

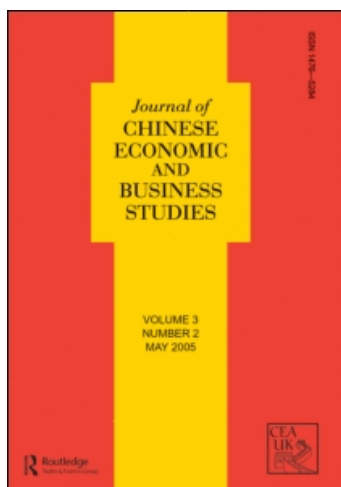
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### Capital flows and domestic market integration in China

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## Capital flows and domestic market integration in China

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This paper examines whether reforms have created a substantial commercial sector with market characteristics in China's financial system. Many studies conclude that the operation of China's capital markets lacks market features, resulting in fragmentation. Yet, this lack of integration coincides with rapid and continuous economic growth. We study the dynamic pattern of domestic capital mobility with a unique data set on provincial savings and investment, which allows us to examine components as well as aggregates. After stripping out foreign and officially influenced funds, we find that the behavior of capital flows in what we define as China's commercial sector looks increasingly like that of interstate flows in the US and other advanced nations. Tracking the direction and size of capital flows also highlights the different behavior of commercial and non-commercial funds transfers in China. This result undercuts the widespread view of China's economy as lacking domestic integration.

**Keywords:** China's economy; capital market; financial integration

**JEL Classifications:** G18; P34; E44; E22

### 1. Introduction

Capital markets and financial systems are essential to an economy because they are responsible for allocating scarce resources, which is the core question addressed in economics. The outcome of resource allocation through major channels like capital markets largely determines the future structure and productivity path of the economy as well as the pace of technical change. The function and operation of capital markets are especially important for China because of China's high savings and investment rates.

China has achieved huge economic growth since the reforms in 1978. In the active forum of explaining this phenomenon, there is a broad agreement on the positive impact of reforms on growth. However, mystery remains when we appraise the impact of reforms on China's capital market, its connection to economic growth and domestic market integration.

Many researchers conclude that 30 years' reforms did not fundamentally change the operation and behavior of China's capital market. Laurenceson and Chai (2003, 3) cite Cheng, Fong, and Mayer's (1997) view that 'China's financial sector, in

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contrast to most other areas of the economy, remains, “essentially unreformed”. They add that ‘the central government continues to exercise considerable control over the financial sector ... the activities of state-owned banks (SOBs) have changed little ... the interest rates that SOBs levy on loans and offer on deposits are still controlled by the central government...’.

Despite limited examination on fundamental issues of a capital market,<sup>1</sup> one particular market feature, integration, has become the center of many studies appraising the operations of China’s economy. As an extension to the ongoing debate over market integration on the commodity and industry side (Bai et al. 2004; Naughton 2003; Park and Du 2005; Poncet 2003, 2005; Young 2000), recent studies focus on capital market integration. The most representative of such efforts is Boyreau-Debray and Wei’s (2004) investigation into China’s capital mobility and market integration. Using the Feldstein–Horioka (1980) model, which looks at the correlation between savings and investment rates, they study China’s data at the aggregate level. In this model, high correlation indicates capital market fragmentation. Boyreau-Debray and Wei find that the correlation between China’s provincial savings and investment rates is much higher (0.5) than typical advanced nations (such as OECD countries) and conclude that China suffers from low capital mobility and fragmented capital markets. The torrent of media reports about the inadequacies of China’s financial system strengthens the idea that reforms largely failed to inject market features into China’s financial system.

These kinds of research conclusions and numerous negative media reports pose serious questions to address when looking at China’s market-oriented reforms in the past three decades. Are reforms changing the way capital markets function? Did China’s capital market display market features following commercial principles? Or did the capital market remain highly fragmented and inefficient? Perhaps, despite the well-documented shortcomings of China’s financial system, the empirical foundation of these popular views remains weak. Results reached from the aggregate data with the Feldstein-Horioka model fail to consider the coexistence of the official and commercial influences in a large transitional economy. Further, numerous grassroots level anecdotal evidence displays significant market features in China’s financial system, which suggests that there is much more to be discovered underneath the conclusion reached from aggregate level data.

Our study challenges this consensus by demonstrating the presence of a large and growing commercial sector within China’s capital markets that displays strong trends of integration. We find that once we decompose aggregate level data to strip out foreign funds, government appropriations and funds that are subject to large official influence, the behavior of capital flows in what we define as China’s commercial sector looks increasingly like that of interstate flows in the US and other advanced nations.

These findings not only indicate that China’s capital markets are more integrated than argued by previous studies, they also, more importantly, present to us the ‘market component’ created by reforms in China’s capital markets. Our finding of a large, growing and integrated commercial sector in China’s financial system undercuts the widespread view of China’s economy as lacking in domestic integration (Boyreau-Debray and Wei 2004; Poncet 2003, 2005; Young 2000).

The high mobility of commercial capital naturally leads us to investigate the size and direction of capital transfers in China. We find that economically advanced

regions experience much larger inter-provincial capital transfers. We also see that the aggregate level behavior confirms popular beliefs that capital is being transferred to the interior and poor regions. But the disaggregated data allow us to detect the distinctive difference between commercial and aggregate sectors, showing that commercial flows do not always transfer to the interior region.

Section 2 describes the general approach and our modified approach to study capital mobility as well as our data set. Section 3 demonstrates the detailed results of our study on capital mobility and market integration. Section 4 documents the possible channels for commercial capital flows to move across provincial borders, which facilitates market integration. This section also tracks the direction and the size of capital transfers. Section 5 summarizes findings and conclusions.

## **2. Capital mobility and financial market integration**

This section introduces the general model, adapts it to examine the degree of mobility in China's domestic capital market, and describes our data set.

### **2.1. General approach**

Financial systems collect funds and channel them to investments. Mobility measures the degree to which savings are channeled to finance projects across geographic boundaries. If capital is perfectly mobile, one region's investment should not be constrained by its savings; similarly, one region's savings should respond to nationwide or worldwide investment opportunities.

Under the hypothesis of perfect capital mobility, the correlation between one country's savings and investment rates should be very low. But Feldstein and Horioka's (1980) (FH) test of data on OECD countries suggests a robust and positive relationship between national savings and investment rates. Although their paper generated a debate on the validity of their test on international capital mobility,<sup>2</sup> it has been widely agreed that their method serves as a reasonable indicator of capital mobility across different regions within a country.<sup>3</sup>

Studies on Japan, Germany, Canada, USA and UK, whose capital markets are generally considered to be highly integrated with almost perfect capital mobility, confirm that the domestic regional investment and savings data show negative or insignificant correlation. Boyreau-Debray and Wei (2004) summarize the results of these intra-national studies as shown in Table 1.

The general approach to studying domestic capital mobility is to collect aggregate data on provincial (or state) savings and investment rates and estimate the coefficient on savings rates in statistical regressions with investment rates as the dependent variable. Boyreau-Debray and Wei (2004) collect China's provincial data on aggregate savings and investment, taking the capital formation item under the expenditure approach of GDP data to represent investment, and subtracting final consumption from the same GDP data to obtain provincial savings. After applying provincial GDP data to obtain savings and investment rates, they find that the unconditional correlation between Chinese provincial savings and investment rates (based on the FH model) is much higher than in advanced nations. After controlling

Table 1. Intra-national capital mobility.

Country	Time Period	Authors	Savings Coefficient <sup>a</sup>	Significance
Japan	1975–1988	Deckle (1996)	[−0.21, −0.30]	Significant (negative)
Japan	1970–1985	Yamori (1995)	[−0.26 to −0.36]	Significant (negative)
Japan	1971–1985	Bayoumi and Rose (1993)	[−0.48]	Significant (negative)
			[0.24]	Non-significant
			[0.01]	Non-significant
USA	1971–1985	Sinn (1992)	[−0.11] <sup>b</sup>	Non-significant
UK	1971–1985	Thomas (1993)	[−0.56]	Significant (negative)
Canada	1961–1989		[−0.11]	Significant (negative)
Germany	1970–1987		[−0.06] <sup>c</sup>	Non-significant

<sup>a</sup>Coefficient of the regional savings rates in a regression with the regional investment rates as the dependent variable.

<sup>b</sup>Correlation between regional savings and investment rates.

<sup>c</sup>Private savings and investment.

Source: Boyreau-Debray and Wei (2004).

other factors that may also affect savings-investment rates relations, they still find evidence suggesting capital immobility in China.

## 2.2. *The need to decompose*

To assess fully the impact of reforms on the behavior of domestic capital flows, we need to penetrate aggregates to uncover the components for several reasons.

The presence of foreign funds in the data used by Boyreau-Debray and Wei obscures domestic market integration. To focus on the behavior of purely domestic capital flows, we need to remove foreign capital flows from the aggregate savings and investment data.

Deep in the process of transition toward a market economy, China still carries many features from the past. The coexistence of thriving private sectors and distorted investment and economic decisions led by government is a distinctive characteristic of China's transition economy. Government transfers and officially influenced capital allocations are still important (although on a decreasing scale). Many recent studies on China's capital markets point out that government systematically allocates capital away from more productive areas to help poor regions (Boyreau-Debray and Wei 2004; Dollar and Wei 2007; Hericourt and Poncet 2009). Decomposing aggregate data will help us to examine fully the impacts of reforms on capital market integration both in and out of the government-led sectors, ultimately exposing the behavior of the commercial sector. Thus, decomposition will also help to discover the active platforms of sectors that may operate under close approximations to market principles.

## 2.3. *Our approach and data set*

The national accounting statistical reports in China allow us to build sub-categories underneath aggregate savings and aggregate investment data for each province.

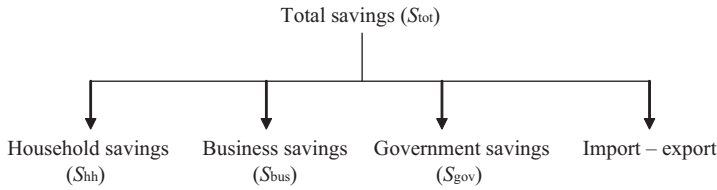


Figure 1. Sources of aggregate level savings data.

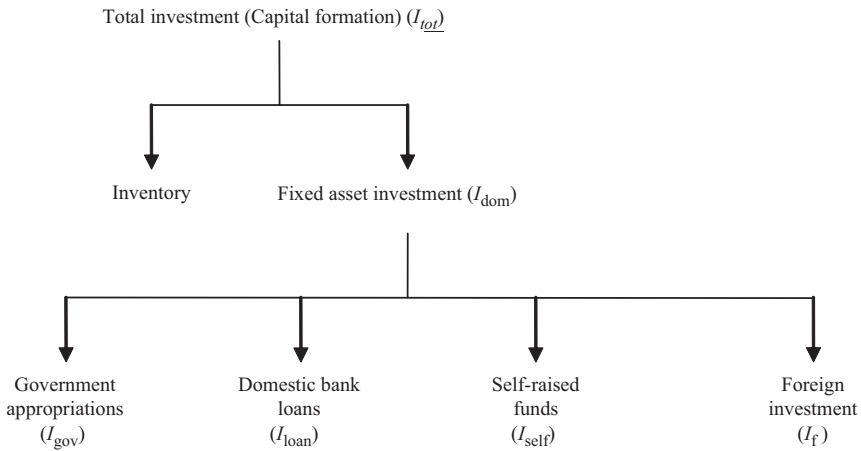


Figure 2. Sources of aggregate level investment funds.

Provincial level statistics provide data on four different sources of savings. Figure 1 summarizes the components of total savings ( $S_{tot}$ ), which include household savings ( $S_{hh}$ ), business savings ( $S_{bus}$ ), government savings ( $S_{gov}$ ) and (imports – exports).<sup>4</sup>

On the investment side, Figure 2 shows that total capital formation includes inventory and fixed asset investment. Data are available for four different sources of funding for fixed asset investment only:<sup>5</sup> government appropriations ( $I_{gov}$ ), domestic bank loans ( $I_{loan}$ ), self-raised funds and others ( $I_{self}$ ), and foreign investment ( $I_f$ ). The category of ‘self-raised funds and others’ (which we will refer to as ‘self-raised funds’ for simplicity) includes funds obtained from retained earnings, funds raised from sales of corporate stock, domestic bank loans that are outside state credit plans<sup>6</sup> and funds obtained from other domestic sources.

Based on our explanation in section 2.2, we distinguish purely domestic capital flows from total aggregates ( $I_{tot}$ ) by subtracting foreign capital ( $I_f$ ) from the aggregate investment. We then remove inventory investment from the investment side to focus on the total domestic investment rate: fixed asset investment ( $I_{dom}$ ) divided by GDP. On the savings side, we remove the (imports – exports) item under total savings ( $S_{tot}$ ). What is left becomes our measure of total domestic savings ( $S_{dom}$ ). Figure 3 illustrates this decomposition.

We then separate domestic savings and investment flows into what we will call ‘official’ and ‘commercial’ sectors. The official sector includes government savings

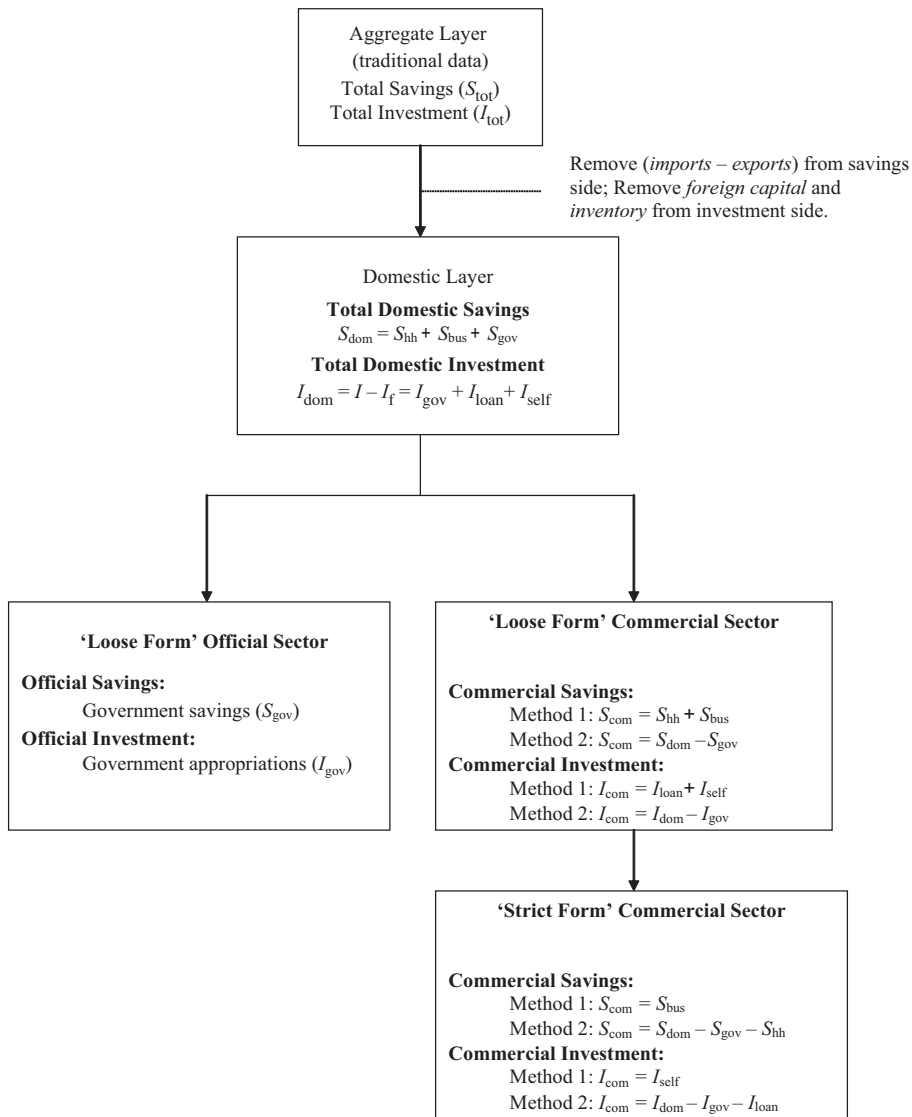


Figure 3. Procedures of building our data set.

( $S_{gov}$ ) on the savings side and government appropriations ( $I_{gov}$ ) on the investment side. Data are directly available for government appropriations ( $I_{gov}$ ). However, for the official sector savings, we use data from *China Fiscal Yearbooks* (various years), subtracting government current expenditure from government revenue to obtain measures for government savings ( $S_{gov}$ ). Details of the data decomposition and construction are available in the Appendix.

The commercial sector captures the investment and savings outside strong government control. Commercial savings include household savings and business savings; commercial investment includes self-raised funds and domestic bank loans.

Even this definition of the commercial sector includes much official influence. The big-four state-owned domestic banks<sup>7</sup> continue to direct most of their loans to state-owned enterprises (SOEs),<sup>8</sup> largely under the supervision of official credit plans. On the savings side, the big-four domestic banks absorb the absolute majority of household deposits. The last four columns of Table 2 demonstrate the dominant status of state banks in both savings and investment.

Ideally, we could define a commercial sector that is much stricter in the sense of ‘no strong official influence’ as we further remove household savings ( $S_{hh}$ ) from the savings side and domestic bank loans ( $I_{loan}$ ) from the investment side. In that case, what is left on the savings side is business savings ( $S_{bus}$ ), and what is left on the investment side is just the self-raised funds ( $I_{self}$ ), which by definition escape strong official influence. We call these items the ‘strict form commercial sector’ in contrast to the ‘loose form commercial sector’ (see the last box in Figure 3) described above.<sup>9</sup> We will examine both the loose form and the strict form commercial sectors for capital mobility:

- loose form, where we bundle ( $S_{hh} + S_{bus}$ ) for commercial savings and ( $I_{loan} + I_{self}$ ) for commercial investment;
- strict form, where we only have ( $S_{bus}$ ) for commercial savings and ( $I_{self}$ ) for commercial investment.

Section A.2 in the appendix explains the construction of estimates for all categories in our commercial sector data set.

These estimates of savings and investment data components, although crucial in our analysis, are not perfect or 100% accurate. Given the imperfections in our data set, we use two methods to capture the commercial sector. We name the direct estimates for each of the components in the commercial sector data construction described above as *method 1*. We also adopt an alternative procedure to make sure that the statistical results are more than an artifact of our unique but imperfect data set. The alternative procedure is to subtract the official sector from the aggregate level data collected by Boyreau-Debray and Wei (2004) (*method 2*). What is left will provide an alternative estimate of the commercial sector. To obtain method 2 loose-form commercial sector savings, we subtract official sector savings from domestic savings, as indicated as method 2 in Figure 3 ( $S_{com} = S_{tot} - S_{gov}$ ). To obtain method 2 loose-form commercial sector investment, we subtract official sector investment from domestic investment ( $I_{com} = I_{tot} - I_{gov}$ ). Further removing household savings and bank loans yields the method 2 estimates for the strict form commercial sector ( $S_{com} = S_{tot} - S_{gov} - S_{hhs}$  and  $I_{com} = I_{tot} - I_{gov} - I_{loan}$ ).

The commercial sector we defined is actually quite substantial to the whole economy. The commercial sector investment has been an extremely important source for fixed asset investment in China. Table 3 shows that 50% to 70% of funds are financed from the strict form commercial sector. If we also include the portion financed by the loose form commercial sector, then the percentage increases to 90%. This means that the size of the data we removed from the aggregate level to expose the commercial sector is quite small. We also find that the truncated data or the removed layers (official layer) have very low correlation with the rest of the data. For example, government appropriations (government investment) have almost no correlation with the rest of the investment funds (which fall under our commercial sector).



Table 2. Distribution of assets, loans and deposits in China's banking system, 1999.

	Assets		Loans		Deposits	
	Billion RMB	Share of banking system total (%)	Billion RMB	Share of banking system total (%)	Billion RMB	Share of banking system total (%)
Big four state banks	10403	73.2	6249	71.7	7618	83
City commercial banks	554	3.9	271	3.1	441	4.8
Foreign banks	263	1.9	180	2.1	43	0.5
Joint equity commercial banks	1456	10.2	704	8.1	1038	11.3
Policy banks	1540	10.8	1312	15.1	37	.4
Total	14218	100	8718	100	9179	100

Note: Assets, deposits and loans refer to consolidated figures including domestic and foreign currency.

Source: The Banking Industry in China, 2000. OECD publication (2002), p. 241.

Table 3. Shares of commercial and official funds in the financing of fixed asset investment in China, 1985–2000.

Province	Official sector						Strict form commercial sector					
	Government appropriations			Bank loans			Foreign investment			Self-raised funds		
	1985	1995	2000	1985	1995	2000	1985	1995	2000	1985	1995	2000
'Poor Regions'												
Hubei	0.11	0.07	0.1	0.24	0.23	0.17	0	0.11	0.02	0.65	0.59	0.71
Shanxi	0.28	0.04	0.07	0.36	0.26	0.21	0	0.04	0.07	0.36	0.66	0.65
Inner Mongolia	0.29	0.07	0.11	0.11	0.22	0.19	0.02	0.09	0.04	0.58	0.62	0.67
Qinghai	0.15	0.06	0.17	0.46	0.4	0.23	0.00	0.01	0.01	0.37	0.55	0.59
Ningxia	0.3	0.04	0.12	0.21	0.3	0.31	0.03	0.04	0.01	0.47	0.63	0.57
Hunan	0.13	0.04	0.07	0.15	0.19	0.2	0.01	0.06	0.02	0.62	0.71	0.65
Anhui	0.14	0.04	0.08	0.18	0.31	0.23	0.18	0.07	0.03	0.69	0.58	0.71
Jiangxi	0.29	0.05	0.09	0.34	0.21	0.23	0.02	0.08	0.03	0.36	0.66	0.64
Henan	0.13	0.04	0.07	0.09	0.23	0.17	0.04	0.11	0.03	0.74	0.62	0.74
Guizhou	0.19	0.04	N.A.	0.23	0.32	N.A.	0.001	0.05	N.A.	0.57	0.6	N.A.
Yunnan	0.16	0.05	0.08	0.23	0.21	0.22	0.02	0.06	0.01	0.6	0.68	0.68
Shaanxi	0.24	0.08	0.11	0.17	0.3	0.26	0	0.09	0.02	0.59	0.52	0.61
Gansu	0.16	0.05	0.14	0.3	0.37	0.31	0.03	0.06	0.02	0.51	0.52	0.52
<b>Average</b>	<b>0.20</b>	<b>0.05</b>	<b>0.09</b>	<b>0.24</b>	<b>0.27</b>	<b>0.21</b>	<b>0.03</b>	<b>0.07</b>	<b>0.02</b>	<b>0.55</b>	<b>0.61</b>	<b>0.60</b>
'Rich Regions'												
Beijing	0.41	0.11	N.A.	0.16	0.15	N.A.	0.07	0.26	N.A.	0.36	0.48	N.A.
Tianjin	0.2	0.03	0.03	0.25	0.24	0.2	0.05	0.23	0.16	0.5	0.51	0.61
Hebei	0.14	0.02	0.04	0.17	0.16	0.17	0.01	0.06	0.02	0.68	0.76	0.77
Heilongjiang	0.2	0.03	0.05	0.09	0.17	0.17	0.1	0.07	0.03	0.61	0.73	0.76
Shanghai	N.A.	0.02	0.03	N.A.	0.22	0.27	N.A.	0.14	0.1	N.A.	0.62	0.59
Shandong	0.09	0.02	N.A.	0.1	0.16	N.A.	0.05	0.09	N.A.	0.76	0.73	N.A.
Guangdong	0.12	0.01	0.02	0.31	0.15	0.17	0.14	0.19	0.11	0.43	0.65	0.71
Liaoning	0.15	0.03	0.06	0.2	0.2	0.2	0.01	0.13	0.06	0.65	0.65	0.69
Zhejiang	0.08	0.01	0.04	0.19	0.21	0.26	0.003	0.08	0.06	0.73	0.69	0.63

(continued)

Table 3. Continued.

Province	Official sector			Strict form commercial sector					
	Government appropriations	Bank loans	Foreign investment	Self-raised funds	Foreign investment	Self-raised funds			
Xinjiang	0.25	0.03	0.17	0.25	0.22	0.02	0.54	0.63	0.68
Jiangsu	0.09	0.02	0.2	0.16	0.16	0.02	0.7	0.69	0.72
Hainan	0.17	0.02	0.06	0.22	0.13	0.05	0.56	0.52	0.65
Jilin	0.16	0.02	0.06	0.15	0.2	0	0.69	0.65	0.71
<b>Average</b>	<b>0.16</b>	<b>0.03</b>	<b>0.04</b>	<b>0.17</b>	<b>0.17</b>	<b>0.04</b>	<b>0.55</b>	<b>0.64</b>	<b>0.58</b>

Note: We categorize provinces above national GDP per capita level to 'Rich Regions' and group provinces below national GDP per capita level to 'Poor Regions'.

Source: The provincial level investment data (including sources of funds from state appropriations, bank loans, foreign investment, self-raised funds and others) are from each province's statistical yearbooks (1986–2001). If any of these data are not reported in provincial statistical yearbooks, we also collect data from the following publications from National Bureau of Statistics: *Xinzhongguo 50 Nian Tongji Ziliao Huibian* (Comprehensive Statistical Data and Materials on 50 years of New China), *Gaige Kaifang 17 Nian de Zhongguo Diqu Jingji* (China Regional Economy: A Profile of 17 Years of Reform and Opening-up), *Zhongguo Caizheng Tongji* 1950–1988 and *Zhongguo Caizheng Nianjian* (various years).

The correlation coefficient of these two layers is merely 0.05. Moreover, the correlation between government savings and the rest of the savings is even smaller at only 0.0017. Therefore, we do not believe that decomposing aggregate data severely obscures the empirical results.

The components we constructed allow us to study economic integration at different layers: replicating Boyreau-Debray and Wei's aggregate-level unconditional test based on the traditional FH model (see Equation (1) below), modifying the traditional FH model to explain total investment rates with savings components (instead of aggregate savings rates) (Equation (2)), and estimating integration at the commercial layer.

The specific regression models are illustrated in the following equations: at the aggregate layer:

$$\left(\frac{I_{\text{tot}}}{Y}\right)_{it} = \alpha_i + \beta_{\text{tot}} \left(\frac{S_{\text{tot}}}{Y}\right)_{it} + u_{it} + t_{it} + \varepsilon_{it} \quad (1)$$

at the aggregate layer but with decomposed savings:

$$\left(\frac{I_{\text{dom}}}{Y}\right)_{it} = \alpha_i + \beta_{\text{gov}} \left(\frac{S_{\text{gov}}}{Y}\right)_{it} + \beta_{\text{hhs}} \left(\frac{S_{\text{hhs}}}{Y}\right)_{it} + \beta_{\text{bus}} \left(\frac{S_{\text{bus}}}{Y}\right)_{it} + u_{it} + t_{it} + \varepsilon_{it} \quad (2)$$

at the commercial layer:

$$\left(\frac{I_{\text{com}}}{Y}\right)_{it} = \alpha_i + \beta_{\text{com}} \left(\frac{S_{\text{com}}}{Y}\right)_{it} + u_{it} + t_{it} + \varepsilon_{it} \quad (3)$$

where  $Y$  stands for provincial GDP,  $i$  for observation unit (i.e. province) and  $t$  for time. Equation (3) includes both loose and strict forms with two different data sets as a result of two methods (method 1 and method 2) used to build the data. The  $u_{it}$  and  $t_{it}$  represent province and time fixed-effects dummies.

We have collected data for 29 provinces for the period 1985 to 2000.<sup>10</sup> Our analysis will cover two periods: 1985 to 1993 and 1994 to 2000. China implemented a new tax policy in 1994 – Tax Sharing System (*fenshuizhi*), which affects local governments' savings in our data set.<sup>11</sup> To ensure data consistency within each period, we study capital integration before and after 1994. In addition, breaking our data into these two periods can also detect possible changes in economic behavior in the early versus later reform periods induced by deepening reforms.

### 3. Results

Our analysis will start with the aggregate layer and continue to peel off officially influenced capital flows until we reach the strict form commercial sector.

We first examine the integration at the aggregate layer before decomposition, which follows B-W's study using the same method they adopted to construct aggregate savings and aggregate investment rates. The coefficient estimates are obtained from a fixed-effect panel data regression.<sup>12</sup> We see from Table 4 that during the early stage of reforms (1985–1993), the coefficient is indeed very high at 0.38, similar to the results B-W discovered.<sup>13</sup> However, there is a significant drop from

0.38 to 0.19 in the later stage of reforms (1994–2000), which suggests a trend towards integration even at the aggregate layer.

Next, we remove foreign influence to focus on domestic capital flows only. But instead of following the traditional approach using total domestic savings  $S_{\text{dom}}$  to explain the total domestic investment rate  $I_{\text{dom}}$ , we use Equation (2) to see how the total domestic investment rate is explained by government savings rate  $S_{\text{gov}}$ , household savings rate  $S_{\text{hhs}}$ , and business (commercial) savings rate  $S_{\text{bus}}$  respectively. The results show that the commercial sector indeed behaves differently from the official funds (government sector). In the early reform period, household savings have a strong impact on total savings ( $\beta_{\text{hhs}}=0.30$ ). But the commercial sector's business savings do not affect overall investment rates ( $S_{\text{bus}}$  turns out to be statistically insignificant). In the later reform period (1994–2000), neither one of these savings components explains total investments (both  $S_{\text{hhs}}$  and  $S_{\text{bus}}$  are statistically insignificant). In general, the total investment rate does not respond to commercial savings. Government savings, however, have a negative impact on total domestic investment in the later period, which probably indicates that official funds are directed to areas with little official sector savings.

We then continue to remove government savings and government investment to reach the loose form commercial sector. Further elimination of household savings and bank loans exposes the strict form commercial sector. Because we adopt two different methods to construct commercial layer data, we compare the behavior of loose form versus strict form commercial layer using results derived with the same data construction method, rather than comparing results across methods. Therefore, Table 5 presents the results in pairs of columns with the same data construction method. For example, column 1 is compared with column 2 etc. Table 5 shows that the coefficient in the early reform period for the commercial layer is high (0.32 by method 2). But once again the later reform period (1994–2000) presents much lower coefficients between investment and savings rates. In particular, the estimated coefficient from method 1 drops from 0.18 to 0.06 which is also insignificant (comparing column 1 to column 5), showing that the commercial layer's behavior looks like that obtained in similar studies on other advanced economies (as shown in Table 1). This suggests progress toward market integration after initial reforms. The decrease in the estimated coefficient value in the later period using method 2 is not as much as that using method 1, but the common trend of moving toward lower coefficients in the results from both data construction methods reassures us that the results are not an artifact of our uniquely decomposed data.

As we further remove officially influenced household savings and bank loans to reach the strict form commercial sector, coefficients of both periods and methods decline further (comparing results in column 1 versus column 2, and column 3 versus 4 etc.), in some cases reaching a level that is similar to that of advanced nations in Table 1. For example, method 1's coefficient drops from 0.18 to 0.002 in the early period and changes from 0.06 to  $-0.23$  in the later period. The coefficient obtained from method 2 decreases from 0.32 to  $-0.03$  in the early period and moves from 0.27 to 0.18 for 1994 to 2000.

As we look at the results of these low coefficients of the strict form commercial sector, we need to be cautious when interpreting these figures as a sign of high mobility for cross-provincial capital flows. For example, if business savings

Table 4. Regression results for aggregate layer and domestic-only layer (1985–1993, 1994–2000).

Dependent Variable (investment rate)	1985–1993		1994–2000	
	(1)	(2)	(1)	(2)
	Replicate B-W's Study (aggregate layer) based on Equation (1)	Our total domestic-only layer based on Equation (2)	Replicate B-W's Study (aggregate layer) based on Equation (1)	Our total domestic-only layer based on Equation (2)
	$\left(\frac{I_{tot}}{Y}\right)$	$\left(\frac{I_{dom}}{Y}\right)$	$\left(\frac{I_{tot}}{Y}\right)$	$\left(\frac{I_{dom}}{Y}\right)$
Regressors				
$\beta_{tot}$	0.38*** (0.08)		0.19*** (0.05)	
$\beta_{gov}$		-0.01 (0.13)		-0.48* (0.28)
$\beta_{hths}$		0.30*** (0.08)		0.25 (0.16)
$\beta_{com}$		0.15 (0.09)		0.03 (0.16)
Total Panel (Unbalanced)		203.00		176.00
Observations		0.86		0.78
Adjusted- $R^2$		0.84		0.73

Note: Individual coefficients are statistically significant at the \*\*\*1% level, \*\*5% level or \*10% level.

Table 5. Regression results for the commercial layer.

Dependent variable (investment rate)	(1985–1993)				(1994–2000)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Loose form commercial sector	Strict form commercial sector	Loose form commercial sector	Strict form commercial sector	Loose form commercial sector	Strict form commercial sector	Loose form commercial sector	Strict form commercial sector
	$\left(\frac{I_{com}}{Y}\right)$	$\left(\frac{I_{self}}{Y}\right)$	$\left(\frac{I_{dom} - I_{gov}}{Y}\right)$	$\left(\frac{I_{dom} - I_{gov} - I_{loan}}{Y}\right)$	$\left(\frac{I_{com}}{Y}\right)$	$\left(\frac{I_{self}}{Y}\right)$	$\left(\frac{I_{dom} - I_{gov}}{Y}\right)$	$\left(\frac{I_{dom} - I_{gov} - I_{loan}}{Y}\right)$
Regressors	Method 1	Method 1	Method 2	Method 2	Method 1	Method 1	Method 2	Method 2
$S_{com}$	0.18** (0.08)		0.32*** (0.09)		0.06 (0.15)		0.27* (0.05)	
$S_{bus}$		0.002 (0.6)		-0.03 (0.08)		-0.23*** (0.11)		0.18*** (0.05)
# obs.	206	210	192	192	182	167	160	167
$R^2$	0.77	0.75	0.82	0.8	0.70	0.69	0.85	0.82
Adjusted $R^2$	0.72	0.70	0.78	0.76	0.63	0.62	0.82	0.79

Note: Individual coefficients are statistically significant at the \*\*\*1% level, \*\*5% level or \*10% level.

Method 1 uses direct estimates for each of the component in the commercial sector data. For example, Loose Form Commercial Sector savings data are obtained by adding household and business savings data. In Method 2, we subtract official sector savings from total domestic savings to obtain the same estimate of the Loose Form Commercial Sector savings data. The detailed explanation of these two methods is discussed in section 2.3 and Figure 5.

experience no major change or even a decrease, whereas investment financed by self-raised funds shows a dramatic increase, this would produce a low correlation between strict form commercial sector savings and investment. However, such a low coefficient does not always indicate *inter*-provincial capital flows because an increase in self-raised funds could be financed with local household savings. Therefore, the low coefficients in the strict form sector do indicate high capital mobility, but this mobility could stem from either cross-layers (transfers between loose and strict form commercial sectors) or from cross-provincial flows.

In summary, Tables 4 and 5 demonstrate the capital mobility for all different layers of China's economy for the early and later reform periods. We find results resembling B-W's discovery before decomposition in early reform periods. But as we remove foreign and officially-influenced capital flows, we discover that underneath the aggregate data, there exists a more mobile and significant commercial sector whose behavior starts to resemble that of advanced economies with no strong relationship between savings and investment rates. This indicates that decades of reforms in China did create market behavior, even in the financial system that is often considered to lag behind market reforms.

In retrospect, these findings are not surprising. Numerous anecdotal accounts demonstrate the transfers of large amounts of capital flows across provincial borders in daily economic activities. These reports are so frequent that one cannot help wondering whether this is indeed part of the business routine in China. For example, recent press reports illustrate that 'strong local economic growth and municipal government work have combined to make Beijing an investment magnet for private domestic funds, which made up more than half of the 131.4 billion yuan (US\$15.9 billion) invested in the capital during the first ninth months of the year'.<sup>14</sup> In addition, Zhejiang saw the number of enterprises based in Shanghai increase to over 50,000 by 2001, with investment in Shanghai reaching 50 billion yuan (Chun and Yao 2003) – 18% of the total fixed asset investment in Zhejiang province for the same year.<sup>15</sup>

Indeed there are various channels affecting the allocation of investment funds that do not reflect a strong positive relationship between total savings and investment rates for a province. Even if we assume that local government savings are mainly used to fund local projects (as reflected in government appropriations in funding sources for fixed asset investment for each province), the majority of the funding sources lies in the other two categories: bank loans and self-raised funds for each province's new investment. The amount of bank loans issued to a province need not reflect the amount of household savings absorbed as bank deposits from the same province.<sup>16</sup> For example, Kumar et al. (1996) show that the loan and deposit ratios do not balance in China, instead they have the pattern of directing more loans to poor regions.

#### 4. Channels, size and direction of domestic capital flows

##### 4.1. Channels of capital flows

The above section shows that, contrary to popular belief, the reforms in China's capital market did present evidence consistent with the growing mobility in the



commercial capital sector. In this section, we briefly document the main channels that facilitate funds transfers.

Chinese government has been taking steps to promote capital market and product market integration for many years. In the meetings of the 16th Central Committee of the Communist Party of China held in 2002, Beijing made it clear that it is their goal to break regional and industrial blockages to promote the mobility of commodities and factors of production in the national market.<sup>17</sup> The establishment of two stock markets in Shenzhen and Shanghai (in the early 1990s) and nationwide stock brokerage, the launch of inter-bank market for short-term funds transfers, and the development of commercial paper market, all help to facilitate funds transfers. For example, in 2002,

the Chinese interbank lending and borrowing market (with maturities of up to four months) hosted more than 5,300 trade deals with a turnover of 1.2 trillion yuan (US\$146 billion), up 50 percent over the previous year. (Imam 2004)

While other commercial banks, such as GuangFa and ShenFa, were net borrowers in the interbank market, the state-owned commercial banks tended to be net lenders. This suggests that the state-owned commercial banks might have incentives to channel excess funds to the interbank market instead of lending to state-owned enterprises, as they were often required to. (Chen, Dietrich, and Fang 2000, 177–81)

Another important channel for domestic capital flows is the trust and investment companies (TICs) in China. ‘(TICs) have chosen borrowers and projects outside the state’s Credit Plan, they have enjoyed greater discretion on the rates and terms they offer for lending and have provided a range of services not offered by bank’ (Kumar et al. 1996). Although the number of TICs fluctuated as the regulatory agencies cracked down on illegal businesses, the total assets continued to grow. By 2005, the total assets amounted to 76.8 billion Yuan (US\$9.3 billion).

Meanwhile, merger and acquisition activities have been growing tremendously. Recent reports<sup>18</sup> point out that ‘China is now the third-largest M&A market in the Asia-Pacific after Japan and Australia. M&A deals in China reached \$41 billion in the first half of 2006, up a staggering 71% year-on-year’. Although consolidations involving firms across different regions can still be challenging since firms can get caught between the conflicting interests of provincial governments, in the surge of M&A deals, we still see the rapid rise of M&A activities among Chinese companies.

The government is also laying the groundwork for greater industrial strength by encouraging [domestic] consolidation. . . Chinese firms invested \$18.8 billion buying up other Chinese companies in the 12 months ending in June, 2006. That’s a jump of 50% over the year before. The total number of transactions rose to 517 from 406 over the same period. (Business Week, July 26, 2006)

These channels facilitated the rise of a commercial sector in China’s economy, which starts to share features with many other developed countries despite the general presumption of primitive systems.

#### **4.2. *Size of capital flows***

In order to further understand the behavior of inter-regional capital flows, this section provides an analysis of the size of capital transfers.

Table 6 reports the size of inter-provincial (and inter-sector) capital flows in China based on our estimates with method 1. We show the average figure of the gap between savings and investment for each sector (calculated by taking the absolute value of the difference between savings and investment) for both time periods by province, and list that value in the 'net' column representing the size of net flows for that sector. We then add another column to illustrate the percentage of these actual flows to the province's total capital formation (total investment). For illustration purposes, we group provinces whose average GDP per capita from 1985–2000 is higher than the national average in the 'rich' group, and bundle the remaining provinces in the 'poor' group. The well-known pattern is very clear from these two groups, with interior provinces mostly falling in the 'poor' group and coastal areas in the 'rich' group.

The magnitude of net flows in Table 6 further demonstrates the significance of the commercial sector (loosely defined) and the mobility of capital flows in this sector, whose average net capital transfer accounts for about 17% of the gross capital formation in the 'rich' group. Also, economically advanced regions experience much larger amounts of capital flows as the average percentage of net capital flows to total capital formation for the rich group is often two or three times higher than that of the poor group.

#### 4.3. Direction of capital flows

Table 7 reports the direction of capital flows for 26 provinces<sup>19</sup> for two periods: 1985–1993 (9 years) and 1994–2000 (7 years). In addition to the aggregate savings and investment data compiled by Boyreau-Debray and Wei, we use estimates produced by method 1 for the official, loose form and strict form commercial sectors' savings and investment to determine the direction of capital flows. The direction of capital flows is 'IN' if a province's investment rate is higher than its savings rate (otherwise 'OUT') in the corresponding sector.<sup>20</sup> For example, in 1985, Beijing's aggregate savings rate is 0.56 and the aggregate layer investment rate is 0.74. Therefore, the higher investment rate indicates that Beijing must have absorbed capital from outside to finance its investment since its own savings rate would not be able to support the higher investment rate. Similarly, if the savings rate is higher than its investment rate, this indicates that the province's savings are transferred out of its origin to other areas.<sup>21</sup> We then record the number of occurrences of 'IN's and 'OUT's for each province in the two time periods in the cells of Table 7. For instance, in the 9 years from 1985 to 1993, Beijing experienced 6 years of capital inflows and 3 years of capital outflows at the aggregate layer.<sup>22</sup> We then report the average of these numbers for each group for both time periods in the last row of these two groups' sections in Table 7.

Some trends become instantly clear when we examine Table 7. Starting from the top layer – the aggregate sector, we see no substantial changes for the early and later reform periods, which show that capital is leaving the 'rich' group and is transferred to the 'poor' areas. This is supported by the pattern that the average number of times the 'rich' group experiences capital outflows is two to three times higher than inflows.

The basic pattern for the loose form commercial sector is similar to the aggregate layer with the 'rich' region more likely to see capital outflows, particularly in the

Table 6. Size of capital flows.

Province	1985–1993												1994–2000											
	Official sector			Loose form commercial sector			Strict form commercial sector			Aggregate level			Official sector			Loose form commercial sector			Strict form commercial sector			Aggregate level		
	Net*	%		Net*	%		Net*	%		Net*	%		Net*	%		Net*	%		Net*	%		Net*	%	
*Rich	8.68	4		121	42		102	41		35.4	12		33.8	3		607	46		305	23		132	9	
Beijing	16.9	13		45.7	32		63.4	46		18.5	12		16.8	2		132	23		62.7	12		14.1	2	
Tianjin	7.2	2		57.5	15		96.5	31		49.7	13		102	6		317	19		189	10		358	21	
Hebei	18.8	6		67	19		147	44		102	28		101	8		260	22		192	16		421	35	
Liaoning	23.2	17		23.7	17		20.7	13		21.5	16		90.1	15		45.2	8		110	18		23.7	4	
Jilin	25.5	12		31.4	11		36.8	12		8.3	4		103	11		79.4	9		121	15		140	15	
Heilongjiang	32.3	6		114.4	17		88	6		81.3	12		94.6	3		683.1	23		124.9	4		573.1	18	
Jiangsu	33.3	11		60.6	18		81.7	27		67.7	18		117	5		795	35		457	20		387	19	
Zhejiang	N.A.	N.A.		N.A.	N.A.		N.A.	N.A.		N.A.	N.A.		41.66	2		246.5	17		287.3	16		237.8	17	
Shanghai	N.A.	N.A.		N.A.	N.A.		N.A.	N.A.		N.A.	N.A.		105.9	5		1182	62		779.2	40		1077	57	
Shandong	9.89	3		49.8	20		63	24		26.6	10		166	12		61.4	5		362	24		64.3	6	
Hubei	22.5	3		127	22		115	23		48	9		62.3	2		339	13		472	17		412	14	
Guangdong	24.8	21		20.9	19		17.8	17		63.3	47		89.6	16		65.5	11		121	21		179	32	
Xinjiang	<b>11.04</b>	<b>4</b>		<b>41.04</b>	<b>9</b>		<b>45.49</b>	<b>12</b>		<b>28.22</b>	<b>8</b>		<b>58.46</b>	<b>4</b>		<b>323.2</b>	<b>17</b>		<b>226.1</b>	<b>12</b>		<b>237.8</b>	<b>14</b>	
Weighted avg	14.5	10		19.6	10		31.6	20		17.1	11		65.4	11		96.5	17		68.5	12		44.9	8	
Shanxi																								

'Poor'	Neimenggu	32.3	31	11.5	11	20.1	21	31.5	26	67.6	14	63.1	12	37.7	7	30.3	7
	Anhui	16.3	9	13.8	7	17	8	10.5	5	27.1	3	86	9	175	19	4.35	1
	Jiangxi	10.2	9	67	45	59.5	43	19.7	15	45.5	6	125	21	37.7	6	11.8	2
	Henan	9.79	3	60.8	15	26.3	10	53.7	17	147	9	357	22	282	17	208	13
	Hunan	4.96	3	32.4	16	35.9	13	12.8	6	118	12	56.2	6	234	23	12.3	1
	Guizhou	8.58	13	12.6	18	9.45	12	17.8	26	48.9	16	63.5	23	49.1	16	179	49
	Yunnan	13.3	11	36.7	20	27.3	26	24.5	17	151	23	292	44	109	15	101	15
	Shaanxi	18.5	13	14.2	9	9.46	5	61	38	98.6	16	68.5	10	77.8	11	136	24
	Gansu	8.79	9	20.6	28	32.7	38	29.6	32	79	24	33.6	11	39.8	12	41.5	15
	Qinghai	9.69	33	6.54	22	2.75	11	13.4	46	34.6	30	35.2	29	33.6	26	50.8	44
	Ningxia	9.65	3	8.56	23	2.3	6	19	56	26.5	22	39.4	32	36.7	29	41.8	36
	<b>Weighted avg</b>	<b>3.32</b>	<b>3</b>	<b>8.02</b>	<b>4</b>	<b>6.62</b>	<b>4</b>	<b>7.29</b>	<b>5</b>	<b>20.86</b>	<b>3</b>	<b>35.36</b>	<b>4</b>	<b>33.48</b>	<b>3</b>	<b>19.26</b>	<b>2</b>

Note: \*Net flows are in 100 million Yuan. For example, we calculate the gap between the savings and investment data of Beijing's Strict Form Commercial Sector for 1985-1993. We then report the average of these gaps for the 9-year period (102 million Yuan) in this table. The size of this capital gap is about 41% of Beijing's total capital formation in these 9 years. The weights used for calculating the weighted averages for every column are each province's share of total capital formation out of national total capital formation for the corresponding time period (1985 to 2003 and 1994 to 2000).



early reform period (for example, the average number of times of capital outflows, 6.75, is more than three times higher than for inflows, 2, for the 'rich' group in the early reform period). Keep in mind that the sources of investment for the loose form commercial sector are domestic bank loans and self-raised funds. Domestic bank loans were largely affected by official credit plans. This pattern in the early reform period also coincides with the discovery of Kumar et al. (1996) on the imbalance of provincial loan and deposit ratios. They find that the loan ratios in interior regions are much higher than their deposit ratios, indicating capital transfer from coastal areas to inner land. However, this trend starts to become less extreme in the later reform period. For the 'poor' region, the numbers of times of capital inflows and outflows are almost the same.

We then move to the strict form commercial sector. The early reform period shows that almost all provinces have a much higher savings rate than investment rate.<sup>23</sup> The later reform period suggests a completely different trend: the 'poor' region started to experience much more frequent cases where strict form commercial investment rate is higher than the savings rate, the opposite to the early period.

Comparing the commercial sector's behavior with aggregate patterns suggests that while capital moves to interior regions at the aggregate layer in both early and later reform periods, the commercial capital flows are not exactly following the same trend, or at least this trend is not as extreme as the case for the aggregate layer, especially in the later reform period. Policy inclination may directly or indirectly transfer vast amount of capital to the West. However, the commercial sector's behavior is not so uniform. If the commercial flows really follow market principles, one has to assume that capital does generate higher returns when it flows out of the interior regions to other areas. Scarcity in the interior surely can increase capital returns, but better infrastructure, more experience in industrial development, cluster-effects, better-trained work force and superior access to domestic and international markets can all contribute to higher returns of capital in the coastal region.<sup>24</sup> Investigating the efficiency of capital allocation is another task and requires additional data. For now, Table 7 informs us about the direction of capital flows, not the efficiency of capital transfers.

Table 7 also highlights the contrast of official sector behavior between 'rich' and 'poor' regions in the early reform periods. Funds are transferred out of the 'rich' provinces to help the ones lagging behind, a phenomenon recognized by other studies as well (Dollar and Wei 2007). We need to be cautious about interpreting the later period figures for the official sector because our data show that almost all provinces in China experience higher government investment rates than savings rates. The lower savings rates are largely caused by the new tax system, which started in 1994, and which changes the calculation of central-local remittance. We explain these changes in section A.3 of the Appendix.

## **5. Conclusions**

We demonstrate that applying the Feldstein–Horioka (1980) model with only aggregate level data for China's transitional economy is inappropriate. The official influence and its coexistence with private sectors in China determine that bundling

these two forces in the analysis does not generate accurate understanding of the operation of China's capital markets. Once we take apart aggregate level data analysis to component level, to distinguish the official sector from the commercial sector, we discover the real progress achieved by market reforms.

We show that capital flows outside the government budget plans in what we define as the commercial sector are both large and mobile. Stripping out foreign capital, government appropriations, both our unique data set and the data obtained from Boyreau-Debray and Wei's study indicate that capital flows in the commercial sector are much more mobile than previously thought. Further, in some dimensions, these commercial capital flows appear to behave like those in the US and other advanced nations. This suggests that three decades of reforms did create a large commercial sector with market characteristics within China's financial system. This sectors started to display important elements of market integration.

Tracking these flows also indicates the active transfers of capital across regional borders and, once again, highlights the difference between the behavior of commercial and non-commercial capital flows.

If the capital market now displays substantial progress toward integration, despite popular belief, we can naturally extend this investigation to the product market. Many recent studies report the lack of integration in China's domestic product market (Poncet 2003, 2005; Young 2000). International experience normally suggests integration in product markets precedes integration in capital markets. Our findings of capital market integration in China's large commercial sector raises new issues to be analyzed with regard to studies on the product market: either the claim about China's product market as lacking in market integration is valid, and then we need to investigate why China's capital market integration precedes product market integration, a trend opposite to other countries' experience; or we have reasons to doubt the validity of the claims on the fragmentation of China's product market. Either way, the results of this paper show the need for further understanding of the reforms' real impact in bringing market features to China's transitional economy.

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### **Notes**

1. Laurenceson and Chai (2003, 3) point out that 'given the apparent importance of financial reform in determining the economic performance of a developing, transitional economy such as China, it is surprising then that the role of finance has been downplayed in the literature examining China's rapid economic growth during the reform period (1978–present)'.

2. For example, Robert Murphy (1984) points out that, in citing the positive correlation between savings and investment as the evidence to demonstrate the immobility of the capital, Feldstein and Horioka 'appear to have confused two assumptions frequently employed together in international macroeconomic modeling: namely, the assumption of perfect capital mobility and the assumption of a small country'. Further, Murphy states that 'even when potential econometric problems are left aside, their test is not a test of capital mobility alone, but a joint test of capital mobility and country size'. Linda Tesar (1991) provides a comprehensive survey of the theory and evidence on the relationship between savings and investment.
3. See the logic and reasoning provided by Genevieve Boyreau-Debray and ShangJin Wei (2004). John F. Helliwell and Ross McKittrick (1998) also show that the 'savings retention disappears if the region of study is a province within Canada rather than the nation as a whole'.
4. According to the macroeconomic accounting framework, if we consider an open economy, private savings (business and household savings) + government savings + (imports - exports) = investment.
5. We remove inventory investment from our study for several seasons. First, fixed asset investment takes up the absolute majority of total investment for the years included in our study. For example, changes in inventories account for 15%, 13.1%, 11.6%, 6.5%, 4.0% and -0.4% respectively for each year from 1995 to 2000 (source: *Data of Gross Domestic Product of China 1996-2002*, Beijing: China Statistics Press, p. 27). More importantly, fixed asset investment measures the majority of the new investment in the domestic economy, which largely determines the prospect of each year's economic growth trend and economic performance. By focusing on fixed asset investment, we can assess whether major investment financing activities are restrained by market fragmentation. In addition, sources of finance for inventory are not reported for decomposition in China.
6. According to NBS publication, self-raised funds include extra-budgetary funds for investment in fixed assets received by investing units from central government ministries, local governments, enterprises and institutions, including their self-raised funds. Domestic bank loans have been used for self-raised funds, particularly in the 1990s. For more details of the studies on using bank loans for self-raised funds, see Ruipei Shi (1991) and Xiangyang Zhan (2000). The category of 'Others' refers to funds for investment in fixed assets received from sources other than government appropriations, domestic bank loans, self-raised funds and foreign investment, including capital raised through issuing bonds by enterprises or financial institutions, funds raised from individuals and through donations, and funds transferred from other units. This definition is also available in the 'Explanatory Notes on Main Statistical Indicators' published by National Bureau Statistics (<http://www.stats.gov.cn/tjsj/ndsj/2005/html/en06i.htm>)
7. The big four state-owned banks are: China Construction Bank, Bank of China, Industrial and Commercial Bank of China, and the Agricultural Bank of China.
8. In China, most of the loans are issued by state banks and the majority of these loans issued by those big four state banks go to SOEs. Ruby Zhu, an assistant economist at the Hong Kong General Chamber of Commerce, writes that 'according to statistics compiled by the People's Bank of China, less than 1 percent of loans approved last year [2001] went to those who were self-employed or in the private sector'. Source: *The Bulletin*, October 2002, Hong Kong General Chamber of Commerce. Also available at: <http://www.hkgcc.org.hk/bulletin/bulletinOldSearch.asp?terms=private+enterprises+provide+new+impetus&ActionForm=bulletinOldSearch.asp&submit=Go&l=E&i=>
9. However, we should remind our readers that it is impossible to isolate completely each of these categories as there are interactions among them. Hence, our definition of the commercial sector can never be 100% pure, nor totally exempt from official influence. For example, it is likely that the self-raised funds on the investment side actually absorb part of household savings. Since absolute purity is unattainable, our goal is to remove as much official influence as we can.
10. We left out data for Tibet because its data pattern shows as a clear outlier. The other provinces not included in our data set due to data limitations are: Chongqing which



became the fourth municipality directly under the central government in China in 1997, and Fujian. Many scholars have questioned the reliability of Chinese statistics (Holz 2001; Holz and Yimin 2003; Rawski 2001), especially statistical reports at provincial level. But because we are looking at data covering a long period of time, we believe that the published data from various provincial statistical yearbooks and other publications from National Bureau of Statistics are reasonable starting point for our analysis.

11. Note that this does *not* affect our estimates of the loose and strict form commercial savings and investment with method 1.
12. We realize that government interventions and fiscal policies may also have an impact on affecting the provincial savings and investment rates. Such impact sometimes has a lagged effect. So we added one-year lagged investment rates as additional independent variables in our regression analysis. But this modification did not change our results significantly.
13. B-W's study also yielded a coefficient of 0.49 but their data cover the whole period of 1978–2000.
14. Tang Ming, 'Private Funds Funnel Into Beijing', *China Daily*, p. 2, Oct 11, 2003.
15. *Zhejiang Statistical Yearbook 2002*, p. 108.
16. This can happen due to either official credit plan influence, or commercial operations. For example, the recent plan to develop the west must have directed a tremendous amount of resources (including bank loans) to western interior areas in China due to official planning. The People's Daily reports that 'Governments at various levels across the country should work together in view of actual conditions...', so as to promote a sustainable, fast and coordinated development of the vast western area... Moreover, the document says more efforts should be exerted to advancing social undertakings, such as science, technology..., and deepen economic restructuring, expand financing channels to provide capital guarantee to the development. The central government, says the document, should keep its investment in the western region by continuing the use of construction capital like long-term construction state bonds and step up transfer payment to the region to help it expand direct and indirect financing channels'. Also available at: [http://english.peopledaily.com.cn/200403/23/eng20040323\\_138229.shtml](http://english.peopledaily.com.cn/200403/23/eng20040323_138229.shtml)
17. Source: *Internal Reports*, Issue 65, October 27, 2003, Development Research Center of the State Council.
18. Sources: the M&A figures in this section come from 'Behind the Chinese M&A Surge', *Business Week*, July 26, 2006, also available at: [http://www.businessweek.com/investor/content/jul2006/pi20060726\\_720112.htm](http://www.businessweek.com/investor/content/jul2006/pi20060726_720112.htm)
19. Provinces and municipal cities not included are: Tibet (as an outlier), Sichuan, Chongqing, and Guangxi due to data limitations for certain sectors.
20. As mentioned in section 2, the savings and investment rates are calculated using the absolute amount of savings (investment) divided by provincial GDP.
21. Notice that we should be cautious when applying this method to the strict form commercial sector, which we intentionally leave out for now for the same reasons mentioned in section 3. If a province's strict form commercial sector's investment rate (funded by self-raised funds) is higher than its corresponding savings rate (the business operating surplus savings rate), this does not necessarily indicate capital flows into the province. Suppose a firm's investment funded by sales of its stock or bonds (definition of self-raised funds) is much larger than its own operating surplus (strict form commercial savings), this gap could be filled by obtaining domestic bank loans from a bank within the province. Therefore, higher strict form commercial investment does not necessarily lead to the conclusion of absorbing capital from other regions. This is more likely to be the case for the loose form commercial sector. Hence, in Table 7, even though we report 'directions' of capital flows for the strict form commercial sector using the same methodology, we do not, however, interpret these figures as inter-provincial capital flows. Rather, we only use the general term ' $S > I$ ' (savings greater than investment) or ' $I > S$ ' (investment greater than savings) for the last two columns of Table 7 for the strict form commercial sector.

22. Some entries in Table 7 are *not* in bold font. This indicates missing data for certain years, which also means that adding up the two figures of 'IN' and 'OUT' will not give the total number of nine for the first time period and seven for the second time period.
23. We exert caution when interpreting the figures for the strict form commercial sector and therefore do not use the terms of capital inflows and outflows (see note 21.)
24. Jefferson and Su (2002) find that enterprises in interior provinces in China exhibit a large and growing productivity and technological capabilities gap compared with enterprises in coastal provinces. Although they also find that FDI seems to enjoy higher returns in interior regions in China, FDI does not seem to be flowing into the interior region rapidly. The authors explain this phenomenon by pointing out the possible high initial cost to set up FDI in the interior region: 'In order for foreign investors to move their capital to the interior, China's central government and its sub-jurisdictions may have to focus on ways to lower the set up costs needed for investors to extend their reach into the interior'.
25. These data are obtained from various years of *Zhongguo Tongji Nianjian (China Statistical Yearbook)*.
26. These data are obtained from various years of *Zhongguo Tongji Nianjian (China Statistical Yearbook)*.
27. The GDP income approach – sometimes called the structural item approach – reports four categories: employee compensations, net taxes on production, depreciation of fixed asset investments, and operating surplus.
28. Operating surplus is often used to measure business savings in related literature. For example, Murphy (1984) used it as an estimate for business savings in his study on corporate capital market integration for the US.
29. See details from Zhang (1999).

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## Appendix

### A.1. Official sector data set

The official sector includes government savings ( $S_{gov}$ ) on the savings side and government appropriations ( $I_{gov}$ ) on the investment side.

China's National Bureau of Statistics (NBS) reports sources of funds to finance fixed asset investment on the following categories each year: government appropriations, domestic bank loans, self-raised funds and foreign capital. Therefore, we simply use government appropriations as our measure for government investment ( $I_{gov}$ ).<sup>25</sup>

We estimated government savings ( $S_{gov}$ ) using data reported in fiscal yearbooks. We include government extra-budgetary revenue and extra-budgetary expenditure items in our calculation. When calculating government savings, only current expenditure items should be subtracted from government revenues. Therefore, expenditure items such as capital construction funds (*jiben jianshe feiyong*) and enterprises innovation funds (*qiye gengxi gaizao feiyong*) are not subtracted from government revenues as they should be part of the savings. The formula to calculate government savings is: government revenue + extra-budgetary revenue – current expenditure – extra-budgetary expenditure.

Note that, in 1994, China adopted new fiscal and tax policies that affected the calculation of provincial government revenue and expenditure. Therefore, we will separate our data to two different periods: before and after the tax reform in 1994 to ensure the consistency of data within each period. For details of the new tax system, see section A.3.

### A.2. Commercial sector data set

Just as in the case for the official sector investment figures, we used the NBS reports on domestic loans, and self-raised funds for our direct measures of the commercial investment. We then construct our own estimates for household savings and business savings. Household savings are obtained from subtracting household consumption figures from household income. The consumption figures are the household consumption data reported as part of the expenditure approach of GDP for each province.<sup>26</sup> The household income is the employee compensation figures reported as an item under GDP by income approach<sup>27</sup> for each province. As for the business savings data, we use the 'operating surplus' item in GDP by income approach reported by NBS.<sup>28</sup>

### A.3. Central-local tax remittance after 1994

In 1994, China implemented a new tax system – Tax Sharing System (*fenshuizhi*).

The Tax Sharing System (TSS) was designed to fundamentally change how central and local governments share revenues. Under the TSS, taxes were assigned either to the central or local governments. Central taxes include customs duties, the consumption tax, VAT revenues collected by customs, income taxes from centrally owned enterprises, turnover taxes on railways, banks, and non-bank financial intermediaries and insurance companies, and resources taxes on offshore oil extraction. Local taxes consist of business taxes (excluding those named above as central taxes), income taxes and profit remittances of locally owned enterprises, urban land-use taxes, personal income taxes, the fixed asset investment orientation tax, the stamp tax, and so on. Initially, the only shared tax was to be the VAT, at the fixed rate of 75% for the central government and 25% for local governments. This was modified by a concession on sharing the growing proceeds from the excises tax. In 1998, the securities trading tax was shifted from a purely local tax to a shared tax, with 88% for the central government and 12% for the local government (World Bank 2002).

TSS also clarified the division of spending responsibilities. Central expenditure includes defense, armed police, capital investment, central administration, central-level institutions, and debt services, while the local expenditure items include local administration and local institutions, locally sponsored capital investment and technical renovation, aid to agriculture, urban maintenance and construction, price subsidies, and others.<sup>29</sup>

Another major change in the TSS system was the establishment of the central government's own collection agencies. The center set up national tax services (NTSs) in all provinces to collect central taxes and shared taxes. Local tax bureaus can collect only local taxes.

In the meantime, many old elements from the previous regime still remain in effect. For example, the previous transfer mechanisms such as quota subsidies for poor and minority regions, along with most of the old system of special purpose (earmarked) grants are still being carried out. This simultaneous implementation of the two regimes created a complicated and confusing system.

After the immediate implementation of the TSS system, the formula we used to calculate government savings (mentioned in section A.1: government revenue + extra-budgetary revenue – current expenditure – extra-budgetary expenditure) yielded negative savings figures for many provinces (although not all provinces) in our data set owing to falling provincial budgetary revenues. We separated our analysis into pre- and post-1994 to ensure data consistency within each sub-period.