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Abstract

We examine cross-region capital mobility in China and track how the degree of mobility has changed over time. The effects of fiscal and redistributive activities of different levels of government in China on private capital mobility are taken into account. Our results indicate that there is a significant improvement in capital mobility over time in China, particularly for private capital in the more developed regions. The central and provincial governments, via their taxation, spending, and transfers, loosen the relationship between private saving and investment and appear to promote capital mobility, particularly for less developed regions. There are considerable differences between more and less developed regions in terms of the degree of capital market integration and the improvement in capital mobility over time. The results have important policy implications on global re-balancing as well as regional development gap and risk-sharing within China.

JEL code: C22, C23, F21

Keywords: Feldstein-Horioka, Chinese cross-region capital mobility, saving-investment relationship, Chinese capital market integration

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1. Introduction

While China has made great strides in economic reforms and development, her financial system is still considered being far from efficient and domestic capital markets are fragmented (Boyreau-Debray and Wei, 2005). An integrated capital market where private funds can flow freely is essential for the Chinese economy to sustain its growth and achieve better efficiency. In this paper, we examine capital mobility in China and how the degree of mobility has changed over time. We also take into account of the effects of fiscal and redistributive activities of different levels of government in China on cross-region capital mobility.[1]

After 1978, economic reforms experimented along the coastal areas such as Guangdong and Shanghai have resulted in rapid development in these regions. They have become the engine of economic growth for the whole country. However, this might have contributed to a widening economic development gap between these coastal and the more inland regions. The Chinese central government in 2000 initiated a "Develop the West" program to promote a more balanced growth across China (Lin and Liu, 2008). At the same time, China is under increasing pressure from her major trading partners to rely less on foreign demand in an effort to curb global imbalances. The 2007-2009 global financial crisis gives rise to yet another incentive for China to turn more to domestic demand as a propeller of growth.

Furthermore, the composition of the domestic absorption matters a great deal here. Prasad (2008) shows that the economic growth of China has been driven mainly by investment rather than by consumption. Greater capital mobility would enhance the ability of households to borrow for consumption of both home and foreign goods. Higher consumption spending would then

[1] Capital mobility is defined in this paper as free flows of funds across regions. Since financial markets in China are still underdeveloped and the number of financial instruments being traded is limited, a related but different concept of market completeness in which financial instruments covering a wider range of contingencies are traded is not examined here.

generate a more sustainable growth driven by domestic demand in China and contribute toward global re-balancing. Xu (2008) finds evidence of low degree of consumption risk sharing across Chinese provinces; he suggests that one should focus on the mechanisms that have prevented regions from sharing their risks within China. Increased capital mobility is essential for more active cross-region borrowing and lending that would in turn facilitate risk sharing and confer corresponding welfare gains.

In short, understanding capital market integration at the national and regional levels is important towards the goals outlined above. Recognizing there may be vast regional differences, we also estimate the degree of capital mobility for different regions based on their level of economic development. In light of these recent developments, it is hoped that our estimation results bear some policy relevance.

In a pioneering study, Feldstein and Horioka (hereafter FH) (1980) evaluate the degree of cross-country capital mobility by estimating the correlation between saving and investment, also referred to as the saving-retention rate, based on cross-sectional data of OECD countries. They argue that if capital mobility is high, incremental saving in one country would seek investment opportunities with the highest possible risk-adjusted returns around the world, resulting in low correlation between national saving and national investment. Under financial autarky, a country's domestic investment must be financed exclusively by her domestic saving, resulting in perfect correlation between national saving and investment. In their results, the estimated saving retention rate is quite high and is not statistically different from unity. This implies low capital mobility and contradicts a general consensus that capital is highly mobile among the OECD countries. While many subsequent studies of international capital mobility using cross-sectional, time-series, and panel data largely confirm the FH results, they provide alternative explanations

and interpretations to this puzzle, including government policies such as budget deficit and current account targeting (Summers, 1988; Roubini, 1988; Bayoumi, 1990). In addition, Baxter and Crucini (1993) and Mendoza (1991), among others, show that incorporating adjustment costs in inter-temporal models with built-in mobile capital can produce a correlation between domestic saving and investment as high as that observed in the data.

Some studies have adapted the FH framework to examine capital mobility across regions within a country. A key advantage of examining domestic capital mobility via the FH framework is that, unlike national sovereignties, provinces are not subject to the current account solvency constraint that complicates the interpretation of the saving retention rate. Bayoumi and Rose (1993) and Thomas (1993) estimate the saving-retention rate for the UK; Yamori (1995) and Dekle (1996) for Japan; Sinn (1992) for the US; and Thomas (1993) as well as Helliwell and Mckitrick (1999) for Canada. For these countries, which are considered to have a well-integrated domestic capital market, the estimates are found to be not significantly different from zero. These studies provide a rationale for our adoption of the FH framework in studying capital mobility in China.

Boyreau-Debray and Wei (2005) and Li (2010) estimate the saving-investment correlation in China using provincial-level data. Both studies conclude that China's domestic capital mobility is low and its capital market is fragmented. The former also suggests that there is no evidence of increasing capital mobility over time in China. Our investigation is different from these two studies in four important aspects. First, we consider the influence of government on private capital mobility. Second, the estimation methods used in our paper explicitly account for cross-sectional dependence in panel data, which can arise from nationwise policies that simultaneously affect all provinces. Third, we examine capital mobility for individual regions in China. Fourth,

we track detailed changes over time in the level of national and regional capital market integration.

Our results indicate that there is a significant improvement in capital mobility over time in China, particularly for private capital in the more developed regions. The central and provincial governments, via their taxation, spending, and transfers, loosen the relationship between private saving and investment and appear to promote capital mobility particularly for less developed regions. There are considerable differences between more and less developed regions in terms of capital market integration.

2. Econometric methods

With panel data, the FH framework can be expressed as

$$IR_{it} = \lambda_i + \beta SR_{it} + u_{it}, \tag{1}$$

where IR_{it} and SR_{it} stand for investment rate (investment over GDP) and saving rate (saving over GDP) of country i at time t; λ_i is the country-specific effect. The relationship between investment and saving is captured by the saving-retention rate, β. Under the assumption of low capital mobility, saving and investment tend to be strongly cointegrated with β being close to unity, and u_{it} follows a stationary process. Under the assumption of high capital mobility, saving and investment tend to be either weakly cointegrated with β being significantly below unity, or not cointegrated at all with u_{it} follows a unit root process. [2]

[2] Using panel data estimation has some advantages over using cross-sectional regression. Sinn (1992) raises the concern that averaging the data over time may create an upward bias in the estimates of the saving-investment correlation β. Coakley et al. (1996) also suggest that FH (1980)'s cross-section regression actually reflects the average long run coefficient which tends to unity as a result of the solvency constraint, irrespective of the degree of capital mobility.

In this paper, we adapt equation (1) to study capital mobility in China; the subscript i indicates province or region i instead. It is important in this context to recognize that Chinese provinces are often subject to common policy shocks from the central government and other nationwide shocks that may not have the same impact across them.[3] Moreover, provinces are also subject to idiosyncratic shocks that arise from province- or region-specific policies.[4] The existence of factors and shocks affecting different provinces simultaneously and differently renders the panel unit root tests of u_{it} derived under the cross-sectional independence assumption invalid for our study.[5]

While there are several panel unit root tests that account for cross-sectional dependence, we use Chang's method (2004) for several reasons. First, it has a general structure that incorporates both contemporaneous cross-sectional correlation and heterogeneous serial correlation structure. This will help to account for both the common shocks and the idiosyncratic shocks. Second, Chang (2004) proves that by using sieve bootstrap in a proper way, the test statistics have nice property in infinitely large sample.[6] Third and the most relevant for our application is the finite sample property. The bootstrap test statistics are reasonably sized even when the number of time series observations is small.

The cointegrating parameter β are estimated using two estimation methods: the panel dynamic OLS (PDOLS) of Mark and Sul (2003) and the canonical cointegrating regressions

[3] The most common policy shock to the provinces is the interest rate change by the People's Bank of China.

[4] Region-specific policies include the "Open Door" policy implemented in the coastal cities during the 1980s and 1990s, the "Develop the West" program in 2000, and the "Rising-Up of the Middle" program in 2003. Natural disasters also constitute idiosyncratic shocks to various provinces.

[5] Two popular panel unit root tests under the assumption of cross sectional independence are LL test (Levin et al., 2002) and IPS test (Im et al., 2003). If this assumption is violated, the test statistics are no longer normally distributed under the null hypothesis of unit root.

[6] Prior works that also use bootstrap to circumvent nuisance parameter problem arising from cross-sectional dependence include, for example, O'Connell (1998), Maddala and Wu (1999), Wu and Wu (2001). However, Chang (2004) is the first to provide detailed proof of the properties of the test statistics derived in the paper.

(CCR) of Park (1992). The first method assumes homogeneous β across regions while the second method allows for heterogeneous β.[7] After estimating the cointegrating vector, we apply Chang's (2004) panel unit root test to the corresponding residuals to test whether the investment rate (IR_{it}) and the saving rate (SR_{it}) are cointegrated[8].

3. Data

This paper uses a balanced-panel dataset that covers 26 province-level administrative areas (provinces for short) during 1978-2006. The data of total investment, GDP, as well as government expenditure and revenue are taken from the China Economic Information Database (CEIC) and the China Statistical Yearbook.[9] To examine regional differences in capital mobility, we group the provinces into nine regions and estimate β for each region. The grouping is based on their geographic vicinity, level of economic development, and the Chinese central government's regional groupings. These nine regions are (i) Beijing, Tianjin, Hebei, (ii) Shanxi, Shandong, (iii) Guangdong, Hainan, Fujian, (iv) Shanghai, Jiangsu, Zhejiang, (v) Hubei, Hunan, (vi) Guangxi, Guizhou, Yunan, (vii) Liaoning, Jilin, Heilongjiang, (viii) Anhui, Henan, and (ix) Shaanxi, Gansu, Qinghai, Xinjiang, Inner Mongolia.

To account for possible changes in the degree of capital mobility over time, we repeat the estimation for two sub-periods: 1978-1992 and 1993-2006. The year 1993 is chosen as the splitting point as it marks several important policy changes. China's legislative body in 1992 confirmed the legal status of private enterprises and the central government promised to continue

[7] We also estimate the homogenous saving-investment cointegrating parameter by OLS and heterogeneous saving-investment cointegrating parameter by dynamic seemingly unrelated regression (DSUR) developed by Mark, Ogaki, and Sul (2005). These results are qualitatively similar and therefore not presented. They are available upon request.
[8] Chang (2006) proves that, given a consistent estimate of the error terms in a panel cointegration setting, the subsequent sieve bootstrap unit root test statistics will retain the nice properties exhibited in Chang (2004).
[9] There are thirty-one provincial-level administrative areas in Mainland China, among which five have missing data. As this paper needs to employ a balanced panel sample, twenty-six provinces are retained in the final sample.

fostering a market-oriented economy in which various kinds of business ownership are treated equally. In 1993, China also began to prepare itself for the exchange rate reform that was implemented in 1994. Lastly, splitting the full sample at the year 1993 yields two sub samples with similar size that make it easier to gauge and compare the degree of capital mobility over time.

We also disaggregate the full data series into the government and private components. This decomposition is important because it makes it possible to see whether domestic investment is equally responsive to all types of saving. Thomas (1993) and Dekle (1996) find that including the government component in the domestic investment and saving tends to reduce the estimated value of the saving retention rate β and consequently overestimates the degree of capital mobility due to active governmental allocation of funds across regions. As China is gradually transforming itself from a centrally-planned economy into a market-oriented one, we are interested in the role of the government in influencing the domestic capital mobility.

The private and government saving are calculated based on the following relation:

$$S \equiv GDP - C_p - G = (GDP - T - C_p) + (T - G) = S_p + S_g, \tag{3}$$

where S, S_p, and S_g denote the provincial-level total, private, and government savings respectively. T and G refer to the provincial government taxation and purchase, proxied by the government revenue and expenditure. In gathering the provincial level data, it is important to take into account the effects of central government's policies. For example, one such important policy is the 1994 tax reform. Since the form, the central government redistributes part of the tax revenue submitted by the local governments to various provinces through an inter-governmental transfer system. If the central government's transfers are ignored, the provincial government's

revenue and expenditure will be incorrectly measured. This in turn affects the measures of the saving and investment of the government and private sectors. Figure 1 depicts the sum of the provincial budget balances with and without the adjustment. The large discrepancy between the two indicates the importance of the adjustment. Without adjusting for the transfers, the data indicates that the local governments run a rising deficit since 1994. With the adjustment, the provincial government budget is roughly balanced throughout the sample period.

Total investment consists of fixed capital formation and changes in inventories. Since the China Statistical Yearbook at both the national and provincial levels does not directly report the provincial government investment, we take the difference between the provincial government expenditure and government consumption ($G - C_g$) as a proxy of the provincial government investment. It is then subtracted from the total investment to obtain the private investment series.

4. Results

Table 1 presents Chang (2004)'s unit root test results for the saving and investment rates of both the total and private component. The four bootstrap statistics (F_{OLS}, F_{GLS}, K_{OLS}, and K_{GLS}) together with the corresponding *p*-values test the null hypothesis of I(1) in a dependent panel. The F_{OLS} and K_{OLS} test statistics are based on the system OLS estimator of the autoregressive coefficients, and F_{GLS} and K_{GLS} test statistics are based on the system GLS estimator of the same parameters. The *F*-type tests are two-sided tests for testing the null hypothesis of unit root for all region *i* against the alternative hypothesis that at least some regions are stationary. These are two-sided test as the alternative hypothesis contains both the stationary and explosive cases. However, since this reduces the power of the tests, Chang (2004, 2006) also develops the *K*-statistics which are one-sided tests.

The F_{OLS} statistic for the total investment rate is 17.014 with a p-value of 1.000, which indicates that the null hypothesis of $I(1)$ cannot be rejected. None of the test statistics F_{OLS}, F_{GLS}, K_{OLS}, and K_{GLS} for the other series are significant at conventional significance levels, suggesting that they are all unit root processes.

The cointegrating relationship between saving and investment is estimated by the panel dynamic OLS (PDOLS) method (Mark and Sul, 2003) and the results are reported in Table 2. Columns (1)-(3) show the estimated homogeneous β^{PDOLS} for the total (government plus private) series whereas Columns (4)-(6) show the counterpart for the private component. When data from the whole sample period of 1978-2006 is used, all four bootstrap test statistics (F_{OLS}, F_{GLS}, K_{OLS}, K_{GLS}) on the residuals reject the null hypothesis of unit root at the 1% significance level. These results indicate that the total investment and saving rates are cointegrated with an estimated saving retention rate β of 0.607 which is also statistically different from zero based on both the parametric and non-parametric standard errors. However, there seems to be a significant change from the first sub-period of 1978-1992 to the second sub-period of 1993-2006. The saving-retention rate falls from 0.448 to 0.020 and it is no longer statistically significant in the latter period. A similar pattern is observed for the private saving and investment. The private saving retention rate is close to unity and is statistically significant in the whole sample (0.968). It decreases from 0.883 in the first sub-period to 0.213 in the second sub-period and becomes statistically insignificant. The corresponding values for Britain using data in 1971-1987 (Thomas, 1993) and for Japan using data in 1975-1988 (Dekle, 1996) are 0.33 and 0.13 respectively. These estimates indicate that the capital market in China during the 1990s and 2000s was more integrated than that in Britain during the 1970s and 1980s and was less integrated than that in Japan during the second half of 1970s and the whole 1980s.

The saving-retention rate is lower for the total series than for the private component, implying that government's fiscal redistributive activities relax the tie between private saving and investment. Thomas (1993) finds similar evidence for the cross-regional capital mobility in Great Britain.[10] Boyreau-Debray and Wei (2005) suggest that there is active resource allocation by the Chinese central government in that funds are redistributed from the more developed to the less developed regions.

Our results also suggest that there is significant improvement in the private capital mobility over time. Rolling window estimation of the saving retention rate with a window length of 15 years shows that the rate falls drastically starting from 2002, indicating that the total and private funds flow more freely afterwards. The rolling window results are plotted in Figure 2. The solid line represents the private saving-retention rate and its value is consistently greater than that of the total series which is represented by the dashed line. The improvement could be due to the banking reform in 2000 and the liberalization commitments required by the WTO accession in 2001. The plot reveals that most of the improvement in total capital mobility is driven by greater mobility in private capital. Our results are different from those of Boyreau-Debray and Wei (2005) which indicate that there is no evidence of improvement in the degree of capital market integration in China. The discrepancy can arise from the different estimation methods and the central government's fiscal redistributive policies that are accounted for in our paper.

To take into account heterogeneity in capital mobility across regions, we estimate the saving-retention rate for each of the 9 regions using Park's CCR method. The results are shown in Table 3. There are significant differences among the 9 regions, particularly between the more developed regions (the first four regions in Table 3) and the less developed ones (the last five

[10] Our finding contrasts that of the cross-country study of Bayoumi (1990) which shows that private capital is more mobile than total capital. He argues that the current account targeting of the governments offsets cross-country private capital flows and tightens the positive relationship between private saving and investment.

regions). In the full sample, the private saving-retention rate is mediocre at the value of 0.519 for the region consisting of Guangdong, Hainan and Fujian and is very high at the value of 1.874 for the region consisting of Hubei and Hunan.

For the more developed regions, the saving retention rate falls sharply from the first to the second sub-period. The estimate for the private capital mobility of the region consisting of Shanxi and Shandong is 0.888 in the first sub-period and is significant at the 1% level. It decreases to 0.276 and is no longer statistically different from zero in the second sub-period. Similar pattern is observed for the other three developed regions, including the region consisting of Beijing, Tianjing and Hebei, the region consisting of Shanghai, Jiangsu and Zhejiang, and the region consisting of Guangdong, Hainan and Fujian, except that the saving-retention rate for the last region is significant at the 10% and 1% level respectively for the private and total data. Figure 3 plots the rolling PDOLS estimates of the total and private saving-investment correlation of these four developed regions. Private capital mobility improves right after 1992, the beginning of our rolling estimation time window. In the 2000s, the private capital market among these four regions has a comparable level of integration as that in Canada during 1961-1987 and in Germany during 1970-1987, based on the results reported in Thomas (1993). The gap between the private and total capital mobility narrows over time until the early 2000s, after which most of the improvement in the total capita mobility is attributed to the greater mobility in the private capital.

Comparing Figure 3 and Figure 4 indicates that the gap between private and total capital mobility for the less developed regions is greater than that for the more developed regions. Less-developed regions tend to receive larger transfers (as a share of their GDP) from the central government and have higher public investment rate, which results in a sizable difference between

the private and total saving-investment correlations. Central government's fiscal redistributive policies tend to induce greater capital mobility for these regions. Figure 4 indicates that both the private and total capital mobility in the five less developed regions do not exhibit any improvement until the early 2000s. The private saving retention rate begins to decrease in 2002 while the total saving-retention rate does so in 2004. The gap between the two essentially disappears after 2004. Overall, the private capital market in the less developed regions appears to be more integrated in the 2000s than in the 1990s although the improvement is less pronounced than that in the more developed regions.

5. Conclusion

Our results have important policy implications. There is now a consensus among many policy makers and academic researchers that there is a need to shift the domestic demand structure in China toward a consumption-driven growth model. Many international investors are concerned that excessive fixed-asset investment, particularly that under the discretion of local governments, is leading to production overcapacity, asset price bubbles, and unsustainable build-up of local government debts. All of which may have destabilizing effect on economic growth. Mobile capital represents an important vehicle in which borrowing for consumption can be promoted. Increasing domestic demand driven mainly by consumption can also lessen reliance on exports, thereby contributing to global-rebalancing. In addition, given that there are limited set of financial instruments being traded in China, capital mobility is a key mechanism that can facilitate risk-sharing among the Chinese provinces.

We find evidence of increasing private capital mobility within China over 1978-2006. It should improve borrowing and consumption risk sharing in the private sector across Chinese

provinces. Our results also show that there are significant regional differences in the level of private capital market integration. Private capital mobility in the more developed regions shows persistent and significant improvement since at least early 1990s and in the early 2000s becomes comparable to that in some developed countries in the 1970s and 1980s. In the less developed regions, government public investment and transfers seems to promote overall capital mobility. Private capital mobility in these regions only improves in the 2000s and appears to be below the level achieved in the more developed regions. China's earlier reform efforts were favorable to the export-oriented coastal regions, resulting in rapid development along these areas and widening economic gap across regions. Such a gap represents a serious obstacle to the objective of promoting a more balanced and domestic-driven growth. Government policies since 2000 aimed at moving production to western and central regions may have fostered capital market integration in these areas although there are other possible contributing factors such as the banking reform in 2000 and WTO accession in 2001. It highlights the importance of continued efforts to promote capital mobility in order to rebalance the economic development landscape in China.

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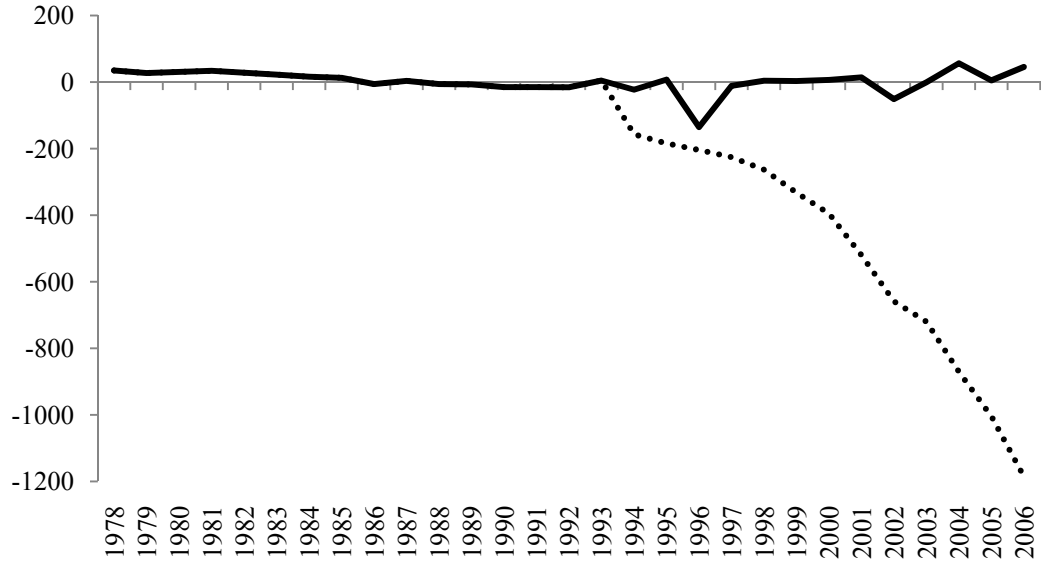

Figure 1. The aggregate of provincial budget balances (in billion yuan)

The solid line represents the value after adjusting for inter-governmental transfers; the dotted line represents the value without adjustment.

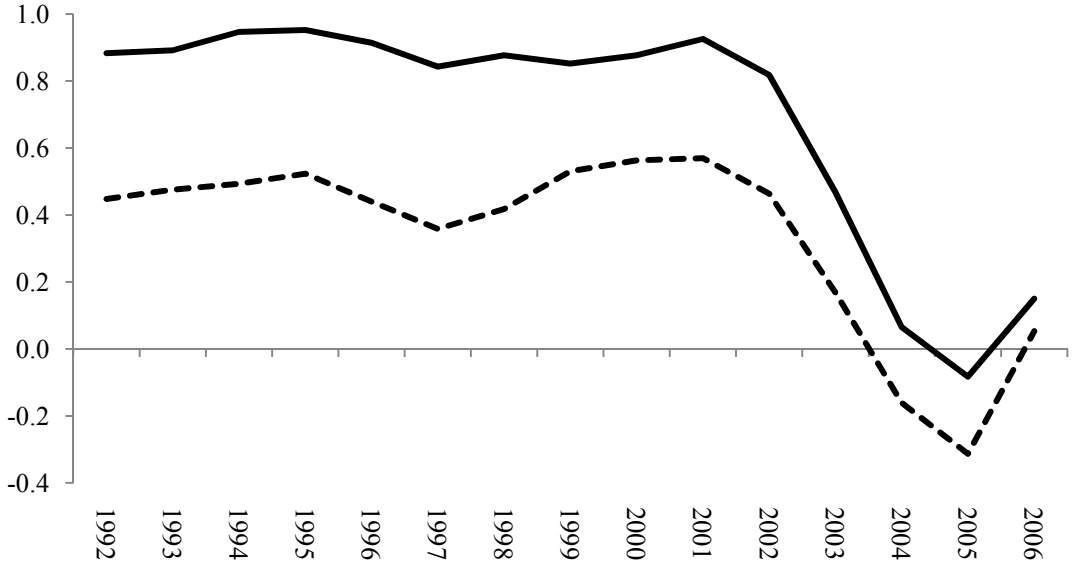

Figure 2. Rolling panel dynamic OLS (PDOLS) estimates of the saving-retention rates

The dashed line represents the estimate of β for the total saving and investment rate whereas the solid line represents the estimate of β for the private saving and investment rate.

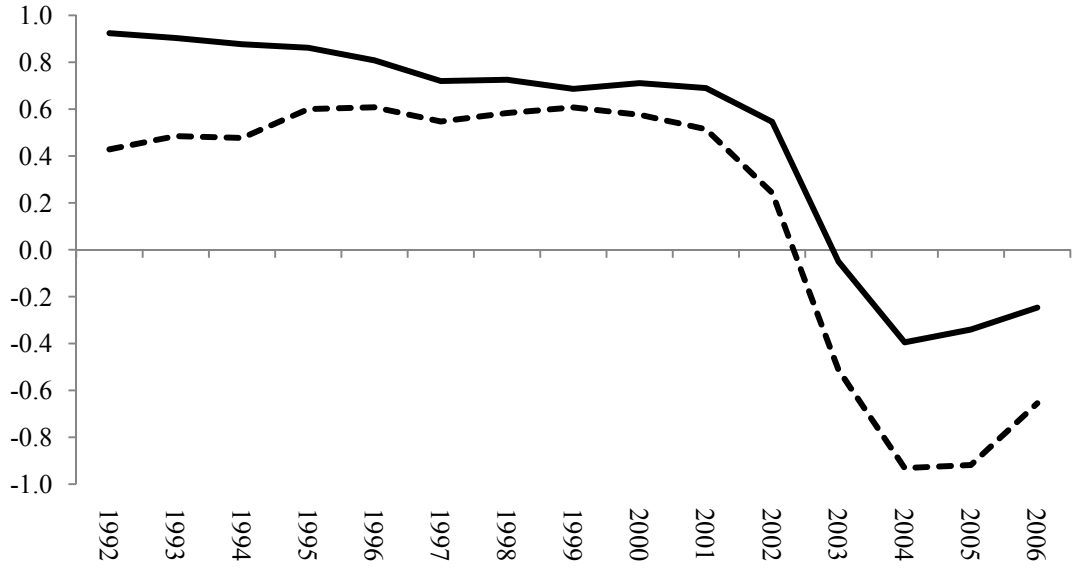

Figure 3. Rolling panel dynamic OLS (PDOLS) estimates of the saving-retention rates for the more developed regions

The dashed line represents the estimate of β for the total saving and investment rate whereas the solid line represents the estimate of β for the private saving and investment rate.

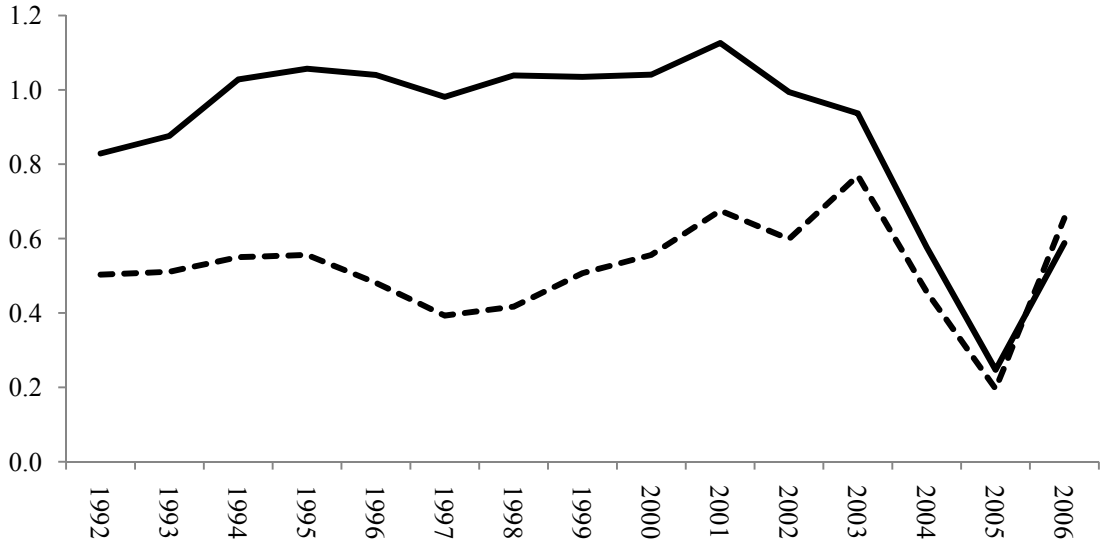

Figure 4. Rolling panel dynamic OLS (PDOLS) estimates of the saving-retention rates for the less developed regions

The dashed line represents the estimate of β for the total saving and investment rate whereas the solid line represents the estimate of β for the private saving and investment rate.

Table 1: Bootstrap panel unit root test

	F_{OLS}	F_{GLS}	K_{OLS}	K_{GLS}
Total investment rate	17.014	62.448	11.962	62.448
	(1.000)	(1.000)	(0.904)	(0.986)
Private investment rate	21.562	74.992	18.329	73.641
	(0.998)	(1.000)	(0.821)	(0.998)
Total saving rate	28.856	104.425	10.249	33.033
	(0.985)	(1.000)	(0.961)	(1.000)
Private saving rate	29.150	19.924	1.997	27.008
	(0.973)	(1.000)	(0.999)	(0.999)

Notes: F_{OLS}, F_{GLS}, K_{OLS}, and K_{GLS} are the bootstrap statistics of Chang (2004). They test the null hypothesis that the data series is integrated of order 1. P values are in parentheses.

Table 2: Panel dynamic OLS regression of $IR_{it} = \lambda_i + \beta\, SR_{it} + u_{it}$

	Total			Private		
	1978-2006	1978-1992	1993-2006	1978-2006	1978-1992	1993-2006
	(1)	(2)	(3)	(4)	(5)	(6)
β^{PDOLS}	0.607	0.448	0.020	0.968	0.883	0.213
[Parametric standard error]	[0.090]	[0.341]	[1.118]	[0.118]	[0.245]	[0.865]
[Non-parametric standard error]	[0.081]	[0.136]	[0.239]	[0.095]	[0.107]	[0.220]
F_{OLS}	26.365***	19.521**	19.093	34.466**	17.222	20.916*
(p-value)	(0.003)	(0.015)	(0.140)	(0.013)	(0.519)	(0.080)
F_{GLS}	34.484***	45.352***	38.051***	29.707***	19.163*	19.770**
(p-value)	(0.010)	(0.000)	(0.000)	(0.010)	(0.058)	(0.013)
K_{OLS}	26.365***	19.521***	19.093*	34.466***	17.222	20.916**
(p-value)	(0.000)	(0.003)	(0.073)	(0.008)	(0.380)	(0.016)
K_{GLS}	34.484***	45.352***	38.051***	29.707***	19.163*	19.770**
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.058)	(0.043)

Notes: *, **, and *** denote significance at 10%, 5%, and 1% level, respectively.
The homogenous saving-investment parameter is estimated by the panel dynamic OLS method of Mark and Sul (2003). F_{OLS}, F_{GLS}, K_{OLS}, and K_{GLS} are the bootstrap statistics of Chang (2004). They test the null hypothesis that the residuals of the cointegrating equation follow a unit root process. Rejection of the null hypothesis implies that the investment and saving rates series are cointegrated.

Table 3: Cointegrating parameter β_i^{CCR} of the canonical cointegrating regression $IR_{it} = \lambda_i + \beta_i SR_{it} + u_{it}$

	Total			Private		
	1978-2006 (1)	1978-1992 (2)	1993-2006 (3)	1978-2006 (4)	1978-1992 (5)	1993-2006 (6)
Beijing, Tianjin, Hebei	1.443	-2.669**	-0.557	0.968***	1.533***	-0.161
	(0.239)	(0.070)	(0.292)	(0.000)	(0.000)	(0.376)
Shanxi, Shandong	0.738***	0.842***	0.263	0.875***	0.888***	0.276
	(0.000)	(0.000)	(0.651)	(0.000)	(0.000)	(0.669)
Guangdong, Hainan, Fujian	0.338***	0.588***	-0.636***	0.519***	0.614***	-0.172*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.070)
Shanghai, Jiangsu, Zhejiang	0.653	-1.951***	0.491	0.947***	1.131***	-1.266
	(0.582)	(0.000)	(0.666)	(0.000)	(0.000)	(0.335)
Hubei, Hunan	1.541***	2.187*	0.914**	1.874***	2.469***	0.498
	(0.000)	(0.083)	(0.027)	(0.000)	(0.000)	(0.381)
Guangxi, Guizhou, Yunan	0.741***	-0.098	1.722***	1.702**	0.625***	0.662
	(0.000)	(0.431)	(0.007)	(0.018)	(0.003)	(0.303)
Anhui, Henan	0.728***	0.694***	2.028***	0.906***	0.727***	2.112***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Liaoning, Jilin, Heilongjiang	0.839**	3.212***	6.320***	1.124***	0.744***	3.402***
	(0.042)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Shaanxi, Gansu, Qinghai, Xinjiang, Inner Mongolia	0.474***	0.251**	2.322***	1.125***	1.139***	1.610***
	(0.000)	(0.032)	(0.000)	(0.000)	(0.000)	(0.000)
F_{OLS}	28.168**	16.605	18.251**	36.210***	23.033	22.887***
(p-value)	(0.010)	(0.173)	(0.037)	(0.002)	(0.108)	(0.000)
F_{GLS}	43.932***	26.309***	30.616***	41.244***	34.250***	25.708***
(p-value)	(0.000)	(0.001)	(0.000)	(0.000)	(0.002)	(0.000)
K_{OLS}	28.168***	16.605**	18.251***	36.210***	23.033**	22.887***
(p-value)	(0.000)	(0.029)	(0.000)	(0.000)	(0.048)	(0.005)
K_{GLS}	43.932***	26.309***	30.616***	41.244***	34.250***	25.708***
(p-value)	(0.000)	(0.002)	(0.001)	(0.000)	(0.0021)	(0.001)

Notes: *, **, and *** denote significance at 10%, 5%, and 1% level, respectively. P-values are in parentheses.
The heterogeneous saving-investment cointegrating parameters are estimated by the CCR approach of Park (1992). F_{OLS}, F_{GLS}, K_{OLS}, and K_{GLS} are the bootstrap statistics of Chang (2004). They test the null hypothesis that the residuals of the cointegrating equation follow a unit root process. Rejection of the null hypothesis implies that the investment and saving rates series are cointegrated.