



# International Financial Liberalization Development and Economic Growth in China

メタデータ	言語: eng 出版者: 公開日: 2010-06-21 キーワード (Ja): キーワード (En): 作成者: Han, Chi, Miyamoto, Katsuhiro メールアドレス: 所属:
URL	<a href="https://doi.org/10.24729/00000875">https://doi.org/10.24729/00000875</a>

## **International Financial Liberalization Development and Economic Growth in China\***

Chi Han<sup>a</sup>, Katsuhiko Miyamoto<sup>b</sup>

### **Abstract**

This paper evaluates the contribution of international financial liberalization (IFL) development to Chinese economic growth and analyzes what is a channel through which the contribution is achieved. We find that IFL development contributes to Chinese economic growth significantly and the contribution is achieved through two channels: the total factor productivity (TFP) channel and the physical capital accumulation channel. Furthermore, we also find that the higher Chinese international financial openness is, the greater the contribution of IFL development to Chinese economic growth through the two channels is.

**JEL classification:** F30; O40; O16

**Keywords:** IFL development; Economic growth; TFP; Capital accumulation

### **1. Introduction**

After China has been enforced an economic reform and openness policy since 1978, China is highly growing with the average economic growth of 9.7% from 1978 to 2006, and gradually becomes one of the most charming countries for foreign investors. Simultaneously, China is also gradually relaxing the restrictions on domestic financial market openness, though its foreign exchange rate and capital account balance are controlled. Considering the economic

---

\* We are very grateful to Japan Society for the Promotion of Science (JSPS) for financial assistance.

<sup>a</sup> Associate professor of College of Economics, Osaka Prefecture University. Email: hanchi@eco.osakafu-u.ac.jp

<sup>b</sup> Professor of School of Accountancy, Kansai University

background in China, this paper will study whether Chinese international financial liberalization (IFL) development contributes to its economic growth and analyzes through what channel the contribution is achieved.

Theoretical studies of the contribution of IFL to economic growth provide conflicting discussions. Obstfeld (1994), Acemoglu and Zilibotti (1997) argue that IFL development facilitates risk-sharing and thereby enhances production specialization, capital allocation, and economic growth. Levine (2001) argues that IFL accelerates economic growth by encouraging improvements in the domestic financial system. On the other hand, Devereux and Smith (1994) argue that IFL may lead to lower precautionary savings and reduce economic growth. Boyd and Smith (1992, 1997) argues that less-developed economies seek to close off their financial markets since capital will flow from capital-scare countries with weak institutions and policies into capital-abundant countries with better institution and policies.<sup>1</sup>

In empirical studies, there are two types of IFL measure to be proxy for IFL development. The first is based on government restrictions on capital account, in which the IMF-restriction measure and the Quinn-measure are most commonly used. The second is based on a ratio of actual international capital flows to gross domestic product (GDP), which is proxy for international financial openness. Based on the two types of IFL measure, many empirical studies also yield conflicting conclusions as theoretical studies. Grilli and Milesi-Ferretti (1995) find no link between economic growth and the IMF-restriction measure. On the other hand, using the IMF-restriction measure, Bekaert et al. (2001) argues that equity market liberalizations contribute to economic growth and Edwards (2001) finds that the IMF-restriction measure is negatively associated with growth in rich countries but positively associated with growth in poor countries. Quinn (1997) finds that the Quinn measure is positively linked with economic growth. Kraay (1998), however, find that Quinn's result is not robust. Edison et al. (2002) use the IMF-measure and the second type of IFL measure to estimate the effect of international financial integration development on economic growth. They find

---

<sup>1</sup> Rivera-Batiz (2001) argues that the impact of international financial liberalization on long-run growth can be either positive or negative when considering corruption in a developing economy.

that international financial integration does not accelerate economic growth even controlling for particular economic, financial, institutional, and political characteristics.

The common feature in these empirical studies above is that these papers only analyze whether IFL development accelerates economic growth but do not analyze why IFL development accelerates economic growth or does not. Compared to using cross-country data or panel data in these empirical evidences discussed above, this paper uses Chinese time series data to study the impact of IFL development on Chinese economic growth and analyzes what is a channel through which the impact is achieved.

Based on a standard neoclassical growth model, economic growth is achieved through two channels: the one is the growth of the real total factor productivity (TFP) and the other is the growth of the real per labor physical capital accumulation. Therefore, if IFL development contributes to Chinese economic growth, the contribution may be achieved through the two channels. Usually, TFP is regarded as the contributions of all unknown other factors to economic growth after considering the contributions of capital accumulation to economic growth because it is unknown.

The paper uses the second type of IFL measure to analyze whether IFL development contributes to Chinese economic growth and estimates whether TFP and capital accumulation are two channels through which the contribution of IFL to economic growth is achieved. Since the second type of IFL measure is proxy for international financial openness, so the type of measure designed in the paper should reflect not only the foreign capital inflows but also the ability of domestic residents to diversify their investment abroad. In the paper, four IFL measures are defined. They are FDI inflows, FDI flows, capital inflows and capital flows measures. Since these measures indicate different degrees of Chinese international financial openness, we can also analyze effects of the different degree of Chinese international financial openness on economic growth. Furthermore, the paper also considers a policy conditioning information set to control for other potential determinants of economic growth. The policy conditioning information set includes government size, real trade openness and inflation rate. The policy conditioning information set serves as representing macroeconomic stabilities.<sup>2</sup>

Considering that IFL development is endogenously determined with

economic growth, TFP and capital accumulation, this paper uses instrumental variables method to estimate the contributions of IFL development to economic growth and the growths of TFP and capital accumulation. Based on estimated results, the paper finds that IFL development gives positive, significant and robust contributions to economic growth and the growths of TFP and capital accumulation, respectively. These results mean that IFL development accelerates Chinese economic growth not only through the channel of the growth of TFP but also through the channel of the growth of capital accumulation. Furthermore, the paper also finds that the higher the degree of Chinese international financial openness is, the greater the contributions of IFL development to Chinese economic growth through the two channels. However, the paper finds that allowing the outflows of short-run capital will slightly weaken the growth of capital accumulation.

This paper is organized as follows. Section 2 describes IFI measures, and a model of economic growth and its sources. Section 3 estimates whether IFL development contributes to Chinese economic growth. Section 4 analyzes whether TFP and capital accumulation growths are two channels through which IFL development accelerates Chinese economic growth. Section 5 provides some conclusions.

## **2. Measuring IFL development, economic growth and its sources**

### **2.1. IFL measures**

In the previous section, we explained the two types of IFL measure briefly. As the first type of IFL measure, the IMF-restriction measure and the Quinn-measure are most commonly used. The IMF-restriction measure is from the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER), which provides whether there are government restrictions on capital account transactions for all most countries every year. As a dummy variable, the IMF-restriction measurer cannot tell us any information about the magnitude and effectiveness of restrictions on capital flows. For improving the disadvantage of the IMF-restriction measure, Quinn (1997) designed a

---

<sup>2</sup> The same discussion please sees Esterly and Rebelo (1993), Fischer (1993), Levine et al. (2000), and Edison et al. (2002).

new measure that provides information about the magnitude of restrictions on both capital inflows and outflows based on the AREAER. The Quinn-measure, however, is only available for selected years for most countries. As the second type of IFL measure, a ratio of actual international capital flows to GDP is widely available and no subjectivity on capital restriction. However, Greenwood and Jovanovic (1990), Greenwood and Smith (1997) argued that international financial liberalization development and economic growth may be endogenously determined. Furthermore, Edison et al (2002) indicated that the second type of IFL measure is influenced by many factors that may produce a spurious, positive relationship between economic growth and capital flows.

Since capital account is also restricted by Chinese government and the Quinn-measure is only available for selected years, the first type of IFL measure does not serve to analyze an effect of IFL development on Chinese economic growth. The paper defines the following four second type of IFL measures to evaluate effects of Chinese IFL development on its economic growth.

*FDI inflows measure* defines as the logarithm of the ratio of FDI inflows to current GDP. This measure indicates long-run capital inflows in China. After China has conducted an economic reform and openness policy since 1978, China enforced a series of policies to introduce FDI actively. Therefore, it is an important measure for analyzing effects of IFL development on China's economic growth.

*FDI flows measure* defines as the logarithm of the ratio of the sum of the absolute values of FDI inflows and outflows to current GDP. This measure considers Chinese long-run capital flows. That is, this measure considers both the ability of foreigners to invest in China and the ability of residents to invest abroad in the long-run capital mobility.

*Capital inflows measure* defines as the logarithm of the ratio of the sum of FDI and portfolio inflows to current GDP, in which portfolio inflows include investments in equity securities and in debt securities by foreign investors. The measure considers capital inflows in both the long-run and in the short-run in China.

*Capital flows measure* defines as the logarithm of the ratio of the sum of the absolute values of FDI and portfolio inflows and outflows to current GDP.

This measure considers capital mobility of foreigner and residents in both the long-run and the short-run. Edison, et al (1998) used this measure to indicate capital account openness.

From the definitions of the four IFL measures, we can know that FDI inflows measure is the smallest measure and capital flows measure is the largest measure, but the relation between FDI flows and capital inflows measures is ambiguous. Therefore, the degree of international financial openness represented by FDI inflows measure is less than that represented by the rest of three IFL measures, and the degrees of international financial openness represented by FDI flows and capital inflows measures are less than that represented by capital flows measure. From the relations among the four IFL measures, the paper can compare effects of the different degree of Chinese international finance openness on its economic growth.

## 2.2. Economic growth and its two sources

In order to declare sources of economic growth, we consider a neoclassical production function as follows:

$$Y_t = A_t K_t^{1-\alpha} L_t^\alpha, \quad (1)$$

where  $Y$  is the real GDP,  $A$  is the real TFP,  $K$  is the real physical capital accumulation,  $L$  is the labor,  $\alpha$  is the labor share, and  $t$  represents time.

Since Eq.(1) is constant returns to scale, it can be rewritten as follows:

$$y_t = A_t k_t^{1-\alpha}, \quad (2)$$

where  $y$  is the real per labor GDP and  $k$  is the real per labor physical capital accumulation.

Taking natural logarithm on the left and right hands of Eq.(2) and differentiating it by time  $t$ , we can obtain

$$\frac{\dot{y}_t}{y_t} = \frac{\dot{A}_t}{A_t} + (1-\alpha) \frac{\dot{k}_t}{k_t}, \quad (3)$$

where  $\dot{y}_t/y_t$  is the growth rate of the real per labor GDP,  $\dot{A}_t/A_t$  is the growth rate of the real TFP,  $\dot{k}_t/k_t$  is the growth rate of the real per labor physical

capital accumulation, respectively. Eq.(3) means that the growth rate of the real per labor GDP can be decomposed into two parts: the one is the contribution of the real TFP and the other is the contribution of the real per labor physical capital accumulation. Therefore, the growths of the real TFP and the real per labor physical capital accumulation are two direct channels of economic growth and all other elements accelerate economic growth only through influencing the two channels.

Firstly, we consider how to estimate the real capital accumulation in China. Since an initial value of capital accumulation in China cannot be taken from any statistics book, we use the initial capital accumulation value in 1978 of 1411.2 billion Chinese yuan measured in 1978 prices, which is estimated by Chow and Lin (2002). As shown in Appendix, we can obtain the real fixed capital formation measured in 1990 Chinese yuan prices and its current values from World Development Indicators CD-ROM (2004). Thus, if we translate the initial capital accumulation value in 1978 of 1411.2 billion Chinese yuan measured in 1978 prices into a value in 1990 prices, we can estimate Chinese real capital accumulation measured in 1990 prices in every year. Dividing the real fixed capital formation in 1978 measured in 1990 prices by its current values in 1978, we can obtain a fixed capital formation deflator in 1978. Multiplying the initial capital accumulation value of 1411.2 billion in 1978 prices by the fixed capital formation deflator, we can translate the initial value of 1411.2 billion Chinese yuan in 1978 prices into the value of 2644.8 billion Chinese yuan in 1990 prices. Therefore, using following equation, we can obtain a series of the real capital accumulation measured in 1990 prices from 1978 to 2002:

$$K_t = I_t + K_{t-1}(1 - \xi_t) \quad (4)$$

where  $K_t$  and  $K_{t-1}$  are the real capital accumulation measured in period  $t$  and  $t-1$ , respectively,  $I_t$  is the real fixed capital formation in period  $t$ , and  $\xi_t$  is the rate of depreciation of capital accumulation in period  $t$  and it is referred to China Statistical Yearbook (1992, 1995).<sup>3</sup>

For labor, Young (1995) proposed to use an adjusted raw labor force. Sarel (1997), however, considered no necessary to adjusting the raw labor data since any unmeasured improvement in labor quality will be reflected in TFP. Thus, this paper follows Sarel (1997).<sup>4</sup>



In turn, we consider how to estimate the real TFP. Taking natural logarithm on the right and left sides of Eq.(2), we can have

$$\ln A_t = \ln y_t - (1 - \alpha) \ln k_t. \quad (5)$$

Eq.(5) means that the logarithm of the real TFP is represented as the residuals of the relationship between the logarithm of the real per labor GDP and the logarithm of the real per labor physical capital accumulation. Since labor share  $\alpha$  is unknown, we need to estimate it before estimating TFP.

Since labor share means the ratio of labor remuneration to GDP at factor cost, this paper uses national accounts data to estimate it.<sup>5</sup> Hsueh and Li (1999) list the data of labor remuneration at the provincial level from 1978 to 1995. We also can expand the data to 2002 by using China Statistical Yearbook (1997-2004). Since we have no data on labor remuneration at national accounts, we add up the provincial data as its national accounts data. The labor share is shown in Figure 1.

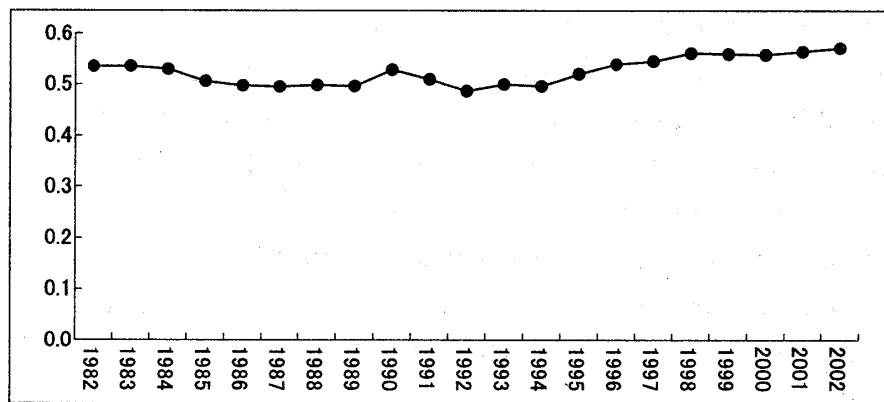


Figure1 Chinese labor share

<sup>3</sup> In China Statistical Yearbook (1992, 1995), the basic depreciation rate of fixed assets of state-owned enterprises up to 1992 is printed. The data is 3.7% in 1978~1979, 4.1% in 1980~1982, 4.4% in 1984, 4.7% in 1985, 4.9% in 1986~1987, 5.0% in 1988~1989, 4.8% in 1990, 5.5% in 1991~1992. Since the data is not continued to print in China Statistical Yearbook issued from 1996, the paper assume that the data from 1993 is 5.5%.

<sup>4</sup> Miyamoto and Liu (2005) also used unadjusted labor to estimate TFP of the national and provincial levels in Chinese economy.

<sup>5</sup> Using Cobb-Douglas production function, many empirical studies of Chinese estimate labor share by calculating the ratio of compensation of employees to GDP at factor cost based on data from the national accounts. For examples, estimated labor share in selected periods is 0.453 over the 1979-1994 periods by Hu and Khan (1997), and 0.52 over the 1981-2000 periods by Miyamoto and Liu (2005).

Figure 1 shows that the labor share in China moved around 0.50 from 1982 until 1995 and then gradually increased up to 0.57 until 2002. Using the estimated labor share in every year, we can estimate the real TFP from Eq. (5).

### **2.3. Policy conditioning information set**

In order to control for the potential determinants of economic growth and its two sources, the paper considers a policy conditioning information set that includes government size, real trade openness and inflation rate. The government size defines as the logarithm of the ratio of the government final consumption expenditure to GDP.<sup>6</sup> The real trade openness defines as the logarithm of the ratio of the sum of the real exports and imports of goods and services to the real GDP. The inflation rate defines as the logarithmic difference of Consumer Price Index (CPI).

### **2.4. Summary statistics**

Table 1 presents descriptive statistics and correlations among the four IFL measures and the three variables in the policy conditioning information set over the 1982-2002 period due to the restrictions of available data. The four IFL measures are positively and highly correlated with each other. Furthermore, though the government size, the real trade openness and the inflation rate have some correlation with each IFL measure and with each other, the correlation coefficients are not too great to give an impact on estimating the contributions of IFL development to economic growth and its two sources.

---

<sup>6</sup> Based on the definition in World Development Indicators, the government final consumption expenditure includes all government current expenditures for purchases of goods and services (including compensation of employees) and most expenditure on national defense and security, but it excludes government military expenditures.

Table 1 Summary statistics (1982-2002)

	FDI inflows	FDI flows	Capital inflows	Capital flows	Government size	Real trade openness	Inflation rate
<i>Panel A: Descriptive statistics</i>							
Mean	0.559	0.700	0.693	0.886	2.547	3.680	4.670
Standard deviation	1.083	1.042	1.039	1.054	0.069	0.151	0.068
Minimum	-1.548	-1.450	-1.456	-1.352	2.437	3.461	4.591
Maximum	1.852	2.000	1.976	2.125	2.677	4.108	4.821
<i>Panel B: Correlation</i>							
FDI inflows	1						
FDI flows	0.997	1					
Capital inflows	0.988	0.990	1				
Capital flows	0.950	0.942	0.938	1			
Government size	-0.541	-0.555	-0.556	-0.465	1		
Real trade openness	0.317	0.289	0.312	0.293	0.314	1	
Inflation rate	0.143	0.169	0.182	0.091	-0.416	-0.321	1

Notes: *FDI inflows* are the log of the ratio of FDI inflows to GDP. *FDI flows* are the log of the ratio of the sum of the absolute values of FDI inflows and outflows to GDP. *Capital inflows* are the log of the ratio of the sum of FDI and portfolio inflows to GDP. *Capital flows* are the log of the ratio of the sum of the absolute values of FDI and portfolio inflows and outflows to GDP. *Government size* is the log of the ratio of government final consumption expenditure to GDP. *Real trade openness* is the log of the ratio of the sum of real exports and real imports of goods and services to the real GDP. *Inflation rate* is the logarithmic first difference of consumer price index.

### 3. IFL development and economic growth

In the paper, we use the following equation to estimate effects of IFL development on Chinese economic growth:

$$\ln g_t = \alpha_1 + \beta_1 FD_t + \Gamma_1 X_t + \varepsilon_t \quad (6)$$

where  $g_t$  is the real per capita GDP measured in 1990 constant Chinese yuan,  $FD_t$  is one of the four IFL measures defined in the previous section,  $X_t$  is a column vector that includes three variables in the policy conditioning information set. Since all variables in Eq.(6) are treated as logarithm, the coefficients estimated in this equation represent elasticities of the real per capita GDP with respect to each explanatory variable. The real per capita GDP will grow by as high as  $\beta_1$  percent when IFL measure grows by one percent. Therefore, the contribution of IFL development to economic growth can be evaluated by  $\beta_1$ . If  $\beta_1 > 0$ , IFL development will positively contribute to Chinese economic growth.

Since IFL development and the real per capita GDP may be potentially endogenously determined, we use instrumental variables method to estimate Eq.(6). As instrumental variables, the two lagged values of IFL measure and the one lagged value of controlling variables are used. The estimated result is shown in Table 2.

Table 2 shows that there is a positive relationship between all the four IFL measures and the real per capita GDP. All the four IFL measures positively contribute to the growth of the real per capita GDP at the 1% significance level. This means that IFL development is robust to economic growth in China. Compared to the coefficient of each IFL measure, we see that a rather larger IFL measure has a rather larger coefficient. This means that the higher the degree of Chinese international financial openness is, the greater the contribution of IFL development to Chinese economic growth is.

Table 2 also provides the effects of the conditioning information set on Chinese economic growth. The conditioning information set have the expected sign. The real trade openness positively contributes to the growth of the real per capita GDP at 1% significance level for all the four IFL measures. The government size and the inflation rate negatively contribute to the growth of the real per capita GDP. The government size is significant at 1% significance

level for FDI inflows, FDI flows and capital inflows measures but not significant for capital flows measure. On the other hand, the inflation rate is significant at 1% significance level for all the four IFL measures. In addition, the Hansen test for overidentifying restrictions indicates that the orthogonality conditions cannot be rejected.

Table2 Estimate on the international financial integration development and the real per capita GDP: instrumental variables estimator

Explanatory variable	(1)	(2)	(3)	(4)
Constant	21.878*** (6.565)	23.128*** (6.422)	24.441*** (6.166)	19.294*** (3.079)
Government size	-2.646*** (-3.466)	-2.863*** (-3.862)	-2.688*** (-3.466)	-2.092 (-1.380)
Real trade openness	1.135*** (3.854)	1.180*** (4.278)	0.960*** (2.922)	0.950*** (2.879)
Inflation rate	-2.540*** (-4.750)	-2.737*** (-4.705)	-2.945*** (-4.737)	-2.182*** (-3.127)
FDI inflows	0.298*** (7.001)			
FDI flows		0.316*** (6.820)		
Capital inflows			0.343*** (5.749)	
Capital flows				0.387*** (4.696)
Adjusted R-squared	0.936	0.931	0.902	0.885
Durbin-Watson	1.817	2.048	1.557	2.402
Hansen test	0.356	0.572	0.727	0.947

Notes: *FDI inflows* are the log of the ratio of FDI inflows to GDP. *FDI flows* are the log of the ratio of the sum of the absolute values of FDI inflows and outflows to GDP. *Capital inflows* are the log of the ratio of the sum of FDI and portfolio inflows to GDP. *Capital flows* are the log of the ratio of the sum of the absolute values of FDI and portfolio inflows and outflows to GDP. *Government size* is the log of the ratio of government final consumption expenditure to GDP. *Real trade openness* is the log of the ratio of the sum of real exports and real imports of goods and services to the real GDP. *Inflation rate* is the logarithmic first difference of consumer price index. Numbers in parenthesis are t statistic values. Instrument variables include constant and two lags of a financial measure and one lag of other explanatory variables in above. \*\*\*, \*\*, \* represent significant at 1%, 5% and 10% level, respectively.

#### 4. IFL development and channels of economic growth

In the previous section, we find that IFL development accelerates Chinese economic growth significantly. In this section, we will analyze whether the growths of the real TFP and the real per labor physical capital accumulation is two channels through which IFL development accelerates Chinese economic growth.

##### 4.1. IFL development and TFP

To evaluate an impact of IFL development on TFP, we consider the following equation as same as Eq.(6):

$$\ln A_t = \alpha_2 + \beta_2 FD_t + \Gamma_2 \mathbf{X}_t + \varepsilon_t \quad (7)$$

where  $A_t$  represents the real TFP that is calculated from Eq.(5) as the residuals of the relationship between the logarithm of the real per labor GDP and the logarithm of the real per labor physical capital accumulation,  $FD_t$  is one of the four IFL measures, and  $\mathbf{X}_t$  represents the policy conditioning information set as same as in Eq.(6). Since all variables in Eq.(7) are treaded as logarithm, the coefficients estimated in the equation represent elasticities of the real TFP with respect to each explanatory variable. The real TFP will grow by as high as  $\beta_2$  percent when IFL increases by one percent. Therefore, the contribution of IFL development to TFP can be evaluated by  $\beta_2$ . If  $\beta_2 > 0$ , IFL development will positively contribute to economic growth through TFP growth channel.

Because IFL development and TFP may be potentially correlated, we also use instrumental variables method to estimate Eq.(7). As instrumental variables, we use the two lagged values of IFL measure and the one lagged value of controlling variables, respectively.

Table 3 shows a positive relationship between all the four IFL measures and TFP. IFL development accelerates the growth of the real TFP at the 1% significance level for FDI inflows, FDI flows and capital inflows measures and at the 5% significance level for capital flows measure. This means that the contribution of IFL development to the growth of TFP is robust. Furthermore, from Table 3, we can find that a rather higher IFL measure has a rather higher coefficient. This means that the higher the degree of international

financial openness is, the greater the contribution of IFL development to the growth of TFP is.

On the other hand, the conditioning information set also has expected signs. The real trade openness positively contributes to the growth of the real TFP at 1% significance level for all the four IFL measures. The government size and the inflation rate negatively contribute to the growth of the real TFP at 1% significance level for all the four IFL measures. In addition, the Hansen test for overidentifying restrictions indicates that the orthogonality conditions cannot be rejected.

Table3 Estimate on the international financial integration development and TFP: instrumental variables estimator

Explanatory variable	(1)	(2)	(3)	(4)
Constant	24.325*** (7.323)	25.487*** (7.234)	26.716*** (6.637)	24.852*** (5.667)
Government size	-3.837*** (-4.691)	-3.998*** (-4.871)	-3.818*** (-5.223)	-3.767*** (-3.280)
Real trade openness	1.740*** (4.900)	1.760*** (5.015)	1.578*** (4.730)	1.624*** (4.113)
Inflation rate	-3.694*** (-6.997)	-3.877*** (-6.875)	-4.097*** (-6.485)	-3.773*** (-6.297)
FDI inflows	0.156*** (3.412)			
FDI flows		0.161*** (3.155)		
Capital inflows			0.180*** (2.847)	
Capital flows				0.198** (2.377)
Adjusted R-squared	0.918	0.908	0.897	0.922
Durbin-Watson	2.257	2.247	2.011	2.016
Hansen test ( <i>p</i> -value)	0.269	0.416	0.524	0.662

Notes: *FDI inflows* are the log of the ratio of FDI inflows to GDP. *FDI flows* are the log of the ratio of the sum of the absolute values of FDI inflows and outflows to GDP. *Capital inflows* are the log of the ratio of the sum of FDI and portfolio inflows to GDP. *Capital flows* are the log of the ratio of the sum of the absolute values of FDI and portfolio inflows and outflows to GDP. *Government size* is the log of the ratio of government final consumption expenditure to GDP. *Real trade openness* is the log of the ratio of the sum of real exports and real imports of goods and services to the real GDP. *Inflation rate* is the logarithmic first difference of consumer price index. Numbers in parenthesis are *t* statistic values. Instrument variables include constant and two lags of a financial measure and one lag of other explanatory variables in above. \*\*\*, \*\*, \* represent significant at 1%, 5% and 10% levels, respectively.

From the estimate, we can declare that IFL development positively contributes to Chinese economic growth through TFP channel because IFL development gives a positive, significant and robust impact on the growth of TFP. Furthermore, we also see that the higher the degree of Chinese international financial openness is, the greater the contribution of IFL development to the growth of the real TFP is.

#### 4.2. IFL development and physical capital accumulation

In turn, we will check whether the growth of the real per labor physical capital accumulation is another channel through which IFL development accelerates Chinese economic growth.

To assess an impact of IFL development on the growth of the real per labor physical capital accumulation, we also consider the following equation as same as Eq. (6):

$$\ln k_t = \alpha_3 + \beta_3 FD_t + \Gamma_3 \mathbf{X}_t + \varepsilon_t \quad (8)$$

where  $k_t$  is the real per labor physical capital accumulation defined in Eq. (2),  $FD_t$  is one of the four IFL measures, and  $\mathbf{X}_t$  represents the policy conditioning information set as same as in Eq. (6). Since all variables in Eq. (8) are treaded as logarithm, the coefficients in this equation represent elasticities of the real per labor physical capital accumulation with respect to each explanatory variable. The real per labor physical capital accumulation will grow by as high as  $\beta_3$  percent when IFL measure increases by one percent. Therefore, the contribution of IFL development to the growth of the real per labor physical capital accumulation can be evaluated by  $\beta_3$ . If  $\beta_3 > 0$ , IFL development will positively contribute to Chinese economic growth through the channel of the growth of the real per labor physical capital accumulation.

Considering that the relationship between IFL development and the growth of the real per labor physical capital accumulation is potentially endogenously determined, we also use instrumental variables method to estimate Eq. (8). As instrumental variables, the two lagged values of IFL measures and the one lagged value of controlling variables are used.

Table 4 shows a positive relationship between all the four IFL measures and the growth of the real per labor physical capital accumulation. All the four IFL measures positively and significantly contribute to the growth of the



real per labor physical capital accumulation at the 1% significance level. This means that IFL development is robust to the growth of the real per labor physical capital accumulation. However, the effect of capital flows measure on the growth of the real per labor physical capital accumulation is different from its effects on Chinese economic growth and the growth of the real TFP. The contribution of capital flows measure to the growth of the real per labor capital accumulation is less than the contribution of the capital inflows measure, but is larger than FDI inflows and FDI flows measures. This means that, though short-run capital outflows will weaken the growth of the real per labor capital

Table 4 Estimate on the international financial integration development and the real per labor physical capital accumulation: instrumental variables estimator

Explanatory variable	(1)	(2)	(3)	(4)
Constant	21.212*** (7.513)	22.137*** (7.622)	22.493*** (7.733)	21.859*** (5.571)
Government size	-2.544*** (-3.553)	-2.641*** (-3.792)	-2.282*** (-3.351)	-2.503*** (-2.674)
Real trade openness	1.290*** (5.321)	1.295*** (5.748)	1.084*** (4.581)	1.188*** (5.103)
Inflation rate	-2.186*** (-4.923)	-2.342*** (-5.069)	-2.453*** (-5.452)	-2.284*** (-4.503)
FDI inflows	0.149*** (3.851)			
FDI flows		0.160*** (3.852)		
Capital inflows			0.192*** (4.377)	
Capital flows				0.182*** (3.188)
Adjusted R-squared	0.918	0.910	0.896	0.918
Durbin-Watson	2.289	2.380	1.999	2.472
Hansen test ( <i>p</i> -value)	0.183	0.333	0.317	0.719

Notes: *FDI inflows* are the log of the ratio of FDI inflows to GDP. *FDI flows* are the log of the ratio of the sum of the absolute values of FDI inflows and outflows to GDP. *Capital inflows* are the log of the ratio of the sum of FDI and portfolio inflows to GDP. *Capital flows* are the log of the ratio of the sum of the absolute values of FDI and portfolio inflows and outflows to GDP. *Government size* is the log of the ratio of government final consumption expenditure to GDP. *Real trade openness* is the log of the ratio of the sum of real exports and real imports of goods and services to the real GDP. *Inflation rate* is the logarithmic first difference of consumer price index. Numbers in parenthesis are *t* statistic values. Instrument variables include constant and two lags of a financial measure and one lag of other explanatory variables in above. \*\*\*, \*\*, \* represent significant at 1%, 5% and 10% levels, respectively.

accumulation in China, but allowing short-run flow will more accelerate the growth of capital accumulation rather than only allowing long-run capital flow.

On the other hand, the variables in the conditioning information set also have the expected signs. The real trade openness positively contributes to the growth of the real per labor physical capital accumulation at 1% significance level for all the four IFL measures. The government size and the inflation rate negatively contribute to the growth of the real per labor physical capital accumulation at 1% significance level for all the four IFL measures. In addition, the Hansen test for overidentifying restrictions indicates that the orthogonality conditions cannot be rejected.

In this section, we analyze the impacts of IFL development on the two source of economic growth. We find that IFL development contributes to Chinese economic growth not only through the channel of the growth of TFP but also through the channel of the growth of the real per labor physical capital accumulation. Furthermore, we find that the higher international financial openness make greater contributions to the growth of TFP. On the other hand, no matter how short-run capital outflows will weaken the growth of capital accumulation in China, allowing short-run flow will more accelerate the growth of capital accumulation rather than only allowing long-run capital flow.

## **5. Conclusions**

The paper examined whether IFL development contributes to Chinese economic growth and analyzed what is a channel through which the contribution is achieved. Based on a standard neoclassical growth model, the growths of the real TFP and the real per labor physical capital accumulation are two sources of economic growth. Therefore, the growth of the real TFP and the growth of the real per labor physical capital accumulation may be two channels through which IFL development accelerates economic growth. In order to assess contributions of IFL development to Chinese economic growth and the growths of the real TFP and the real per labor physical capital accumulation, the paper designed four IFL measures: FDI inflows, FDI flows, capital inflows and capital flows measures. The four measures consider both foreign capital inflows and the ability of domestic residents to diversify their

investments abroad. Simultaneously, the paper also considers a policy conditioning information set to control for other potential determinants of economic growth and its two sources.

Rather than directly using Chinese economic growth rate, the growth rates of the real TFP and the real per labor physical capital accumulation, the paper uses logarithmic values of the real per capita GDP, the real TFP and the real per labor physical capital accumulation as dependent variables, respectively. Furthermore, all explanatory variables that include one of the four IFL measures and the policy conditioning information set are also treated as logarithm. Thus, each coefficient estimated represents elasticity. The procedure is convenient for comparing the contributions of IFL development on Chinese economic growth and its two sources between the four different IFL measures.

Considering that IFL development may be endogenously determined with economic growth and the growths of the real TFP and the real physical capital accumulation, the paper used instrumental variables method to assess their relations, respectively. We found that IFL development give positive, statistically significant and robust impacts on Chinese economic growth and the growths of the real TFP and the real per labor physical capital accumulation, respectively. These results mean that IFL development accelerates Chinese economic growth not only through the TFP channel but also through the physical capital accumulation channel. Furthermore, we also found that the higher the degree of Chinese international financial openness is, the greater the contributions of IFL development to Chinese economic growth through the TFP channel and the physical capital accumulation channel. The contribution of IFL development to the real capital accumulation, however, is different from the contributions of IFL development to Chinese economic growth and the growth of TFP. Although capital flow measure is the largest in the four TFL measures, its contribution to the real per labor physical capital accumulation is less than that of capital inflows measure, but is larger than that of two FDI measures. This means that, though short-run capital outflows will weaken the growth of capital accumulation in China, allowing short-run flow will more accelerate the growth of capital accumulation rather than only allowing long-run capital flow. Therefore, the paper suggests that expanding Chinese international financial openness is a favorable way though which China can accelerate its economic growth.

## Appendix Data

Variable	Definition	Period	Source
GDP	Real and real per capita GDP is measured in 1990 constant Chinese yuan.	1982-2002	World Development Indicators CD-ROM(2004)
Employment	Total numbers of employed persons.	1982-2002	China Statistical Yearbook(2003)
Labor remuneration		1982-2002	The data from 1982 to 1995 are taken from Hsueh and Li (1999). And the data from 1996 to 2002 are taken from China Statistical Yearbook(1997~2004).
Government size	Logarithm of the ratio of the government final Consumption expenditure to GDP in current Chinese yuan.	1982-2002	World Development Indicators CD-ROM(2004)
Real trade openness	Logarithm of the ratio of the sum of real exports and real imports of goods and services to real GDP in 1990 constant Chinese yuan.	1982-2002	World Development Indicators CD-ROM(2004)
Inflation rate	Logarithm of the difference of Consumer Price Index.	1982-2002	The data from 1982 to 1985 are taken from Comprehensive Statistical Data and Materials on 50 Years of New China. And the data from 1986 to 2002 are taken from China Statistical Yearbook(2003).
Initial capital accumulation	Measured in 1978 constant Chinese yuan.	1978	Chow and Lin(2002)
Real and current capital formation	Real gross capital formation is measured in 1990 constant Chinese yuan.	1972-2002	World Development Indicators CD-ROM(2004)
FDI inflows	Logarithm of the ratio of FDI inflows to GDP.	1982-2002	International Financial Statistics(IFS) (2003)
FDI flows	Logarithm of the ratio of the sum of the absolute values of FDI inflows and outflows to GDP.	1982-2002	International Financial Statistics(IFS) (2003)
Capital inflows	Logarithm of the ratio of the sum of inflows of FDI and portfolio to GDP.	1982-2002	International Financial Statistics(IFS) (2003)
Capital flows	Logarithm of the ratio of the sum of the absolute values of inflows and outflows of FDI and portfolio to GDP.	1982-2002	International Financial Statistics(IFS) (2003)

**References**

- Acemoglu, D., Zilibotti, F., 1997, Was Prometheus unbound by chance? Risk diversification, and growth. *Journal of Political Economy* 105, 709-751.
- Bekaert, G., Harvey, C.R., Lundblad, C., 2001, Does financial liberalization spur growth? NBER Working Paper 8245.
- Boyd, J.H., Smith, B.D., 1992, Intermediation and the equilibrium allocation of investment capital: implications for economic development. *Journal of Monetary Economics* 30, 409-432.
- Boyd, J.H., Smith, B.D., 1997, Capital market imperfections, international credit markets, and nonconvergence. *Journal of Economic Theory* 73, 335-364.
- Chow, G.C., Lin, A., 2002, Accounting for economic growth in Taiwan and Mainland China: a comparative analysis. *Journal of Comparative Economics* 30, 507-530.
- Devereux, M.B., Smith, G.W., 1994, International risk sharing and economic growth. *International Economic Review* 35, 535-551.
- Edison, H., Levine, R., Ricci, L., Slok, T., 2002, International financial integration and economic growth. *Journal of International Money and Finance* 21, 749-776.
- Edwards, S., 2001, Capital mobility and economic performance: are emerging economies different? NBER working paper No. 8076. Cambridge, MA: National Bureau of Economic Research.
- Esterly, W., Rebelo, S., 1993, Fiscal policy and economic growth: an empirical investigation. *Journal of Monetary Economics* 32, 417-458.
- Fischer, S., 1993, The role macroeconomic factors in growth. *Journal of Monetary Economics* 32, 485-512.
- Greenwood, J., Jovanovic, B., 1990, Financial development, growth, and the distribution of income. *Journal of Political Economy* 98, 1076-1107.
- Greenwood, J., Smith, B., 1997, Financial markets in development, and the development of financial markets.
- Grilli, V., Milesi-Ferretti, G.M., 1995, Economic effects and structural determinants of capital controls. *Staff Papers* 42, 517-551.
- Hu, Z., Khan, M.S., 1997, Why is China growing so fast? *IMF Staff Papers* 44, 103-131.
- Hsueh T., and Li, Q., 1999, *China's National Income, 1952-1995*. Westview

Press.

- Kraay, A., 1998, In search of the macroeconomic effects of capital account liberalization. Unpublished, Washington: World Bank.
- Levine, R., 2001, International financial liberalization and economic growth. *Review of International Economics* 9, 688-702.
- Levine, R., Loayza, N., Beck, T., 2000, Financial intermediation and growth: causality and causes. *Journal of Monetary Economics* 46, 31-77.
- Miyamoto, K., Liu, H. An analysis of the determinants of provincial-level performance in China's economy. *Comparative economic studies* 47, 520-542.
- Obstfeld, M., 1994, Risk-taking, global diversification, and growth. *American Economic Review* 84, 1310-1329.
- Quinn, D., 1997, The correlates of change in international financial regulation. *American Political Science Review* 91, 531-551.
- Rivera-Batiz, F.L., 2001, International financial liberalization, corruption, and economic growth. *Review of International Economics* 9, 727-737.
- Sarel, M., 1997, Growth and productivity in ASEAN countries. IMF Working Paper No. 97/97.
- Young, A., 1995, The tyranny of numbers: confronting the statistical realities of the East Asian growth experience. *Quarterly Journal of Economics* 110, 641-680.