GDP	Dynamic panel regressions (GMM)	Financial development and government deregulation in the financial sector significantly promote China's economic growth.
Liang (2005b)	Provincial panel (1990-2001, annual).	1. Loans/GDP 2. Share of credit to private sector 3. Bank competition	ln (real per capita GDP)	Dynamic panel regressions (GMM).	Financial development significantly promotes economic growth in coastal region but not in inland region.
Guillaumont-Jeanneney, Hua and Liang (2006)	Provincial panel (1993-2001, annual).	1. Private credit/ GDP 2. Indicator of bank competition 3. Public credit	TFP and its two components, i.e., the growth rate of technical efficiency and that of technical progress	Dynamic panel regressions (GMM).	Financial development significantly contributes to productivity growth. Financial development enhances China's productivity mainly through raising efficiency.
Hao (2006)	Provincial panel (1985-1999, annual).	1. Loans/GDP 2. Household savings deposits/GDP 3. Fixed asset investment financed by loans / that financed by state budgetary appropriation	ln (real per capita GDP)	Dynamic panel regressions (GMM)	Financial development contributes to economic growth through two channels: the substitutions of loans for budget appropriation and mobilization of household savings. Loan expansion does not contribute to growth.
Cheng and Degryse (2006)	Provincial panel (1995-2003, annual).	1. Deposits/ GDP 2. Credit/GDP	Real per capita GDP growth	Fixed-effects regressions and	Banking development exerts significantly positive impact on economic growth.

		3. Concentration index (respectively for banks and non-bank institutions)		dynamic panel regressions (GMM).	Banks outperform non-bank financial institutions.
Zhang, Wan and Jin (2007)	Provincial panel (1987-2001, annual).	Bank loans to non-state owned sectors/GDP	TFP	GLS	Significant positive nexus between financial deepening and productivity growth.
Time Series Studies:					
Shan, Morris and Sun (2001)[a]	9 OECD countries and China, time series, national level (1986–1998, quarterly).	Bank loans to private sector/ GDP	Real per capita GDP	Multivariate VAR model and Granger causality test.	One-way causality from economic growth to financial development. Two-way causality between CPI and financial development.
Chang (2002)	Time series, national level (1987-1999, quarterly).	Monetary survey/ GDP	GDP	Multivariate VAR model and Granger causality test.	No support for either demand-following or supply-leading hypothesis. Financial development affects economic growth indirectly through the degree of openness.
Fan, Jacobs and Lensink (2005)	Time series, national level (1992-2004, quarterly).	1. M2/GDP 2. ln (Domestic bank credit /GDP) 3. ln (Market value of tradable stocks/GDP).	ln(GDP)	Granger causality test	Positive relationships between financial depth, banking sector development and growth. No positive relationship between stock market development and growth.
Shan (2005)[a]	10 OECD countries and China, time series, national level (1985-1998, quarterly).	Total credit	Rate of change of real GDP	Multivariate VAR model.	One-way causality from economic growth to total credit. Small role of total credit in promoting investment and productivity.
Liang and Teng (2006)	Time series, national level (1952-2001, annual).	1. Bank credit/GDP 2. Deposits/GDP.	ln(real per capita GDP)	Multivariate VAR model.	Unidirectional causality from economic growth to financial development.

Notes: 1. Numbers in parenthesis after authors indicate the years of publication.
2. Papers in the table are ordered chronologically by years of publication.
3. Small a after the authors indicates that, the specific studies include countries besides China. However, the current table only provides a summary of Chinese case.
Source: Author's compilation.

regarding finance-growth debate. These discrepancies in the empirical findings might be caused by various reasons. Here, we address following four reasons which presumably cause the discrepancies. Note that the current discussions are common for both cross-country studies and Chinese case studies, and our analytical framework will be designed to overcome the problems.

First, the lack of concern about the time span makes it difficult to distinguish long-run and short-run dimensions in the context of finance-growth nexus.

In the literature, economic growth variables have been selected rather arbitrarily. Some authors use level terms, whilst some others use growth terms. Luintel and Khan (1999), in a sample of ten countries, found that there is a negative correlation between the financial indicator and the growth rate of real per capita income in seven out of ten countries. In contrast, they found that there is strong positive correlation between the same financial indicator and the level of real per capita income in all sample countries[9]. They consequently concluded that the relationship between financial development and economic growth tends to be a long-run one.

Secondly, the results from two different approaches, i.e., growth regression approach and causality approach, connote different interpretations on the relationship between financial development and economic growth. The selection of either approach is difficult to be fully justified.

Compared to the causality approach, the growth regression approach stresses on the deduction of economic theory rather than pure statistical evidence. However, in the case of growth regressions, the question of directions of causality is largely unanswered because they usually impose the predetermined assumption of a causal relationship running from financial development to economic growth. In contrast, the causality approach makes allowance for the reverse causality as well. Certainly, the approach often bears the criticism of lacking sound theoretical background. Moreover, it is questionable whether the causality observed in the statistical sense can be interpreted as the causality in our common sense or not.

Thirdly, regarding the definition of financial variables, on the one hand, any single indicator may not capture various aspects of financial development; on the other hand, in country-specific studies, indicators commonly used in the cross-country studies may not reflect country-specific features which vary across countries.

Since Goldsmith (1969), economists have constructed various indicators for financial development[10]. However, as pointed out by Demirguc-Kunt and Levine (2008: 3), designing good empirical proxies of financial development still represents a valuables area for future research. Meanwhile, in single country case such as China, its financial development process bears specific features[11]. It is hence questionable whether the indicators used in cross-country studies could capture those country-specific features well or not. As seen

in the Chinese literature, efforts have been made to construct appropriate measures which reflect the Chinese features of financial development.

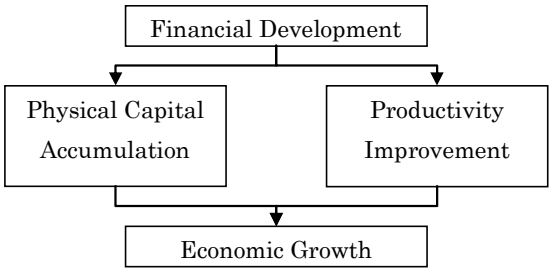
Fourthly, the finance-growth debate to date has rarely addressed the issue at sub-national level. However, recent researches suggest the existence of inter-regional heterogeneity within a country.

Guiso et al (2002) argued that even in an economy with integrated financial market, local financial development is still an important determinant of the local economic growth. After studying the case of Italy, wherein no frictions of capital movement, they found that economic activities in a certain region are strongly affected by the level of financial development in the region albeit weaker effects for larger firms. Alternatively, in another study of China, Liang (2005b) found that financial development significantly contributes to the economic growth in coastal region but not in the inland regions. His study suggested that, in China, financial functions provided by the financial sector might vary across the regions although the structure and the size of financial sector are essentially same.

3. Finance-Growth Nexus in China: Channel Decomposition Exercise

Our empirical analysis builds on an aggregate production function framework. The hypothesis is that financial development is one of the fundamental factors which indirectly give impact on economic growth through two channels, namely, physical capital accumulation and productivity improvement. Figure 1 presents the conceptual framework for empirical analysis[12].

Figure 1 Finance-Growth Nexus: A Framework



Source: Author's compilation.

In the literature, it is well-documented that financial development gives impact on economic growth mainly through two channels, namely, physical capital accumulation and productivity improvement[13]. Once these two channels are accounted for, the overall impact of financial development on economic growth turns out to be ambiguous[14].

With respect to the first channel, the impact is complicated and ambiguous. Certainly, financial development may facilitate the process of agglomerating small savings from scattering savers and channeling them to corporate sector. The corporate sector in turn may use the capital for physical investment. This increases the volume of resources available to finance investment[15]. However, financial development may raise or reduce the savings rate. On the one hand, increase of the liquidity, ease of access and inter-temporal risk sharing may make financial assets more attractive instruments for savings. In addition, better financial services may encourage sav-

ings by raising the returns to savings. On the other hand, since the savers can achieve their target stocks of wealth at a lower savings rate, higher interest rates which raise the returns to savings may lower savings rate.

With respect to the second channel, it is obvious that financial development can promote efficient capital allocation by lowering information costs, identifying promising investment and facilitating corporate governance, which in turn leads to the productivity improvement. On the one hand, financial development reduces the costs of collecting and processing information. Before providing finance, a well-functioning financial system can produce ex ante information about the investment at lower costs than individual investors. Consequently, financial development furthers technological innovation by facilitating the allocation of capital to the investors (projects) who (which) have the best chances to be successful in the future. On the other hand, after providing finance, a well-functioning financial system can exert ex post corporate governance by monitoring the activities of borrowers. Financial development consequently ensures the efficient uses of capital and makes savers more willing to finance production and innovation.

3.1 Framework for Empirical Analysis

Our empirical analysis adopts a methodology termed by Wong (2007), i.e., channel decomposition exercise. The methodology involves two steps: first, applying accounting approach to decompose the economic growth into two components, i.e., the contribution from physical capital accumulation and the contribution from the improvement of total factor productivity; secondly, regressing the growth variable and its two components on the fundamental determinants of growth including financial development. The differentiation between the overall impact on economic growth and the decomposed impacts on two components makes it possible to explore the channels through which the fundamental determinants effect on economic growth. Note that the focus determinant in the context of this analysis is financial development albeit some other determinants are also included to control for the unspecified influences from a vector of other factors.

Literature Review of Channel Decomposition

The idea analogous to the channel decomposition can be found in previous studies although it was recently termed by Wong (2007). For instance, Fisher (1993) and Bosworth et al (1995) examined the channels through which various determinants impact on economic growth[16]. In finance-growth literature, as early as King and Levine (1993), the channels of capital accumulation and productivity growth have been addressed. Similar examinations have been frequently highlighted in the consequent literature. Especially, Rioja and Valve (2004) and Benhanbib and Spiegel (2000) are worth mentioning. The former found that channels through which finance affects growth vary among countries at the different stages of economic development, i.e., in rich countries, finance boosts growth mainly through pro-

ductivity improvement, while in poorer countries, mainly through capital accumulation. The latter found that factor accumulation and productivity improvement channels exist contemporaneously although the two were associated with different financial indicators[17].

These aforementioned studies distinguished the primitive determinants from the fundamental determinants of economic growth. Consequently, they addressed the impacts of fundamental determinants on growth running through the channels of primitives. However, these studies did not systematically decompose the overall impact of fundamental determinants on growth into the impacts running through the primitives. In contrast, Hall and Jones (1999), Frankel and Romer (1999) and Wong (2007) provided the ideas of decomposition exercises.

With the purpose to investigate the effects of social infrastructure on economic growth, Hall and Jones (1999) decomposed the output per worker into the contributions from factor accumulation and productivity improvement. The components of economic growth were then regressed on the indicator of social infrastructure[18]. Frankel and Romer (1999) adopted the same decomposition method as Hall and Jones (1999) to examine the effects of trade on economic growth and its component[19]. Alternatively, Wong (2007) followed the standard growth accounting framework in which the growth rate of output per worker was decomposed into the contributions from the growth of physical capital accumulation, growth of human capital accumulation and TFP growth. They were then regressed on a set of fundamental determinants[20]. Note that the decomposition approach of Hall and Jones (1999) was performed on levels, and the consequent regression analyses were conducted using level terms of growth variables. While, the decomposition approach of Wong (2007) was performed on growth, and the consequent regression analyses were conducted using growth terms of growth variables. Accordingly, the approaches of Wong (2007) and Hall and Jones (1999) differ from each other in whether the analysis is conducted on levels terms or on growth terms.

Framework for Current Analysis

Combining Wong (2007) and Hall and Jones (1999)'s approaches, this current study proposes a framework which conducts the decomposition of output on both level and growth terms.

Consider a simple Cobb-Douglas production function of constant returns to scale as follows.

$$Y_{i,t} = A_{i,t} K_{i,t}^{\alpha} L_{i,t}^{1-\alpha}$$

where K and L are physical capital and labor, A is an overall efficiency factor including not only the technological progress but also efficiency improvement induced by institutional factors, whereas subscript i and t stands for province and time respectively. This aggregate production function is assumed to be common across provinces and over whole sample period.

With simple manipulation, it is possible to rearrange the above production function as:

$$\left(\frac{Y}{L}\right)_{i,t} = A_{i,t}^{\frac{1}{1-\alpha}}\left(\frac{K}{Y}\right)_{i,t}^{\frac{\alpha}{1-\alpha}}$$

By taking logarithm on both sides of the equation, a level decomposition equation comparable to Hall and Jones (1999) can be obtained as follows.

$$\log\left(\frac{Y}{L}\right)_{i,t} = \frac{1}{1-\alpha}\log(A)_{i,t} + \frac{\alpha}{1-\alpha}\log\left(\frac{K}{Y}\right)_{i,t} \quad (\text{eq.1})$$

Given the appropriate measurements of $\frac{Y}{L}$, $\frac{K}{L}$ and A, it is obvious that following three equations for regression can be constructed. Note that in this group of model specifications, all economic growth variables are taken on level terms.

Group 1:

$$\log\left(\frac{Y}{L}\right)_{i,t} = \alpha_0 + \alpha_1 Finance_{i,t} + \alpha_2 Control_{i,t} + \varepsilon_{i,t} \quad (\text{eq.1a})$$

$$\frac{1}{1-\alpha}\log(A)_{i,t} = \alpha_0' + \alpha_1' Finance_{i,t} + \alpha_2' Control_{i,t} + \varepsilon_{i,t}' \quad (\text{eq.1b})$$

$$\frac{\alpha}{1-\alpha}\log\left(\frac{K}{L}\right)_{i,t} = \alpha_0'' + \alpha_1'' Finance_{i,t} + \alpha_2'' Control_{i,t} + \varepsilon_{i,t}'' \quad (\text{eq.1c})$$

where $Finance$ is a measure of financial development, while $Control$ stands for a vector of other factors associated that are generally accepted to be important in explaining China's economic growth[21].

Further differentiating equation (1), a growth decomposition equation comparable to Wong (2007) can be obtained as follows.

$$g\left(\frac{Y}{L}\right)_{i,t} = \frac{1}{1-\alpha}g(A)_{i,t} + \frac{\alpha}{1-\alpha}g\left(\frac{K}{Y}\right)_{i,t} \quad (\text{eq.2})$$

where $g()$ denotes the growth rate.

Consequently, another group of regression equations can be constructed as follows. Note that in this group of model specifications, economic growth variables are taken in growth terms.

Group 2:

$$g\left(\frac{Y}{L}\right)_{i,t} = \beta_0 + \beta_1 Finance_{i,t} + \beta_2 Control_{i,t} + \nu_{i,t} \quad (\text{eq.2a})$$

$$\frac{1}{1-\alpha}g(A)_{i,t} = \beta_0' + \beta_1' Finance_{i,t} + \beta_2' Control_{i,t} + \nu_{i,t}' \quad (\text{eq.2b})$$

$$\frac{\alpha}{1-\alpha}g\left(\frac{K}{Y}\right)_{i,t} = \beta_0'' + \beta_1'' Finance_{i,t} + \beta_2'' Control_{i,t} + \nu_{i,t}'' \quad (\text{eq.2c})$$

By using this framework, the current study attempts to overcome three problems observed in the literature as mentioned in the sub-section 2.3. Testing hypotheses of the equations are as follows.

First, if the estimated coefficients of financial variables are statistically significant in both groups of equations, it indicates the existence of finance-growth relationship in both long-run and short-run dimension. If the estimated coefficients of financial variables are statistically significant only in the regressions using level terms of economic growth variables, i.e., Group 1 of equations, it indicates the existence of finance-growth relationship in a long-run dimension and excludes it in a short-run dimension. On the contrary, if the estimated coefficients of financial variables are statistically significant only in the regres-

sions using growth terms of economic growth variables, i.e., Group 2 of equations, it indicates the existence of finance-growth relationship in a short-run dimension and excludes it in a long-run dimension[22].

Secondly, if the estimated coefficients of financial variables on two channels are statistically significant, we may conclude that physical capital accumulation and productivity improvement are two viable channels through which finance gives impact on growth. Furthermore, if the estimated coefficients of financial variables on growth are statistically significant only when the estimated coefficients of financial variables on both or either of two channels are statistically significant, we may conclude that the direction of causality between financial development and economic growth most possibly runs from the former to the latter.

Thirdly, the estimations will be conducted at both national and sub-national levels. In the estimations carried out at sub-national level, all sample provinces are classified into two groups, i.e., costal provinces and inner provinces[23]. If the signs and values of estimated coefficients of financial variables vary across two groups of provinces at the sub-national level, it suggests the existence of the heterogeneity of finance-growth relationship across Chinese regions. If they are common over two groups of sample provinces, it suggests the non-existence of the heterogeneity.

3.2 Description and Sources of Data

The dataset used in this study applies to 1980-2004 period[24] and contains 26 Chinese provinces (or provincial-level autonomous regions and municipalities). Hainan, Chongqing, Sichuan, Xizang (Tibet) and Qinghai are excluded from the sample due to missing data. For the set of sample provinces, data are available for all variables. Hence the estimations reported in sub-section 3.3 are carried out with balanced panel dataset. The original data to construct the variables are collected from officially published statistics. Table 2 provides the detailed definition of variables and statistical sources.

Indicators of Financial Development

In order to overcome the problem of indicator selection with respect to the financial development, we include six financial variables which represent various aspects of financial development in China. These six financial variables can be classified into two groups based on the connotations of financial development. LOAN, SAVING and BUDGET capture the process of financial development from the perspective of the expansion of quantity of financial sector in providing financial services, while the other three capture the process of financial development from the perspective of the changes of quality of financial sector in providing financial services.

The six financial variables are constructed based on the literature.

(1) LOAN, SAIVNG and BUDGET are computed following Hao(2006). He argued that financial development in China after 1978 has been featured by

Table 2 List of Variables

Variables (Time Span)	Definition of Variables		Sources
Financial Variables			
LOAN (1980-2004)	Ratio of total loans to GDP.		CCS55, CSY.
SAVING (1980-2004)	Ratio of total household savings deposits to GDP.		
BUDGET (1980-2004)	Ratio of total loans to the state budgetary appropriation for capital construction and enterprises innovation.		CCS50, CCS55, CSY.
COMPETITION (1993-2004)	Ratio of loans issued by the financial institutions other than Big Four to total loans.		ACFB, provincial statistical yearbooks.
CONCENTRATION (1993-2004)	Herfindahl index of banking deposit concentration. $CONCENTRATION_{i,t} = \sum_{j=1}^{n} \left(D_{j,i,t} \Big/ \sum_{j=1}^{n} D_{j,i,t} \right)^2$ where $D_{j,i,t}$ is the deposits for financial institution j, province i, time t, and n is the number of financial institutions.		
CENTRAL (1980-2004)	Ratio of total loans to total deposits.		CCS55.
Growth Variables			
Group 1 (1980-2004)	GRP	$\log\left(\frac{Y}{L}\right)$ in equation (1a), logarithm of output per worker.	CSY.
	EFF	$\frac{1}{1-\alpha}\log(A)$ in equation (1b), contribution from productivity improvement in level term.	
	CAP	$\frac{\alpha}{1-\alpha}\log\left(\frac{K}{Y}\right)$ in equation (1c), contribution from physical capital accumulation in level term.	
Group 2 (1980-2004)	GGRP	$g\left(\frac{Y}{L}\right)$ in equation (2a), growth rate of output per worker.	
	GEFF	$\frac{1}{1-\alpha}g(A)$ in equation (2b), contribution from productivity improvement in growth term.	
	GCAP	$\frac{\alpha}{1-\alpha}g\left(\frac{K}{Y}\right)$ in equation (2c), contribution from physical capital accumulation in growth term.	
Control Variables			
EDUCATION (1980-2004)	Enrollment rate to tertiary education (persons per 10,000 people).		CCS55, CRE17.
OPENNESS (1980-2004)	Ratio of exports plus imports to GDP.		CCS55, ADB Key Indicators.
FDI (1980-2004)	Ratio of FDI to GDP.		
FISCAL (1980-2004)	Share of fixed asset investment by state-owned sector in total fixed asset investment.		CCS55.
STATE (1980-2004)	Ratio of government expenditure to GDP.		

Notes: 1. Growth rates are computed as the log difference of values for every two successive years.

2. CCS55 refers to China Compendium of Statistics: 1949-2004, CCS50 refers to China Compendium of Statistics: 1949-1999, ACFB refers to Almanac of China's Finance and Banking, various issues, CSY refers to China Statistical Yearbook, various issues, and CRE17 refers to China Regional Economy: a Profile of 17 Years of Reform and Opening Up.

Source: Author's compilation.

three main aspects: first, loan expansion; secondly, mobilization of household savings; and thirdly, substitution of loans for state budget appropriation as the primary source of external financing. The three variables are respectively computed to capture these three aspects[25].

(2) COMPETITION is computed following Liang (2005a and 2005b) and Guillaumont- Jeanneney et al. (2006). The variable reflects the degree of competition in the financial sector.

(3) CONCENTRATION and CENTRAL are constructed following Boyreau-Debray (2003)[26]. The former accounts for the structure of banking sector in the provinces[27], while the latter accounts for the intervention by central bank in loan extension practices[28].

Indicators of Economic Growth and its Components

This study includes two groups of economic growth indicators, three for each. In order to obtain appropriate measurements of the growth variables, capital stock series for each province are constructed first, and then two proxies of productivity improvement are computed as the residuals respectively from equation (1) and (2).

In data processing, following four issues are especially worth mentioning. Firstly, in all calculations, implicit provincial GDP deflators are used as the price indices to convert the nominal values of data into real terms. Secondly, total numbers of employed person are used as the proxy of labor input. Thirdly, provincial capital stock series are computed from provincial gross capital formation using Perpetual Inventory Method (PIM) which involves two steps given as follows[29].

(1) Obtaining initial values of capital stock for each province by the equation[30]:

$$K_{i,0} = \frac{I_{i,0}}{(\delta + g_i)}$$

where δ refers to the rate of depreciation, while g is the average geometric growth rate of investment for the whole sample period. Note that a universal rate of depreciation, 5 percent[31] is assumed for all provinces and over whole sample period, and g is computed by regressing the logarithm of investment series of each province on a time trend variable t. The benchmark year for all sample provinces is set as 1978.

(2) Obtaining the capital stock series for each province in later years by the equation:

$$K_{i,t} = I_{i,t} + (1-\delta)K_{i,t-1}$$

where K_t is the capital stock in year t, I_t is the gross capital formation in year t, δ is the same as above.

Fourthly and finally, the distribution share of labor, $(1-\alpha)$ is estimated based on the ratio of compensation of employees to value-added in the input-output table. Exactly, average of the estimates based on five input-output tables, i.e., 1990, 1995, 1997,

2000 and 2002 input-output tables, is used in the data processing[32]. It gives the share of 0.493 which is regarded as common for all provinces and over the whole sample period.

3.3 Regression Results

This sub-section reports the regression results of Group 1 of equations (in level terms). Table 3 presents the regression results for the panel covering all sample provinces. Table 4 presents the corresponding results for two sub-samples (coastal and inner provinces). Our analysis starts by estimating three equations for the sample including all provinces (entire sample). The same estimations are then carried out for each of two sub-samples, i.e., coastal provinces and inner provinces. In addition, as explained above, the main aim of this study is to empirically investigate the channels through which post-1978 financial development influences the economic growth in China. Therefore, the estimations are conducted to include GRP, i.e., economic growth indicator as the dependent variable first, which followed by the estimations to explore the effects of financial indicators respectively on two channels (CAP and EFF). It is worthy to note that: (1) six financial indicators are included one at a time to avoid the collinearity of explanatory variables; (2) in order to test the robustness of coefficient estimates of financial variables over various model specifications, three different methods of panel estimation including common constant method (pooled OLS method), fixed effects method and random effects method, are adopted.

These estimation results are of our interest in the following four respects.

First, the regression results are sensitive to the selection of growth variables. Specifically, financial variables are significantly associated with the level terms of growth variables while insignificantly associated with the growth terms. Therefore, the relationship between financial development and economic growth in China tends to be a long-run one.

Table 3 and Table 4 show that the coefficient estimates of financial variables are statistically significant over model specifications and different estimation methods. It implies the existence of a relationship between financial development and economic growth in a long-run dimension. However, with respect to the Group 2 of equations, the estimated coefficients of financial variables are not statistically significant in almost all model specifications. It implies that financial development has not been able to generate impacts on economic growth in a short run. The fact that a significant association between the financial variables and the level terms of growth variables contemporaneously exists with an insignificant association between the financial variables and the growth terms of growth variables suggests that the relationship between financial development and economic growth is a log-run one in China[33].

Secondly, the empirical evidence suggests the existence of two channels, i.e., physical capital accumulation and productivity improvement. The direction of causality between financial development and economic

growth turns out to have had run from the former to the latter in China.

In Table 3 and Table 4, albeit the variations in the estimated coefficients, as long as a statistically significant association is detected between financial development and two components of economic growth (either or both), a statistically significant association between financial development and economic growth variable itself is detected, and vice verse. This implies that physical capital accumulation and productivity improvement are the viable channels through which financial development has given impact on economic growth in China. Furthermore, so far, the causal relationship has presumably run from financial development to economic growth.

Thirdly, various aspects of financial development as measured by different financial variables exert different impacts on economic growth, and the channels through which they give impact on the growth are different as well. The expansion of financial services in China has contributed to the economic growth, and the main channel through which the effects operate is the channel of physical capital accumulation. Meanwhile, the empirical evidence supports the argument that government distortions in the financial sector have hindered the growth, while the increase of competition may foster the growth largely through the channel of productivity improvement.

Column (1)-(3) in Table 3 show that the coefficients of LOAN, SAVING, BUDGET and COMPETITION are positive and statistically positive. This means that: (1) the three main aspects of China's post-1978 financial development argued by Hao (2006), i.e., loan expansion, mobilization of household savings and substitution of loans for state budget appropriation as the primary source of external financing, have largely contributed to the economic growth in China; (2) increased competition in banking sector has fostered economic growth. Meanwhile, CONCENTRATION and CENTRAL are found to be negatively correlated with the economic growth. The fact indicates that the government interventions in financial system have impaired the economic growth in China.

Furthermore, column (4)-(9) in table 3 show that various aspects of financial development in China have influenced economic growth through different channels. With respect to the LOAN, SAVING, and BUDGET, despite the variations over three estimation methods, financial variables obviously give impact on dependent variable GRP mainly through the channel of physical capital accumulation[34]. Compared to the FDI variable, it is obvious that FDI variable has given impact on economic growth mostly through the channel of productivity improvement, while financial development has worked through the channel of physical capital accumulation[35].

However, with respect to the COMPETITION and CONCENTRATION, the channel of the productivity improvement appears to be more significant. Since both indicators actually proxy for the provincial financial

structures, the results suggest that increased competition in financial sector might help improve the efficiency of resource allocation, and consequently contribute to the economic growth. Finally, with respect to CENTRAL, although the overall impact on GRP is significantly negative, the decomposed impacts on CAP and EFF are ambiguous. It is thus difficult to distinguish relatively more significant channel[36].

Fourthly, the existence of inter-regional heterogeneity tends to be sensitive to the selection of financial variables, at least in the case of the comparison between coastal provinces and inner provinces.

Different from Liang (2005b), who argued that financial development significantly promotes economic growth in coastal provinces but not in inner provinces, we found that LOAN, SAVING and BUDGET are significantly associated with GRP in both sub-samples, and the main channel turns out to be capital accumulation[37]. Therefore, concerning the relationship between the expansion of financial services and economic growth, there is probably no significant inter-regional heterogeneity. Similarly, with respect to the estimations of CENTRAL, the distortions of central bank in credit extension have impaired the economic growth in both coastal and inner provinces. In this case, there seems no inter-regional heterogeneity either.

However, the estimation results of COMPETITION and CONCENTRATION do present inter-regional heterogeneity. In both cases, financial variables are not significantly correlated with the growth variables in coastal provinces, but in inner provinces, they are significantly correlated with the growth variables. This probably indicates that the inner provinces have relied more on the formal financial sector for financing, and consequently influenced more by the changes in the structure of banking sector in the provinces.

4. Concluding Remarks

This study re-investigates the relationship between financial development and economic growth in China. Unlike many of the previous studies, this study stresses on two channels through which financial development might influence on the economic growth, i.e., physical capital accumulation and productivity improvement. In the empirical analysis, an approach combining the conventional accounting framework and regression analysis are adopted. The accounting framework makes it possible to obtain a decomposition of economic growth into the contributions respectively from physical capital accumulation and productivity improvement, while the growth regression approach makes it possible to explore the channels through which the financial indicators exert impacts on economic growth.

The main findings of this study are summarized as follows. First, the regression results are sensitive to the selection of growth variables. The relationship between financial development and economic growth

in China tends to be a long-run one. Secondly, the existence of two channels is supported by the empirical evidence. The direction of causality between financial development and economic growth turns has presumably run from the former to the latter in China. Thirdly, the impacts induced by various measures of financial system exert on economic growth are different, and the channels through which they give impact on the growth are different as well. The expansion of financial services in China has contributed to the economic growth, and the main channel through which the effects operate is the channel of physical capital accumulation. Meanwhile, the government distortions in the financial sector appear to have hindered the growth. The increase of competition may foster the growth mostly through the channel of productivity improvement. Fourthly, the existence of inter-regional heterogeneity tends to be sensitive to the selection of financial variables. The improvement in the financial intermediation process appears to have contributed to the economic growth in both coastal and inner provinces, while the proxies of provincial financial structures do appear heterogeneity over two groups of provinces.

Table 3 Finance and Growth in China: Group 1 of Equations (Entire Sample)

	Dependent variables: log(annual output per labor) and its components								
	GRP			CAP			EFF		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Financial variable: LOAN	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	7.175	7.813	7.666	0.083	0.793	0.634	7.093	7.020	7.068
LOAN	0.008	0.009	0.009	0.010	0.009	0.010	-0.002	-0.000	-0.001
	(9.779***)	(10.107***)	(10.855***)	(13.880***)	(14.456***)	(15.851***)	(-1.972**)	(-0.430)	(-0.895)
EDUCATION	0.009	0.007	0.008	0.000	0.001	0.001	0.008	0.006	0.006
	(21.934***)	(14.150***)	(15.452***)	(0.369)	(3.386***)	(2.985***)	(20.334***)	(12.304***)	(13.539***)
OPENNESS	0.003	0.001	0.001	-0.004	-0.001	-0.002	0.007	0.002	0.003
	(3.902***)	(1.071***)	(1.186)	(-5.773***)	(-1.490)	(-2.355**)	(8.318***)	(2.270**)	(2.978***)
FDI	0.059	0.065	0.067	0.031	0.020	0.023	0.028	0.045	0.043
	(8.456***)	(11.055***)	(11.495***)	(5.193***)	(4.647***)	(5.524***)	(3.775***)	(8.082***)	(7.773***)
FISCAL	-0.027	-0.036	-0.034	0.028	-0.019	-0.012	-0.055	-0.017	-0.022
	(-8.307***)	(-8.556***)	(-8.604***)	(10.074***)	(-6.113***)	(-4.209***)	(-15.924***)	(-4.326***)	(-5.750***)
STATE	-0.002	-0.010	-0.008	-0.001	-0.003	-0.002	-0.001	-0.007	-0.006
	(-2.184***)	(-7.788***)	(-7.201***)	(-1.661*)	(-3.241***)	(-2.635***)	(-0.718)	(-5.716***)	(-5.730***)
No. of observations	650	650	650	650	650	650	650	650	650
adj. R^2	0.768	0.875	0.777	0.440	0.782	0.484	0.732	0.885	0.629
Financial variable: SAVING	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	7.019	7.265	7.260	-0.017	0.879	0.686	7.036	6.386	6.544
SAVING	0.014	0.020	0.020	0.014	0.011	0.012	-0.001	0.009	0.007
	(16.007***)	(28.239***)	(28.129***)	(19.693***)	(15.656***)	(17.766***)	(-0.620)	(10.245***)	(8.667***)
EDUCATION	0.008	0.003	0.004	0.000	-0.000	-0.000	0.008	0.003	0.004
	(24.626***)	(8.154***)	(10.109***)	(0.686)	(-0.151)	(-0.438)	(20.441***)	(6.742***)	(8.956***)
OPENNESS	0.005	0.003	0.003	-0.002	0.001	0.000	0.007	0.002	0.003
	(6.543***)	(4.085***)	(4.322***)	(-3.487***)	(0.736)	(0.023)	(8.084***)	(2.723***)	(3.464***)
FDI	0.034	0.030	0.030	0.005	-0.005	-0.003	0.029	0.035	0.034
	(5.332***)	(6.981***)	(7.218***)	(0.942)	(-1.220)	(-0.771)	(3.583***)	(6.661***)	(6.590***)
FISCAL	-0.031	-0.015	-0.018	0.026	-0.010	-0.003	-0.056	-0.006	-0.014
	(-10.396***)	(-4.964***)	(-6.048***)	(10.359***)	(-3.092***)	(-1.807)	(-16.327***)	(-1.524)	(-4.017***)
STATE	0.003	-0.003	-0.003	0.004	-0.001	0.000	-0.001	-0.002	-0.003
	(3.463***)	(-3.607***)	(-3.106***)	(5.394***)	(-0.992)	(0.497)	(-0.954)	(-2.122**)	(-2.636***)
No. of observations	650	650	650	650	650	650	650	650	650
adj. R^2	0.809	0.936	0.880	0.546	0.791	0.516	0.730	0.901	0.665

	Dependent variables: log(annual output per labor) and its components								
	GRP			CAP			EFF		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Financial variable: BUDGET	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	7.116	8.086	7.898	0.124	1.327	1.088	6.992	6.759	6.815
BUDGET	0.004	0.004	0.004	0.004	0.002	0.003	0.000	0.002	0.001
	(8.901***)	(9.438***)	(9.784***)	(9.421***)	(6.633***)	(7.878***)	(0.366)	(4.422***)	(3.859***)
EDUCATION	0.010	0.009	0.009	0.002	0.003	0.003	0.008	0.006	0.006
	(27.924***)	(17.550***)	(19.527***)	(5.959***)	(7.294***)	(7.520***)	(21.376***)	(12.595***)	(13.809***)
OPENNESS	0.005	0.002	0.002	-0.002	-0.000	-0.001	0.007	0.002	0.002
	(5.616***)	(1.677*)	(1.959*)	(-3.300***)	(-0.194)	(-1.054)	(8.158***)	(1.980**)	(2.720***)
FDI	0.051	0.052	0.054	0.024	0.007	0.012	0.028	0.045	0.043
	(7.301***)	(8.877***)	(9.320***)	(3.691***)	(1.538)	(2.472**)	(3.760***)	(8.243***)	(7.954***)
FISCAL	-0.006	-0.021	-0.017	0.051	-0.012	-0.001	-0.056	-0.008	-0.014
	(-1.698*)	(-4.389***)	(-3.881***)	(16.169***)	(-3.226***)	(-0.290)	(-15.477***)	(-1.929*)	(-3.451***)
STATE	-0.001	-0.011	-0.009	-0.000	-0.005	-0.004	-0.001	-0.006	-0.006
	(-0.991)	(-9.308***)	(-8.327***)	(-0.216)	(-5.437***)	(-4.441***)	(-0.756)	(-5.316***)	(-5.281***)
No. of observations	650	650	650	650	650	650	650	650	650
adj. R^2	0.763	0.873	0.770	0.360	0.727	0.342	0.730	0.888	0.637
Financial variable: COMPETITION	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	7.594	7.921	7.872	0.427	1.020	0.974	7.168	6.901	6.957
COMPETITION	0.008	0.009	0.009	-0.004	0.004	0.004	0.012	0.005	0.005
	(2.925***)	(5.630***)	(5.213***)	(-1.165)	(3.842***)	(20.450***)	(3.205***)	(3.505***)	(3.398***)
EDUCATION	0.007	0.004	0.004	0.001	-0.000	-0.000	0.006	0.004	0.004
	(16.954***)	(6.951***)	(8.963***)	(1.443)	(-0.642)	(-0.498)	(11.696***)	(8.160***)	(8.791***)
OPENNESS	0.005	-0.001	0.001	-0.000	-0.002	-0.002	0.005	0.001	0.002
	(5.631***)	(-0.710)	(1.084)	(-0.321)	(-2.297**)	(-2.458**)	(4.558***)	(0.847)	(1.871*)
FDI	0.022	-0.014	-0.000	-0.014	-0.011	-0.011	0.036	-0.003	0.002
	(2.871***)	(-2.335**)	(-0.038)	(-1.620)	(-2.855***)	(-2.826***)	(3.547***)	(-0.557)	(0.449)
FISCAL	-0.013	0.021	0.016	0.053	0.020	0.022	-0.066	0.001	-0.003
	(-3.140***)	(5.091***)	(4.098***)	(11.405***)	(7.461***)	(8.135***)	(-11.976***)	(0.329)	(-0.889)
STATE	-0.000	-0.006	-0.006	0.006	-0.001	-0.000	-0.006	-0.005	-0.006
	(-0.313)	(-3.982***)	(-4.188***)	(3.828***)	(-0.911)	(-0.388)	(-3.457***)	(-3.768***)	(-4.505***)
No. of observations	312	312	312	312	312	312	312	312	312
adj. R^2	0.764	0.946	0.725	0.471	0.959	0.392	0.744	0.972	0.667

	Dependent variables: log(annual output per labor) and its components								
	GRP			CAP			EFF		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Financial variable: CONCENTRATION	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	8.203	9.362	9.117	0.225	1.633	1.533	7.978	7.729	7.811
CONCENTRATION	-1.274	-5.027	-4.497	0.129	-2.111	-1.880	-1.404	-2.918	-3.131
	(-1.352)	(-6.169***)	(-5.967***)	(0.125)	(-4.001**)	(-3.629***)	(-1.130)	(-3.953***)	(-4.390***)
EDUCATION	0.008	0.005	0.005	0.000	0.000	0.000	0.008	0.004	0.005
	(17.241***)	(10.053***)	(12.958***)	(0.692)	-0.001	(1.209)	(12.506***)	(10.390***)	(11.417***)
OPENNESS	0.005	0.001	0.002	-0.000	-0.000	-0.001	0.005	0.002	0.003
	(5.941***)	(1.063)	(2.326**)	(-0.485)	(-1.059)	(-1.426)	(4.910***)	(1.929*)	(3.047***)
FDI	0.016	-0.015	-0.001	-0.011	-0.012	-0.011	0.027	-0.004	0.002
	(2.122**)	(-2.623***)	(-0.185)	(-1.313)	(-3.025***)	(-2.984***)	(2.699***)	(-0.735)	(0.402)
FISCAL	-0.015	0.014	0.010	0.054	0.017	0.019	-0.069	-0.003	-0.008
	(-3.721***)	(3.386***)	(2.601***)	(11.848***)	(6.218***)	(6.995***)	(-12.659***)	(-0.710)	(-2.153**)
STATE	-0.002	-0.007	-0.006	0.007	-0.002	-0.001	-0.008	-0.006	-0.006
	(-1.152)	(-5.343***)	(-4.963***)	(4.445***)	(-1.743*)	(-1.158)	(-4.565***)	(-4.653***)	(-5.287***)
No. of observations	312	312	312	312	312	312	312	312	312
adj. R^2	0.759	0.947	0.729	0.468	0.959	0.391	0.737	0.973	0.670
Financial variable: CENTRAL	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	7.761	9.168	8.949	0.843	1.652	1.480	6.919	7.516	7.483
CENTRAL	-0.208	-0.581	-0.545	-0.301	-0.028	-0.086	0.093	-0.553	-0.494
	(-4.089***)	(-11.735***)	(-11.371***)	(-6.644***)	(-0.659)	(-2.074**)	(1.823*)	(-12.942***)	(-11.802***)
EDUCATION	0.010	0.007	0.008	0.001	0.003	0.003	0.008	0.004	0.005
	(24.797***)	(14.486***)	(16.648***)	(4.021***)	(7.188***)	(7.126***)	(21.102***)	(9.604***)	(11.225***)
OPENNESS	0.004	0.003	0.003	-0.003	0.000	-0.001	0.007	0.003	0.003
	(4.636***)	(3.107***)	(3.186***)	(-3.867***)	(0.267)	(-0.683)	(8.043***)	(3.335***)	(3.974***)
FDI	0.050	0.031	0.035	0.019	0.007	0.011	0.031	0.024	0.024
	(6.623***)	(5.175***)	(5.893***)	(2.764***)	(1.436)	(2.097**)	(4.137***)	(4.563***)	(4.680***)
FISCAL	-0.021	-0.036	-0.033	0.034	-0.023	-0.011	-0.056	-0.013	-0.018
	(-6.269***)	(-8.784***)	(-8.663***)	(11.378***)	(-6.602***)	(-3.484***)	(-16.333***)	(-3.585***)	(-5.412***)
STATE	-0.000	-0.010	-0.008	0.001	-0.006	-0.004	-0.002	-0.004	-0.004
	(-0.280)	(-8.621***)	(-7.515***)	(1.204)	(-5.843***)	(-4.605***)	(-1.347)	(-4.153***)	(-4.105***)
No. of observations	650	650	650	650	650	650	650	650	650
adj. R^2	0.740	0.881	0.779	0.318	0.708	0.281	0.731	0.909	0.690

Note: ***, ** and * indicate the statistical significance at the 1, 5 and 10 percent levels, respectively.
Source: Author's estimations.

Table 4 Finance and Growth in China: Group 1 of Equations (Sub-samples)

Financial variable: LOAN	Dependent variables: log(annual output per labor) and its components								
	GRP			CAP			EFF		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A: Coastal Provinces	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	7.884	8.360	8.049	0.719	0.643	0.659	7.164	7.717	7.586
LOAN	0.002	0.005	0.004	0.004	0.002	0.002	-0.002	0.003	0.003
	(1.295)	(2.826***)	(2.661***)	(5.339***)	(2.529**)	(2.830***)	(-1.324)	(1.985**)	(1.860*)
EDUCATION	0.010	0.007	0.008	0.002	0.002	0.002	0.007	0.006	0.006
	(19.220***)	(9.007***)	(12.921***)	(9.310***)	(4.002***)	(5.055***)	(16.083***)	(8.876***)	(9.990***)
OPENNESS	0.004	0.005	0.004	-0.002	-0.000	-0.001	0.007	0.005	0.005
	(4.831***)	(3.811***)	(3.807***)	(-5.826***)	(-0.371)	(-1.260)	(8.221***)	(5.060***)	(5.268***)
FDI	0.047	0.045	0.049	0.025	0.025	0.025	0.021	0.020	0.022
	(6.251**)	(5.887***)	(6.856***)	(7.237***)	(6.559***)	(6.825***)	(3.078***)	(3.313***)	(3.683***)
FISCAL	-0.069	-0.076	-0.070	-0.012	0.000	-0.002	-0.056	-0.076	-0.073
	(-6.205***)	(-6.336***)	(-6.283***)	(-2.349**)	(0.064)	(-0.320)	(-5.530***)	(-8.064***)	(-7.856***)
STATE	-0.000	-0.008	-0.004	-0.001	-0.001	-0.001	0.001	-0.007	-0.005
	(-0.040)	(-3.778***)	(-2.453***)	(-1.910*)	(-0.944)	(-1.010)	(0.934)	(-4.187***)	(-3.579***)
No. of observations	250	250	250	250	250	250	250	250	250
adj. R^2	0.800	0.860	0.789	0.578	0.669	0.525	0.738	0.865	0.767
B: Inner Provinces	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	6.527	7.229	7.134	-0.249	0.641	0.495	6.776	6.588	6.640
LOAN	0.011	0.010	0.011	0.012	0.011	0.011	-0.001	-0.000	-0.000
	(10.066***)	(11.455***)	(11.926***)	(10.409***)	(12.112**)	(12.787***)	(-0.874)	(-0.148)	(-0.318)
EDUCATION	0.011	0.009	0.009	0.000	0.002	0.002	0.011	0.007	0.007
	(15.095***)	(14.399***)	(14.829***)	(0.309)	(3.267***)	(2.898***)	(11.218***)	(9.628***)	(10.086***)
OPENNESS	0.019	0.008	0.009	0.026	0.020	0.021	-0.007	-0.012	-0.012
	(3.655***)	(1.948)	(2.187**)	(4.622***)	(5.012***)	(5.350***)	(-1.006***)	(-2.450**)	(-2.534**)
FDI	0.052	0.109	0.107	-0.035	-0.034	-0.031	0.087	0.143	0.140
	(3.069**)	(8.878***)	(8.779***)	(-1.949*)	(-2.834***)	(-2.635***)	(3.929***)	(9.921***)	(9.745***)
FISCAL	-0.017	-0.014	-0.013	0.026	-0.016	-0.011	-0.043	0.002	-0.001
	(-5.052***)	(-3.559***)	(-3.523***)	(7.253***)	(-4.214***)	(-3.067***)	(-9.779***)	(0.418)	(-0.273)
STATE	-0.000	-0.010	-0.009	0.000	-0.002	-0.002	-0.000	-0.007	-0.007
	(-0.277)	(-7.932***)	(-7.453***)	(0.077)	(-2.023**)	(-1.542)	(-0.276)	(-5.120***)	(-5.170***)
No. of observations	400	400	400	400	400	400	400	400	400
adj. R^2	0.729	0.884	0.839	0.518	0.836	0.608	0.498	0.830	0.562

Financial variable: SAVING	Dependent variables: log(annual output per labor) and its components								
	GRP			CAP			EFF		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A: Coastal Provinces	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	7.615	7.817	7.590	0.583	0.451	0.454	7.032	7.366	7.260
SAVING	0.009	0.023	0.019	0.007	0.009	0.008	0.002	0.014	0.013
	(5.235***)	(13.493***)	(12.184***)	(8.621***)	(8.929***)	(8.881***)	(1.325)	(9.434***)	(8.898***)
EDUCATION	0.009	0.003	0.005	0.002	0.000	0.001	0.007	0.003	0.004
	(19.021***)	(5.247***)	(9.712***)	(9.241***)	(0.625)	(1.989**)	(15.250***)	(5.498***)	(6.899***)
OPENNESS	0.004	0.003	0.003	-0.002	-0.001	-0.001	0.006	0.004	0.004
	(4.875***)	(3.816***)	(3.664***)	(-6.206***)	(-1.150)	(-2.803**)	(7.967***)	(5.035***)	(5.196***)
FDI	0.034	0.015	0.023	0.015	0.013	0.014	0.019	0.001	0.004
	(4.584***)	(2.347**)	(3.934***)	(4.535***)	(3.765***)	(4.144***)	(2.583**)	(0.215)	(0.818)
FISCAL	-0.067	-0.052	-0.051	-0.004	0.010	0.008	-0.063	-0.062	-0.061
	(-6.968***)	(-6.076***)	(-6.295***)	(-0.843)	(2.058**)	(1.766*)	(-6.792***)	(-8.161***)	(-8.085***)
STATE	0.003	-0.003	0	0.001	0.001	0.001	0.002	-0.004	-0.003
	(2.130**)	(-1.872*)	(0.103)	(1.720*)	(0.856)	(1.244)	(1.385)	(-2.656***)	(-1.876*)
No. of observations	250	250	250	250	250	250	250	250	250
adj. R^2	0.819	0.919	0.856	0.639	0.746	0.629	0.738	0.901	0.820
B: Inner Provinces	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	6.512	7.112	7.079	-0.261	0.961	0.681	6.774	6.151	6.256
SAVING	0.016	0.019	0.019	0.017	0.010	0.012	-0.002	0.008	0.008
	(13.584***)	(22.455***)	(22.648***)	(13.914***)	(9.114***)	(10.671***)	(-0.980)	(7.027***)	(6.460***)
EDUCATION	0.009	0.004	0.004	-0.002	0.000	-0.001	0.011	0.004	0.004
	(11.934***)	(7.522***)	(7.963***)	(-2.994***)	(0.125)	(-0.814)	(10.658***)	(5.076***)	(5.893***)
OPENNESS	0.016	0.003	0.003	0.023	0.026	0.028	-0.007	-0.024	-0.024
	(3.342***)	(0.823)	(1.021)	(4.444***)	(6.303***)	(6.738***)	(-1.015)	(-5.303***)	(-5.352***)
FDI	0.020	0.050	0.049	-0.070	-0.070	-0.069	0.090	0.120	0.118
	(1.270)	(5.190***)	(5.123***)	(-4.120***)	(-5.392***)	(-5.372***)	(4.013***)	(8.608***)	(8.539***)
FISCAL	-0.018	-0.007	-0.007	0.024	-0.013	-0.005	-0.043	0.006	0.002
	(-5.945***)	(-2.399**)	(-2.564**)	(7.392***)	(-3.403***)	(-1.439)	(-9.779***)	(1.515)	(0.462)
STATE	0.005	-0.005	-0.004	0.006	-0.001	0.001	-0.001	-0.004	-0.004
	(4.229***)	(-4.866***)	(-4.484***)	(4.713***)	(-0.798)	(0.493)	(-0.595)	(-2.614***)	(-2.903***)
No. of observations	400	400	400	400	400	400	400	400	400
adj. R^2	0.768	0.933	0.906	0.588	0.813	0.552	0.498	0.849	0.601

Financial variable: BUDGET	Dependent variables: log(annual output per labor) and its components								
	GRP			CAP			EFF		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A: Coastal Provinces	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	7.482	8.100	7.68	0.341	0.434	0.406	7.141	7.665	7.492
BUDGET	0.004	0.005	0.004	0.004	0.003	0.003	-0.000	0.002	0.002
	(4.263***)	(6.695***)	(6.087***)	(10.695***)	(9.301***)	(9.520***)	(-0.289)	(2.841***)	(2.446**)
EDUCATION	0.010	0.007	0.009	0.002	0.001	0.002	0.007	0.006	0.006
	(21.210***)	(10.232***)	(15.518***)	(12.630***)	(4.536***)	(6.125***)	(16.578***)	(9.670***)	(11.346***)
OPENNESS	0.004	0.005	0.004	-0.002	-0.000	-0.001	0.007	0.005	0.005
	(5.146***)	(4.114***)	(4.182***)	(-6.091***)	(-0.649)	(-1.625)	(8.091***)	(5.252***)	(5.550***)
FDI	0.048	0.043	0.049	0.026	0.024	0.025	0.021	0.019	0.022
	(6.599***)	(6.051***)	(7.424***)	(8.525***)	(7.343***)	(7.821***)	(3.116***)	(3.151***)	(3.690***)
FISCAL	-0.049	-0.05	-0.044	0.014	0.014	0.014	-0.063	-0.065	-0.061
	(-4.826***)	(-4.727***)	(-4.465***)	(3.149***)	(2.934***)	(2.990***)	(-6.449***)	(-7.242***)	(-7.037***)
STATE	0.002	-0.007	-0.002	0.001	-0.000	0.000	0.001	-0.007	-0.005
	(1.532)	(-3.483***)	(-1.111)	(1.923*)	(-0.152)	(0.355)	(0.749)	(-4.059***)	(-3.130***)
No. of observations	250	250	250	250	250	250	250	250	250
adj. R^2	0.813	0.878	0.810	0.679	0.752	0.642	0.736	0.867	0.768
B: Inner Provinces	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	6.713	7.838	7.672	0.063	1.421	1.220	6.650	6.417	6.456
BUDGET	0.003	0.003	0.003	0.002	0.001	0.001	0.001	0.002	0.002
	(5.368***)	(5.425***)	(5.649***)	(2.623***)	(1.350)	(1.471)	(2.021**)	(3.968***)	(4.006***)
EDUCATION	0.013	0.011	0.011	0.002	0.004	0.003	0.010	0.007	0.007
	(16.781***)	(16.323***)	(16.876***)	(2.794***)	(5.534***)	(5.311***)	(11.290***)	(10.475***)	(10.872***)
OPENNESS	0.036	0.019	0.022	0.049	0.038	0.041	-0.013	-0.019	-0.019
	(6.782***)	(4.313***)	(4.955***)	(8.278***)	(8.350***)	(9.176***)	(-2.019**)	(-4.017***)	(-4.199***)
FDI	0.026	0.077	0.075	-0.046	-0.048	-0.045	0.072	0.125	0.122
	(1.348)	(5.288***)	(5.213***)	(-2.149**)	(-3.289***)	(-3.068***)	(3.093***)	(8.399***)	(8.232***)
FISCAL	0.002	-0.009	-0.005	0.040	-0.017	-0.010	-0.038	0.008	0.005
	(0.520)	(-1.868*)	(-1.241)	(8.688***)	(-3.655***)	(-2.165**)	(-7.569***)	(1.780*)	(1.206)
STATE	-0.001	-0.013	-0.011	0	-0.005	-0.004	-0.001	-0.007	-0.007
	(-0.582)	(-9.335***)	(-8.584***)	(0.181)	(-3.956***)	(-3.306***)	(-0.649)	(-5.210***)	(-5.237***)
No. of observations	400	400	400	400	400	400	400	400	400
adj. R^2	0.682	0.854	0.796	0.396	0.773	0.451	0.502	0.836	0.579

Financial variable: COMPETITION	Dependent variables: log(annual output per labor) and its components								
	GRP			CAP			EFF		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A: Coastal Provinces	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	8.571	8.237	8.164	0.973	1.175	1.042	7.598	7.063	7.068
COMPETITION	-0.009	0.004	0.000	-0.003	-0.003	-0.005	-0.006	0.007	0.006
	(-1.842*)	(0.897)	(0.062)	(-1.707*)	(-1.202)	(-2.961***)	(-1.236)	(1.941*)	(1.778*)
EDUCATION	0.006	0.004	0.004	0.002	0.000	0.002	0.004	0.004	0.003
	(9.035***)	(3.782***)	(5.401***)	(8.648***)	(0.917)	(6.157***)	(5.956***)	(4.893***)	(5.044***)
OPENNESS	0.004	0.000	0.002	-0.002	-0.001	-0.002	0.006	0.001	0.002
	(5.033***)	(0.231)	(1.555)	(-5.118***)	(-0.896)	(-4.567***)	(7.347***)	(0.816)	(2.242**)
FDI	-0.007	-0.011	-0.006	-0.000	-0.012	-0.005	-0.007	0.001	0.000
	(-0.820)	(-1.266)	(-0.777)	(-0.105)	(-3.481***)	(-1.631***)	(-0.817)	(0.096)	(0.075)
FISCAL	0.007	0.028	0.034	0.005	0.014	0.015	0.002	0.015	0.016
	(0.492)	(1.731*)	(2.247**)	(0.959)	(2.164**)	(2.893***)	(0.127)	(1.285)	(1.493)
STATE	-0.002	-0.002	-0.001	0.002	-0.001	0.001	-0.004	-0.001	-0.002
	(-1.067)	(-0.746)	(-0.511)	(2.379**)	(-0.778)	(1.713*)	(-2.081**)	(-0.640)	(-0.954)
No. of observations	120	120	120	120	120	120	120	120	120
adj. R^2	0.782	0.889	0.705	0.752	0.876	0.503	0.706	0.919	0.778
B: Inner Provinces	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	6.989	8.050	7.936	0.105	1.041	0.986	6.885	7.009	7.028
COMPETITION	0.012	0.009	0.009	-0.001	0.005	0.005	0.014	0.003	0.003
	(4.254***)	(6.204***)	(6.520***)	(-0.245)	(3.877***)	(3.907***)	(2.765***)	(2.042**)	(2.113**)
EDUCATION	0.008	0.003	0.004	0.000	-0.000	-0.000	0.008	0.004	0.004
	(9.432***)	(6.975***)	(7.841***)	(0.134)	(-0.458)	(-0.509)	(5.536***)	(6.242***)	(6.558***)
OPENNESS	0.016	-0.016	-0.015	0.027	-0.001	-0.001	-0.011	-0.015	-0.015
	(2.499**)	(-4.682***)	(-4.305***)	(2.859***)	(-0.422)	(-0.228)	(-1.017)	(-3.592***)	(-3.656***)
FDI	-0.039	-0.017	-0.015	-0.097	-0.010	-0.011	0.059	-0.007	-0.005
	(-2.061**)	(-1.597)	(-1.435)	(-3.567***)	(-0.974)	(-1.036)	(1.875*)	(-0.547)	(-0.436)
FISCAL	-0.007	0.018	0.018	0.051	0.020	0.022	-0.058	-0.002	-0.004
	(-1.466)	(5.307***)	(5.258***)	(7.630***)	(5.953***)	(6.442***)	(-7.592***)	(-0.415)	(-0.879)
STATE	0.004	-0.009	-0.008	0.008	-0.001	-0.001	-0.004	-0.008	-0.008
	(2.036**)	(-6.388***)	(-5.723***)	(3.002***)	(-0.933*)	(-0.605)	(-1.423)	(-4.613***)	(-4.711***)
No. of observations	192	192	192	192	192	192	192	192	192
adj. R^2	0.578	0.934	0.827	0.476	0.964	0.436	0.505	0.960	0.618

Financial variable: CONCENTRATION	Dependent variables: log(annual output per labor) and its components								
	GRP			CAP			EFF		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A: Coastal Provinces	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	7.967	8.762	8.424	0.663	1.167	0.706	7.305	7.597	7.627
CONCENTRATION	1.018	-1.725	-1.024	0.976	-0.263	0.905	0.041	-1.467	-1.657
	(0.825)	(-1.069)	(-0.760)	(2.079**)	(-0.421)	(1.903*)	(0.035)	(-1.282)	(-1.583)
EDUCATION	0.005	0.004	0.004	0.002	0.000	0.001	0.004	0.004	0.004
	(7.487***)	(4.536***)	(5.554***)	(6.731***)	(0.413)	(3.223***)	(5.188***)	(6.171***)	(6.362***)
OPENNESS	0.004	0.001	0.002	-0.002	-0.001	-0.002	0.006	0.002	0.002
	(4.575***)	(0.586)	(1.182)	(-4.829***)	(-0.816)	(-3.870***)	(6.750***)	(1.268)	(2.116**)
FDI	-0.000	-0.011	-0.007	0.001	-0.012	-0.006	-0.002	0.001	0.001
	(-0.054)	(-1.260***)	(-0.857)	(0.439)	(-3.586***)	(-1.907*)	(-0.234)	(0.174)	(0.139)
FISCAL	0.003	0.03	0.034	0.001	0.012	0.014	0.002	0.018	0.019
	(0.162)	(1.865*)	(2.228**)	(0.177)	(1.985**)	(2.544**)	(0.101)	(1.549)	(1.659)
STATE	-0.000	-0.003	-0.002	0.003	-0.001	0.002	-0.003	-0.003	-0.003
	(-0.092)	(-1.266)	(-0.747)	(3.927***)	(-0.615)	(2.655***)	(-1.669*)	(-1.397)	(-1.678***)
No. of observations	120	120	120	120	120	120	120	120	120
adj. R^2	0.777	0.889	0.704	0.755	0.874	0.398	0.702	0.918	0.781
B: Inner Provinces	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	8.452	9.780	9.674	0.755	1.929	1.853	7.698	7.852	7.890
CONCENTRATION	-6.016	-7.521	-7.518	-4.999	-3.536	-3.441	-1.023	-3.989	-4.091
	(-3.049***)	(-8.202***)	(-8.260***)	(-1.780*)	(-3.697***)	(-3.608***)	(-0.311)	(-3.511***)	(-3.612***)
EDUCATION	0.010	0.005	0.005	0.000	0.001	0.001	0.010	0.004	0.004
	(14.102***)	(11.244***)	(12.344***)	(0.078)	(1.371)	(1.328)	(8.404***)	(7.918***)	(8.330***)
OPENNESS	0.015	-0.014	-0.012	0.030	-0.001	0.000	-0.014	-0.013	-0.013
	(2.296**)	(-4.155***)	(-3.791***)	(3.156***)	(-0.150)	(0.038)	(-1.319)	(-3.225***)	(-3.276***)
FDI	-0.046	-0.024	-0.022	-0.094	-0.014	-0.015	0.048	-0.010	-0.009
	(-2.425**)	(-2.435**)	(-2.271**)	(-3.464***)	(-1.346)	(-1.404)	(1.505)	(-0.833)	(-0.721)
FISCAL	-0.012	0.009	0.008	0.051	0.015	0.017	-0.063	-0.007	-0.009
	(-2.605***)	(2.535**)	(2.557**)	(7.944***)	(4.320***)	(4.862***)	(-8.360***)	(-1.592)	(-2.084**)
STATE	0.007	-0.007	-0.006	0.013	-0.001	-0.000	-0.006	-0.006	-0.006
	(2.733***)	(-4.633***)	(-3.868***)	(3.551***)	(-0.393)	(-0.091)	(-1.395)	(-3.409***)	(-3.428***)
No. of observations	192	192	192	192	192	192	192	192	192
adj. R^2	0.559	0.942	0.845	0.484	0.963	0.429	0.485	0.962	0.633

Financial variable: CENTRAL	Dependent variables: log(annual output per labor) and its components								
	GRP			CAP			EFF		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A: Coastal Provinces	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	8.060	9.396	9.108	0.880	0.925	0.925	7.180	8.470	8.380
CENTRAL	-0.145	-0.876	-0.786	-0.063	-0.201	-0.192	-0.082	-0.675	-0.652
	(-1.567)	(-8.701***)	(-8.099***)	(-1.370)	(-3.585**)	(-3.548***)	(-0.959)	(-8.520***)	(-8.312***)
EDUCATION	0.010	0.006	0.007	0.002	0.002	0.002	0.007	0.005	0.005
	(17.844***)	(8.968***)	(10.675***)	(9.374***)	(3.965***)	(4.720***)	(14.248***)	(8.589***)	(9.067***)
OPENNESS	0.005	0.003	0.004	-0.002	-0.000	-0.001	0.007	0.004	0.004
	(5.188***)	(3.227***)	(3.560***)	(-4.714***)	(-0.625)	(-1.116)	(8.144***)	(4.543***)	(4.758***)
FDI	0.042	0.017	0.022	0.023	0.018	0.018	0.019	-0.001	0.000
	(5.284***)	(2.292**)	(3.110***)	(5.760***)	(4.410***)	(4.620***)	(2.615***)	(-0.206)	(0.066)
FISCAL	-0.06	-0.039	-0.038	0.001	0.012	0.01	-0.060	-0.050	-0.049
	(-5.858***)	(-3.728***)	(-3.779***)	(0.138)	(2.000**)	(1.841*)	(-6.407***)	(-6.151***)	(-6.112***)
STATE	0.001	-0.007	-0.005	-0.001	-0.001	-0.001	0.002	-0.006	-0.005
	(0.437)	(-3.789***)	(-2.941***)	(-1.280)	(-0.903)	(-0.944)	(1.162)	(-4.175***)	(-3.837***)
No. of observations	250	250	250	250	250	250	250	250	250
adj. R^2	0.801	0.891	0.828	0.532	0.678	0.535	0.737	0.895	0.819
B: Inner Provinces	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects	Pooled OLS	Fixed effects	Random effects
Constant	7.037	8.352	8.163	0.528	1.357	1.180	6.508	6.995	6.992
CENTRAL	-0.134	-0.287	-0.270	-0.351	0.111	0.037	0.217	-0.398	-0.338
	(-2.521**)	(-5.251***)	(-5.148***)	(-6.358)	(2.025**)	(0.708)	(3.515***)	(-7.482***)	(-6.531***)
EDUCATION	0.013	0.009	0.009	0.002	0.004	0.003	0.011	0.004	0.005
	(16.039***)	(12.129***)	(13.083***)	(1.916*)	(5.780***)	(5.004***)	(12.045***)	(6.490***)	(7.636***)
OPENNESS	0.043	0.029	0.032	0.052	0.039	0.044	-0.010	-0.010	-0.011
	(8.159***)	(6.953***)	(7.703***)	(9.599***)	(9.251***)	(10.548***)	(-1.577)	(-2.398**)	(-2.793***)
FDI	0.053	0.077	0.078	-0.042	-0.033	-0.034	0.095	0.110	0.111
	(2.798***)	(5.336***)	(5.443***)	(-2.144**)	(-2.245**)	(-2.344**)	(4.316***)	(7.793***)	(7.932***)
FISCAL	-0.013	-0.018	-0.015	0.026	-0.019	-0.010	-0.039	0.001	-0.003
	(-3.326***)	(-4.104***)	(-3.807***)	(6.698***)	(-4.351***)	(-2.397**)	(-8.839***)	(0.273)	(-0.846)
STATE	0.002	-0.011	-0.010	0.004	-0.006	-0.004	-0.002	-0.0065	-0.005
	(1.051)	(-8.159***)	(-7.261***)	(2.590**)	(-4.337***)	(-3.229***)	(-1.413)	(-3.903***)	(-4.073***)
No. of observations	400	400	400	400	400	400	400	400	400
adj. R^2	0.664	0.854	0.792	0.442	0.774	0.438	0.512	0.852	0.598

Note: ***, ** and * indicate the statistical significance at the 1, 5 and 10 percent levels, respectively.
Source: Author's estimations.

Notes

[1] Financial development in this study is restricted to the formal financial sector. The informal financial sector is not covered due to the data limitations. Taking the informal financial sector into consideration, the picture of China's financial development since 1978 might be different. As mentioned in Tsai (2002: 219-220), micro-level finance may have macro-level effects, and the formal and informal financial sectors may complement each other.

[2] In this study, determinants of economic growth are classified into two groups, namely, primitive determinants and fundamental determinants. Specifically, primitive determinants refer to the conventional factors including capital, labor and productivity, while the fundamental determinants refer to the factors other than aforementioned three conventional factors. Both groups may give impact on economic growth, whilst the fundamental determinants operate through the primitive determinants.

[3] For the exact meaning of channel decomposition exercise, see section 3. The term, 'channel decomposition exercise', cf. Wong (2007).

[4] The literature on the relationship between financial development and economic growth is huge. For two comprehensive reviews of those studies, see Levine (1997 and 2005). In sub-section 2.1, the author only reviews the selected empirical studies since Goldsmith (1969).

[5] Goldsmith (1969) covered 35 countries and over the time period from 1860 to 1963. By proposing a financial indicator (financial interrelation ratio) measured as the ratio of financial intermediary assets to output, he graphically depicted a positive relationship between financial development and the level of economic development. Levine (2005: 890) pointed out following six problems of Goldsmith (1969)'s empirical framework: (1) small sample of countries; (2) lack of control for other factors which may influence economic growth; (3) lack of the investigation of the channels through which finance effects on growth; (4) definition of financial indicators do not capture the functioning of the financial system; (5) lack of the identification of causality between finance and growth; (6) lack of the discussion on financial markets and intermediaries. However, regardless of the existence of the problems, Goldsmith (1969)'s work is considered to be path breaking and has substantially influenced a bulk of consequent empirical studies.

[6] Patrick (1966)'s hypotheses stated that the relationship between financial development and economic growth is bidirectional, namely, supply-leading and demand-following. In addition, he argued that the direction may gradually shift from the former to the latter over time as an economy develops.

[7] The cross-section estimation method applied in early works including King and Levine (1993), Levine and Zervos (1998) was questioned for the potential bias arising from the joint determination of financial development and growth. Hence, the later works have applied panel techniques, especially GMM techniques, more and more often to control for the simultaneity bias.

[8] Specifically, Arestis and Demetriades (1997) focused on Germany and United States. They found a finance-to-growth causality in Germany, but evidence for a reverse causality pattern in United States. Luintel and Khan (1999) found bidirectional causality between financial development and economic growth in all 10 sample countries included in their studies. Shan et al (2001) studied nine OECD countries and China. They found bidirectional causality in five countries, demand-leading in three and no causality in two. Shan (2005) studied ten OECD countries and China. He found the evidence of bidirectional causality in five countries, the evidence of demand-leading in four and the evidence of supply-leading in two.

[9] Luintel and Khan (1999) used a financial indicator of financial depth measured as a ratio of total deposit liabilities of deposit banks to one period lagged nominal GDP.

[10] In the cross-country studies, frequently used financial indicators can be classified into two categories, i.e., those associated with the banking sector (or credit market) and those associated with the stock market (or equity market).The first category includes four indicators: (1) the ratio of liquid liabilities of the financial system to GDP; (2) the ratio of deposit money banks' domestic assets to deposit money banks' domestic assets plus central bank domestic assets; (3) the ratio of claims on the non-financial private sector to total domestic credit; and (4) the ratio of claims on the non-financial private sector to GDP. The second category includes two indicators: (1) the ratio of value of domestic equity transactions on domestic stock exchanges to GDP; (2) the ratio of value of domestic equity transactions on domestic stock exchanges to domestic market capitalization. The two categories of financial variables were first

proposed by King and Levine (1993) and Levine and Zervos (1998), respectively.

[11] The China-specific features mostly refer to: (1) the over-concentration of Big Four banks in the financial system; (2) the over-lending to inefficient state-owned enterprises, while good private enterprises left without access to external finance. Due to the facts, China is often cited as a counterexample to the finance-growth literature (Allen et al: 2005). Big Four refers to the Industrial and Commercial Bank of China (ICBC), the Agricultural Bank of China (ABC), the Bank of China (BOC) and the China Construction Bank (CCB).

[12] This framework can be considered as a simplified form of Levine (1997: 691)'s theoretical approach. Note that the productivity improvement in this framework refers to the increases in total factor productivity (TFP), i.e., Solow residual which reflects technological progress and other elements. In Levine (1997), the term technological innovation is used.

[13] The discussions on the conceptual framework borrow from World Bank (1989), Levine (1997, 2005), Demirguc-Kunt and Levine (2008), Greenwood and Jovanovic (1990) and Bencivenga and Smith (1991). In Demirguc-Kunt and Levine (2008: 7 and 12), it mentioned that financial development may also promote the accumulation of human capital. Also note that financial intermediaries and financial market perform differently in providing even same functions. However, the discussions here ignore those differences.

[14] Similarly, while examining the impact of democracy on growth, Tavares and Wacziarg (2001) found that, democracy fosters growth by improving the accumulation of human capital and lowering income inequality. In addition, they also found that democracy hinders growth by reducing the rate of physical capital accumulation and raising the ratio of government consumption to GDP. These two give negative overall impact of democracy on growth.

[15] By facilitating risk sharing among savers and investors, financial development may promote high-return investment which often is high-risk. Meanwhile, by ameliorating liquidity risk, financial development may promote the investment which requires either huge amount or long-term commitment of capital.

[16] Specifically, Fisher (1993) examined the impacts of macroeconomic policy indicators on economic growth and its three sources, i.e., growth rate of the real capital stock, Solow residual and the growth rate of the labor force. Bosworth et al (1995) investigated the impacts of three sets of determinants including initial conditions and the external environment, macroeconomic policy indicators and trade policy regime, on economic growth and its two sources, i.e., capital per worker and TFP.

[17] In addition, Benhanbib and Spiegel (2000) found that the regression results were sensitive to the inclusion of country fixed effects. The finding led to the conclusion that financial development indicators proxied for broader country characteristics.

[18] Hall and Jones (1999)'s decomposition approach assumed a production function which incorporated the human capital accumulation: $Y = K^{\alpha}(AH)^{1-\alpha}$. The production function is rearranged as: $\frac{Y}{L} = A\left(\frac{H}{L}\right)\left(\frac{K}{Y}\right)^{\frac{\alpha}{1-\alpha}}$. The output per labor in this context is consequently decomposed into three components: differences in the capital-output ratio, differences in education attainment and differences in productivity. The accounting equation follows by:

$$\log\left(\frac{Y}{L}\right) = \log A + \log\left(\frac{H}{L}\right) + \frac{\alpha}{1-\alpha}\log\left(\frac{K}{Y}\right)$$

The structural model was then constructed to capture the quantitative effects of social infrastructure on growth and each of three components.

[19] In Frankel and Romer (1999), another simpler decomposition method was also conducted. It decomposed the logarithm of output per worker into its initial value at the beginning of sample period and its changes over the sample period.

[20] Wong (2007) assumed a production function as in Mankiw et al (1992), $Y = K^{\alpha}H^{\beta}(AL)^{1-\alpha-\beta}$. It follows by:

$$g\left(\frac{Y}{L}\right) = \frac{\alpha}{1-\alpha-\beta}g\left(\frac{K}{Y}\right) + \frac{\beta}{1-\alpha-\beta}g\left(\frac{H}{Y}\right) + g(A)$$

The three components at the right-hand side of the equation stand for the contributions from the growth of physical capital accumulation, the growth of human capital accumulation and TFP growth. He further argued that, while regressing economic growth and its each component on same set of determinants, with any linear estimator, the estimated coefficient of the growth of output per worker would equal to the sum of estimated coefficients of the three components.

[21] List of control variables is provided in 3.2. Note that the variables of capital accumulation and productivity improvement are not included in the control variables. The Barro-type growth regressions which incorporate financial indicators as

additional explanatory variables implicitly assume that financial indicators do not hold any relationship with other included explanatory variables. However, if financial development influences growth through capital accumulation and productivity improvement, the incorporation of financial variables might induce spurious regression results. See also Benhabib and Spiegel (2000: 341).

[22] As shown in 3.2, financial variables and control variables are computed as ratio indicators. Therefore, they maintain unchanged over two groups of regressions.

[23] The entire dataset used in this study include 26 provinces, of which coastal provinces (10) include *Beijing*, *Tianjin*, *Hebei*, *Liaoning*, *Shanghai*, *Jiangsu*, *Zhejiang*, *Fujian*, *Shandong* and *Guangdong*. All other sample provinces (16) are classified as inner provinces.

[24] Among six financial indicators constructed in this study, COMPETITION and CONCENTRATION only cover the time period from 1993 to 2004 due to the limitation of original data.

[25] Note that our computation processes of LOAN, SAVING and BUDGET are different from Hao (2006). First, the computation of financial indicators often bears the criticism of dividing stock statistics by flow statistics, therefore following Beck et al. (2002), we first deflate the total loans and total household savings deposits using RPI, then estimate the financial flow in year t by the average of deflated stock statistics in year t and t-1. LOAN and SAVING are accordingly computed as the ratio of the estimated flow statistics to GDP in year t, which is deflated by GDP deflator. Indeed, Beck et al (2002) proposed the using of CPI to deflate financial stock statistics, however, CPI is not available over whole time period for several provinces included in this study. Secondly, in Hao (2006), BUDGET is computed as the ratio of fixed assets investment by domestic loans relative to that financed by state budgetary appropriation. In our definition, BUDGET is computed as the ratio of total loans to the state budgetary appropriation for capital construction and enterprises innovation. The appropriation for capital construction and enterprises innovation are two main items in the total fixed assets investment.

[26] CENTRAL was also used in previous studies including Lardy (1998) and Dayal-Gulati and Husain (2000).

[27] Boyreau-Debray (2003) found that the banking concentration has negative effects on economic growth in China. While computing CONCENTRATION, we classify financial institutions into six categories, i.e., Big Four, Rural Credit Cooperatives and the other financial institutions. In Boyreau-Debray (2003), he classified financial institutions into seven categories, i.e., Big Four, the Bank of Communications, Rural Credit Cooperatives and the other financial institutions. We lose one category because the data for the Bank of Communications is not available over whole time period in our dataset.

[28] Until the removement of credit plan in 1998, credit quotas were unevenly distributed among provinces. Rapidly growing provinces might be assigned with a low credit quota, while slower growing provinces might be assigned with a high quota. Central bank's lending to the local branches of commercial banks had been used as a way to circumvent the credit quota and extend credit. CENTRAL therefore measures the central bank's lending to the provinces.

[29] Gross capital formation consists of two parts, i.e., gross fixed capital formation and changes in inventory. PIM method was used by Wang and Yao (2003) in computing the human capital stock. However, the calculation here is restricted to the physical capital stock.

[30] The procedure to estimate the initial capital stock in 1978 might be too simple. However, as argued by Zhang and Tan (2004: 23), "given the relatively small capital stocks in 1978 and the high levels of investment, the estimates for later years are not sensitive to the 1978 benchmark values of the capital stocks".

[31] Same depreciation rate was also assumed in Perkins (1988) and Wang and Yao (2003). As for other studies, 5.4 percent was used in Chow and Li (2002), 4.9 percent was used in Ezaki and Sun (1999).

[32] 1990 input-output table gives the labor share of 0.420, 1995 input-output table gives the labor share of 0.469, 1997 input-output table gives the labor share of 0.549, 2000 input-output table gives the labor share of 0.541, while 2002 input-output table gives the labor share of 0.484. They give the average of 0.493.

[33] The regression results of Group 2 of equations (in growth terms) are not included in the main text because financial indicators are not significantly related to any one of growth variables in the estimation results of the group. The estimation results of Group 2 of equations are available upon request.

[34] For instance, in the case of SAVING, taken the estimation using common constant method, 100 percent (0.014/0.014=1.000) of the impact on

GRP runs through the CAP, that is, physical capital accumulation channel. While, taken the estimation using fixed effects method, 55 percent (0.011/0.020=0.550) of the impact on GRP runs through CAP, with the remaining impacts account for EFF, that is, the channel of productivity improvement. These calculations hold valid for the cases using other financial variables. It is worthy to note that we do not focus on the percentages because they may lead to the confusion. Instead, we simply focus on the comparison of the coefficient estimates of CAP and EFF.

[35] For instance, in the same estimations mentioned in footnote 36, taken the estimation using common constant method, 85.3 percent (0.029/0.034=0.853) of the FDI's impact on GRP runs through the physical capital accumulation channel, with the remaining impacts account for the channel of productivity improvement

[36] In the case of EFF as dependent variable, the estimation using common constant method (see column (7)) shows a confusing coefficient estimate of 0.093. It makes us difficult to give a conclusive comment, but the results of other two estimation methods suggest that productivity improvement might be the main channel.

[37] For instance, in the case of SAVING, taken the estimation using common constant method, in terms of coastal provinces, 77.8 percent (0.007/0.009=0.778) of the impact on GRP runs through the CAP, with the remaining impacts account for EFF; in terms of inner provinces, 106.3 percent (0.017/0.016=1.063) of the impact on GRP runs through the CAP.

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