

Can China Grow Faster?

A Diagnosis on the Fragmentation of the Domestic Capital Market

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Abstract

This paper looks at the financial side of the Chinese economic development. Segmentation of internal capital market may be a serious drawback of the Chinese financial system (on top of the bad loans problem in its banking sector) but has not received much research attention. This paper fills this void by employing two standard tools from the international finance field to analyze internal financial integration across 28 Chinese provinces over the 1978-2000 period. The first test, proposed by Feldstein and Horioka (1980) and modified in the subsequent literature, examines the correlation between local investments and local savings. The second test, drawn from the risk-sharing literature, uses consumption data to evaluate financial integration. Both tests confirm a similar (and somewhat surprising) picture: capital mobility within China is low! More precisely, it is much lower than within financially integrated countries such as Japan or the United States. In fact, the degree of inter-provincial capital mobility within China is similar to the level observed across national borders among the OECD countries. Furthermore, we find that the degree of internal financial integration appears to have decreased significantly, rather than increased, in the 1990s relative to the earlier period. Finally, we document that the government (as opposed to the private sector) tends to systematically re-allocate capital from more productive regions to less productive ones. In this sense, a smaller role of the government in the financial sector might increase the growth rate of the economy.

Key Words: Chinese economy, internal capital market, financial integration, Feldstein-Horioka, risk sharing.

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1. Introduction

This paper looks at the financial side of the Chinese economic development. The bad loans problem in the Chinese banking sector has received a lot of attention, with some authors arguing it to be a time-bomb for its financial system and for its economy if not treated in a systematic and timely manner (e.g., Lardy, 2001). However, another potential drawback of the Chinese financial system is the possibility of regional segmentation of its capital market that may have prevented capital and savings to be used in the most efficient areas. There are a series of basic inter-related questions that need to be addressed. How integrated is the internal capital market in China? How common is it for savings generated in one part of the country to be channeled to another area? How has capital mobility evolved over time? Does capital flow to more productive regions? These questions are of great importance. In contrast to the question on bad loans problem, the capital market segmentation within China has not received a formal investigation¹.

This paper aims to fill this void. It studies the degree of internal capital market segmentation in China by applying two standard tools used in the international finance literature. The first tool is the Feldstein and Horioka (1980) (FH) test, which examines the correlation between investment and saving. The idea behind the FH test is that under the null hypothesis of a perfectly integrated capital market, investment in one region should not be constrained by the local available savings in that region. Hence, the correlation between local savings and local investment should not be high. The FH test has been modified over time. We implement both the original version of the FH test as well as the modified version proposed in the literature.

The second approach uses consumption-based tests from the risk sharing literature to evaluate the degree of financial integration (Obstfeld, 1994). The idea is that under the hypothesis of perfect capital mobility and asset market completeness, households should be able to smooth consumption over time and across space by transacting in capital markets. As a result, consumption volatility should be smaller than income volatility and consumption growth rates should be more correlated across regions than income growth rates.

A brief review of other related literature is in order here. As said before, there is very few papers that that examines the issue of intra-national capital market segmentation in China. However, there is a literature that looks into the economic federalism in China, another one that looks into the segmentation of the goods market in China, and another one that looks into restrictions on labor migration. According to Qian and Xu (1993), China can be described as a *de facto* federalism, involving a decentralized economic system in which each region can be considered as autonomous economic entity. Qian and Xu argued that this decentralized system has contributed to the vitality of the Chinese economy. Does this *de facto* federalism lead to a highly competitive, nationally integrated goods market or a collection of highly protected and locally fragmented markets? Views differ. Young (2001) reported evidence that there is an

insufficient amount of regional specialization in goods production; production structure appears to be too similar across different parts of China relative to the prior one may have for an integrated country. On the other hand, Huang and Wei (2001) examined the speed of convergence towards the law of one price for identical products in different cities in China during the 1990s and found that the speed of convergence is in fact comparable to what Parsley and Wei (1996) or O'Connell and Wei (2002) found for the United States. In other words, judging from the speed of convergence to the law of one price, the degree of goods market integration in China in the 1990s is probably comparable to the U.S. which, of course, has a highly integrated domestic goods market².

The current paper, by studying possible segmentation of the internal capital market in China, complements the literature on the segmentation of the goods market inside China. It also provides an assessment of how efficient the capital market is in allocating capital flows to more productive regions: if capital is mobile and driven by profit-incentives, it should flow spontaneously to the most productive areas. We document that the government (as opposed to the private sector) tends to re-allocate capital from more productive regions to less productive ones. In this sense, a smaller role of the government in the financial sector might increase the growth rate of the economy.

The rest of the paper is organized in the following way. First, section 2 characterizes the channels for capital mobility within China. Section 3 conducts a series of tests regarding correlation between local investments and savings. Section 4 studies the degree of consumption risk-sharing across the country and its evolution. Section 5 present a more direct examination of how investment in China is allocated across different regions. Section 6 offers concluding thoughts. An appendix describes the data.

2. Institutional background on Capital Mobility in China

There are three main channels to transfer capital within a country from one region to another. The first is cross-regional domestic investment by firms and government. The second is cross-regional lending by the banking system and the third is cross-regional capital financing from the bond and stock market.

2.1. Cross-regional investment by firms and government

¹ While the question of financial integration has not been studied, the question of the efficiency of capital allocation in China has been analyzed by Park and Seht (2000), Cull, Shen and Xu, (2002), Cull and Xu (2000).

² Using data from provincial level input-output tables, Naughton (2000) documented an increase in the inter-provincial shipment of goods in the 1990s relative to their GDP; suggesting that goods market integration is likely have increased. On the other hand, using similar data but embedding it in a gravity-model specification, Poncet (2001) showed that the level of intra-provincial trade in China appears too high relative to the model prediction; suggesting the presence of barriers to goods trade at the province-level.

How easy is it for a firm in one part of China to invest in another part of the country? At first glance, nationwide regulations and tax system are fairly neutral for a firm choosing to invest elsewhere. However, there are important regional barriers and special fiscal incentives that distort the national capital market. Local governments are reluctant to see capital flowing out their jurisdiction because it will entails fiscal losses. Another reason is that local governments may loose good performing enterprises with welfare and job losses³. As a result, most mergers and acquisitions have been trans-industrial within a province rather than trans-provincial or trans-national because of resistance across all levels of the bureaucracy. Also, special tax incentives in the numerous special investment zones create significant distortions in the relative attractiveness of investing in one or another part of the country.⁴ Hence, market-driven capital mobility through cross-regional investment by enterprise is likely to be limited by provincialism and local government resistance to capital outflows.

By contrast, policy-driven capital mobility initiated by central government investment policy has been active for redistributing resources from one region to another: The share of investment financed by the state was as high as 28% in 1981 and of 7 % in 2001, and the share of investment under central responsibility was of 45 in 1980 and of 31% in 2001.⁵ Hence it is likely that policy-driven capital mobility may be important relative to market driven capital movements and that its importance has decreased over time.

2.2. Cross-regional lending by the banking sector⁶

There are three main channels for transferring financial resources within the banking system from one region to another: fund reallocation among regional branches of national banks (within-bank transfer); the interbank market (between-bank transfer)⁷; and central bank lending to the regions.

³ For a description of local government interference in enterprise mergers, see the excellent institutional review of China's capital market developments in China since 1949 (Yi Gang, 2003).

⁴ As part of China's open door policy, special areas with special tax incentives (mainly under the form of lower enterprise tax) were created. Tax exemptions were aimed primarily at attracting foreign investment. Domestic enterprises often benefit from these fiscal incentives, either automatically or on a discretionary basis.

⁵ More recently, the government has initiated a new policy focusing on the development of the western region as an attempt to re-equilibrate China's regional development which previously had been overwhelmingly favorable to the coastal region. This new policy launched in 2000 has two main components: the development of infrastructure with the central government investing in the region and the extension of fiscal incentives to the western provinces.

⁶ China's banking system is composed of the People's Bank of China – China's central bank; four state-owned commercial banks, established in the early 1980s; three policy banks set up in 1994, ten national joint-stock commercial banks; around 90 regional commercial banks, and about 3,000 urban and 42,000 rural credit cooperatives. Foreign banks have branches or representative offices, but their activities are still limited. The four state-owned commercial banks - dominate the market⁶. As of late 2001, they accounted for 63.1% of loans outstanding and 61.5 % of deposits. They also dominate in terms of branches and employees: nearly 2 million people are employed in about 103,000 branches across China.

⁷ Park and Sehart, 2000.

The government had been traditionally using a system of credit ceilings for controlling the money supply. Under this system, within and between-bank transfers were limited. Quotas were imposed on bank lending for each bank and in turn broken down by region. Interbank lending and borrowing have however contributed to capital mobility to a certain extent.⁸

Within and between-bank transfers are likely to have increased as bank were given more autonomy in the 1990s. First, banks were gradually allowed to allocate their national credit ceilings among regional branches.⁹ Second, in 1995, banks became responsible for their losses while four development banks were created to take over the charge of the policy loans from each of the corresponding state banks.¹⁰ The objective was to relieve state-owned commercial banks of their policy activities and to improve their managerial incentives in order to induce their management to be fully profit driven. Hence within bank-transfer is likely to have increased over the 1990s in accordance with greater autonomy granted to the banking system. Third, in January 1996, a national unified interbank market was created and in June, interbank interest rates were liberalized. The existence of a unified national interbank market with free interest rates facilitates capital mobility. At the same time, non-authorized capital movements, particularly those initiated by local branches, have been prohibited. Hence the net effect of between-bank transfer on capital mobility is uncertain.

Central bank lending has been an important policy instrument for allocating resources over the credit plan period. The central bank was engaged in a massive redistribution of bank deposits to support the credit plan and policy lending objectives.¹¹ The vast majority of PBC relending was channeled through PBC local branches. These local branches were heavily under the influence of the local authorities and therefore keen to increase the central bank relending inside the jurisdiction. As a result, credit targets were often exceeded at the national level and had to be

⁸ Local interbank markets were permitted between 1986 and 1993. Bank branches were able to lend funds to branches in other provinces. However, it also became a mean for balancing the surplus and shortage of medium and long term funds. For instance, coastal open areas borrowed from inland areas large sums of money for long term financing purpose to make up for local fund shortage (Xie Duo, 2002). It also became a mean for state banks to circumvent credit quota and lend to non-banking financial institutions for speculative purposes (investment in securities and real estate industry), and thereby fueling inflation. Hence, as part of the retrenchment policy implemented in 1993, interbank trading was suspended, with the exception of trading center run by PBC branches in 35 cities.

⁹ Starting in 1994, credit ceilings applied only to state banks and more importantly, these ceilings were no longer administratively determined, but based on a maximum ratio between loans and deposits that applied only to total national lending by individual state banks (all branches if a national bank are counted together). In January 1998, the annual credit quota system was officially abolished. The central bank now relies mostly on tools such as manipulation of interest rates, required bank reserves and asset-liability ratios, credit assessments, discount rates and, increasingly, open-market operations to control the money supply.

¹⁰ New commercial bank law enacted in 1995.

¹¹ The People's Bank China became in 1984 the central bank of China responsible for designing and conducting monetary policy. Lardy 1998 defines "excess lending" as measured by the amount of loans extended above and beyond the amount that would have been extended if the loan to deposit ratio was equal to the national average. According to this measure, excess lending was as much as 8 percent of provincial gross domestic product in Heilongjiang in 1993 and the "under lending" in Guangdong averaged 7.5% of provincial GDP in a five year period.

financed by central bank extra-lending. To keep hard money creation under control, central bank lending was recentralized through first the limitation of PBC lending to bank headquarter only and second the replacement of provincial by regional branches of the central bank.¹² As a consequence, the role of central bank lending in capital reallocation is likely to have been limited following the reforms.

2.3 Cross-regional issuance of capital from the stock and bond markets

Finally, the third channel of capital mobility is the stock and bond markets. Although banks dominate the financial sector, there are recent signs of a shift towards more market-based financial transactions. Table 1 reports the changes in financial assets and liabilities of each institutional sector in China and between those sectors and the rest of the world in 2000¹³. On average, 67% of total financial transactions are conducted through the banking system (loans and deposits). By contrast, only 5% of financial flows are going through the market (bond and stock exchange). However, even if loans still represent more than half of the non-financial corporations financing, indirect finance – mainly by share issuance – is becoming a significant source of financing, representing 14% of total financing sources in 2000. In 1997, this share was marginal, of 1% of total financing sources. Similarly, between 1997 and 2000, there is a shift of household assets from saving deposits to both foreign exchange deposits and securities. Households invest in 2000 20% of their financial assets under the form of securities (14% in stock, 6% in bonds), compared to 14% in 3 years earlier. The government also relies more on bond issuance (84% of total sourcing of finance compared to 78.9% in 1997). Finally, financial institutions have also increased their portfolios share of securities. These shifts in financial portfolios suggest a tendency of capital market to evolve toward a more market-based system in which direct financing through stocks and bonds playing an incrementally more important role. In principle they are likely to facilitate interregional capital mobility over time, although not sufficiently significant at this moment.

To sum up, on the one-hand, market-driven capital mobility was limited over the 1980s, and is likely to have gained in importance over the 1990s, along with the progress of the market reforms. On the other hand, the government has an important role in allocating capital resources,

¹² In May 1994, local PBC branches were prohibited from relending to state banks in their locality. The PBC instead directed refinancing to the national headquarter of state banks which redistributed them to local branches based on approved plans. Since July 1993, only the central bank's headquarters has been permitted to lend to the head offices of banks. Furthermore, at the end of 1998, the PBC was restructured to reduce further the local influence on lending. Its 31 provincial branches were cut back to nine regional ones, which report directly to PBC headquarters.

¹³ Source: The People 's Bank of China Quarterly Statistical Bulletin, 2002:4. p.78-79. The flow of funds accounts encompass all financial transactions among domestic sectors and between domestic sectors and the rest of the world. The terms “uses” and “sources” reflect the changes in financial assets and financial liabilities of each sector. They are available since 1997 onwards.

either through its investment policy or central bank lending to the provinces. Hence government policy is likely to have a significant impact on capital mobility within China.

3. Are local Investments constrained by local savings ?

3.1 Basic idea

For the purpose of discussion, we start with two hypothetical extreme cases. With zero capital mobility across regions, local savings can only be invested locally, and all local investment has to be financed by local savings. In this case, local investments and local savings should be perfectly correlated. In the other extreme, with perfect capital mobility, savings from any particular locale can go anywhere in search of the best return-risk trade-off. In other words, local savings respond to global opportunities for investment, while local investments are financed by a worldwide pool of capital. There should be no exact relationship between local saving and local investment. While this does not necessarily imply a correlation of zero, the correlation should be substantially below one. This is the fundamental idea of Feldstein and Horioka (1980) who proposed to use the saving-investment correlation as a measure of (lack of) capital market integration.

The Feldstein-Horioka (FH) test was initially proposed as a test of world capital market integration, i.e. as a measure of the degree of capital mobility across countries. In that context, the literature suggests that it does not give conclusive evidence on capital mobility because a low saving-investment correlation can be consistent with various alternatives other than a low degree of capital market integration across countries. These alternatives include the presence of a risk premium associated with currency devaluation, and governments' effort to target the level of current account balance by manipulating the exchange rate. However, within a country, the FH test turns out to be a reasonable indicator on the degree of capital market integration across different regions. The main reason is that the alternative interpretations mentioned above are not operative within a country. If different parts of a country share a common currency, there is no currency devaluation to speak of. Regional governments are also less likely to have a current account target at the regional level¹⁴.

As a reference, Table 2 summarizes the results from five prominent papers in the literature that have examined the intra-national evidence of investment-saving correlations in developed countries. The countries that have been studied are Canada, Germany, Japan, United States and United Kingdom, all of which are known to have an integrated capital market internally. Each of the papers has found non significant or negative saving-investment correlations across the regions. This provides a justification for using the FH test to examine capital market integration within China.

In this section, we first present simple (unconditional) correlations between saving and investment across Chinese provinces and compare them with the corresponding figures from countries with known integrated internal market. We then compute a series of conditional

correlations, following a procedure used by Iwamoto and van Wincoop (2000), that control for a number of factors other than capital market integration that can affect the saving-investment correlation. Because China's capital market is largely dominated by the banking system, we also perform the same tests using banking deposit and loan data. It will tell us to which extent the local banking system has to rely on local deposits to extent new loans.

3.2 Unconditional FH Test

We use a dataset on all Chinese provinces for which data are available to conduct our test. This means 28 provinces (or province-level autonomous regions or super-cities) on the mainland during the reform period (1978-2000), and 24 provinces during the pre-reform period (1952-1977)¹⁵. The database comes from A11 China Marketing Research (2001) and consists of provincial GDP desegregated into household and government consumption, gross capital formation, change in inventory and net exports. Provincial savings are defined as regional GDP minus private and government consumption. Provincial investment is defined as the change in gross capital formation both of the private and public sectors. Both saving and investment are expressed as a ratio of provincial GDP¹⁶.

Table 3 reports the correlations of investment and saving rates in the Chinese provinces averaged over the pre-reform period (1952-1977), the reform period (1978-2000) and two sub-periods with the reform period (1978-1989 and 1990-2000). For comparison purposes, Table 3 also reports the corresponding figures for the national economies of OECD countries¹⁷.

The averaged correlation between local investments and savings are 0.53 during the pre-reform period (1952-1977) and 0.49 during the reform period (1978-2000). By comparison, correlations between investment and saving rates *within* OECD countries such as Japan or the United States where a high degree of capital mobility can be assumed are either insignificantly different from zero or even negative (Table 2). On the opposite extreme, correlations between investment and saving rates across OECD countries are 0.71 between 1960 and 1977 and 0.45 between 1978 and 2000, as reported at the bottom of Table 3. Hence, the intra-national correlation levels found in China are much closer to a between-country level than to a within-country level relative to the evidence based on OECD countries. These comparisons suggest the presence of barriers to capital mobility across the Chinese regions.

We next examine the evolution of the saving-investment correlation over time. The results are reported in columns 3 and 6 of Table 3. These correlations do not vary much before and over the reform period, as shown by the insignificance of the variation. By contrast, the correlation

¹⁴ Note that local protection in the goods market and current account target are not the same thing.

¹⁵ The provinces of Jianxi, Guangdong and Hainan, Sichuan and Chongqing and Ningxia have been excluded for the pre-reform period because of lack of data.

¹⁶ We have tested for the order of integration of the series using panel unit-root tests (Im, Pesaran and Shin, 1997). Both investment and saving rates are stationary.

¹⁷ The data of investment and saving for OECD countries come from the United Nations National Accounts Statistics and are available from 1960 onwards.

sharply increases from 0.30 in the 1980s to 0.52 in the 1990s (column 6, Table 3). This result is somewhat surprising if we believe that the capital market should have become progressively more integrated over time along with the progresses in market reforms and opening-up of the economy.

As already mentioned, simple correlations based on raw data only provide a preliminary measure of financial integration, as factors other than market integration can affect the correlation between investment and saving rates. In the following sub-section, we apply a conditional FH test to the Chinese data that control for these factors.

3.3 Conditional FH test

The conditional FH test that we use follow the strategy proposed by Iwamoto and van Wincoop (2000). Their idea is that if financial markets are integrated, investment depends on factors that determine the global and national supply of funds, factors that determine the productivity of capital, and a set of region-specific factors. Saving in the same country also depends on global and region-specific factors. The global and national factors can be condensed and labeled as g . Those region-specific factors which affect investment and saving can be organized as a set of uncorrelated vectors v , w , z , whereby v and w affect investment, and v and z affect saving. In other words, v is a vector of region-specific factors that affect both investment and saving. w (z) is a vector of factors that affect investment (saving) independently. Investment and saving can be expressed respectively as the following functions: $I = I(g, v, w)$ and $S = S(g, v, z)$. By construction, if researchers do not control for the effects of g and v , then local savings and local investments would be correlated even in the case of a fully integrated financial market.

Iwamoto and van Wincoop implement a method based on this framework to the Japanese prefectures and find that the correlation between local investment and local savings is low once the global, national, and region specific factors are controlled for. As a result, The authors conclude that the degree of financial integration across the Japanese regions is high. We apply their method to the Chinese provinces. First, we control for national shocks by subtracting national saving and investment rates from the province's saving and investment rates:

$$S_{it}^* = S_{it} - S_{-it} \tag{1a}$$

$$I_{it}^* = I_{it} - I_{-it} \tag{1b}$$

where S_{it} and I_{it} are, respectively, the saving and investment rates in province i , S_{-it} is the national saving rate outside province i , and I_{-it} is the national investment rate outside province i ¹⁸.

Second, we control for region-specific shocks for by regressing saving and investment rates for each province separately on region-specific determinants that can affect saving and investment co-movements (equation 2a and 2b):

¹⁸ Some of the provinces constitute a non-trivial fraction of national saving and investment. We therefore use rest of the country instead of national aggregates in order to avoid distorting the correlations upwards.

$$S_{it}^* = \alpha_i + \alpha_y y_{it} + \alpha_F F_{it} + e_{it}^S \quad (2a)$$

$$I_{it}^* = \beta_i + \beta_y y_{it} + \beta_F F_{it} + e_{it}^I \quad (2b)$$

where y measures the stage of local business cycles and F measures regional fiscal policies. The provincial series of business cycles, y , are generated by applying the Hodrick and Prescott (HP) filter to the local GDP series¹⁹. The fiscal variable, F , is the ratio of local government consumption to local GDP. The residuals e_{it}^S and e_{it}^I from equations (2a) and (2b) respectively are in turn used to compute the new correlation between saving and investment.

Table 4 reports the results. The average correlation between investment and saving drops from 0.53 to 0.19 after controlling for national shocks over the pre-reform period and from 0.49 to 0.30 over the reform period (row 2, Table 4). When region-specific factors are also controlled, the correlation decreases further to 0.13 and 0.15 over the pre-reform and reform periods, respectively (row 3, Table 4). The increase in the correlation between the 1980s and the 1990s remains significant even after common national shocks and region-specific (business cycles and fiscal) shocks to local saving and investment are controlled for.

To control for possible endogeneity of the regressors, we introduce the one-year lagged values of the region-specific variables in equations 2a and 2b. As reported in row 4 of Table 4, the use of lagged instead of contemporary values leads to very similar results. Finally, for comparison purposes, columns 7 and 8 report the results found by Iwamoto and van Wincoop respectively for the Japanese prefectures and OECD countries. For the Japanese prefectures, the correlations drop to 0.04 and -0.01 respectively (and are indifferent from zero statistically) once national and regional factors are held constant (column 7). By contrast, the respective figures for OECD countries average 0.44 and 0.28 and remain significantly positive (column 8).

3.4 Capital mobility within the banking sector

Because China's capital market is dominated by banks, performing the FH test using provincial bank deposits and loans may be informative. As described in section 2, within and between bank transfers were limited under the credit plan period and gained progressively in importance over the 1990s along with the banking reforms aimed at granting banks more autonomy and financial responsibility. Therefore, testing for the deposit and loans correlation level of significance may provide another piece of evidence of the degree of capital mobility within China.

Table 5 reports the results of applying the same methodology as above to deposits and loans data in the Chinese provinces as well as in the OECD countries for the purpose of comparison. The uncontrolled correlation is of 0.66 over the 1980s and 0.50 over the 1990s, a level similar to the correlations between OECD countries, of 0.63 and 0.62 respectively over the 1980s and the 1990s. When we control for the national trend, the average correlation drops from 0.66 to 0.30

¹⁹ We use HP(100) filtered $\log(\text{province GDP})$ minus HP(100) filtered $\log(\text{national GDP})$.

over the 1980s, and increases slightly over the 1990s. This suggests that the importance of the national component over the 1980s has decreased over the 1990s. Indeed, the reforms implemented over the 1990s granting the banks more autonomy have at the same time decrease the importance of central planning. For comparison, the global component for OECD countries has little impact on the correlation. Finally, when national and regional factors are controlled, the correlation between deposits and loans increases over time, as shown by the significance of the variation reported in column 3 of Table 5, suggesting a decrease in capital mobility within the banking sector over the 1990s.

Overall, the finding of a positive and significant correlation after controlling for the national factors and region-specific shocks suggests that there are still significant barriers to intra-national capital mobility in China. Hence, even when national and region-specific components are controlled for, the patterns of capital flows within China remain closer to that of *international* capital movements as opposed to *intranational* capital mobility observed within countries with no internal barriers (such as Japan).

4 Is there effective risk-sharing in consumption?

In this section, we turn to examining another aspect of internal financial integration that focuses on the consumption side (as opposed to the investment side discussed in the last section), namely, the extent to which the internal capital market in China allows sufficient risk-sharing in consumption across different regions.

4.1. Basic Idea

According to the risk-sharing theory (see Obstfeld, 1994 for reference), in a fully integrated world, individuals can, by pooling their risk, insure against uncertainty in their resources. Under the assumption of asset market completeness and perfect capital mobility, household changes in consumption should move one for one with aggregate changes in consumption absent of idiosyncratic fluctuations of preferences or measurement error. Furthermore, differences in consumption changes across households should not be correlated with changes in household resources.

Based on this idea, one can construct another measure of capital market integration²⁰. Given that assumptions of perfect capital mobility and market completeness are at odds with reality, one would not expect to find a perfect coherence in the evolution of per capita consumption across countries but rather a weaker correlation. A more reasonable result would be to observe, in the presence of increasing international capital mobility and financial sophistication, an increasing

²⁰ For a survey of the literature on risk-sharing see Crucini and Hess (2000).

coherence of consumption fluctuations and a decreasing volatility of consumption²¹. According to the empirical evidence found in the literature, consumption is more correlated *within* OECD economies, where we know that the level of financial integration is high, than *between* them²². The general conclusion of the intra-national literature is that intra-national risk-sharing is much stronger than international risk-sharing.

This section is organized as follows: we first present an unconditional test of risk-sharing in order to characterize consumption smoothing in the Chinese provinces. We apply thereafter the framework proposed by Obstfeld (1994) that allows testing for risk-sharing by assuming either a complete or an incomplete asset market²³.

4.2. Unconditional Test of Risk-Sharing

Table 6 shows the correlations of provincial per capita consumption growth with the rest of the country per capita consumption growth rate and the correlation of per capita GDP growth with the rest of the country per capita GDP growth rate²⁴. All the data are expressed in real terms using 1978 prices and in log-difference. As in the previous section, correlations across the Chinese provinces are calculated over the pre-reform period (1952-1977), the reform period (1978-2000) and two sub-periods (1978-1989 and 1990-2000). For comparison purpose the corresponding figures for OECD countries are also reported.

Consumption correlations in the Chinese provinces average respectively 0.62 and 0.53 over the pre-reform and reform periods. By comparison, the corresponding figures for OECD countries stand below at 0.35 (Table 6, row 4). Intra-national correlations of consumption found in the empirical literature on risk-sharing are reported in Table 7. Local per capita consumption growth rates are more correlated within China than within OECD economies such as USA (correlation of 0.31 or 0.40) or Japan (correlation of 0.46). Thus and somewhat surprisingly, per capita consumption growth rates are more correlated within China than in any other international or intra-national sample of OECD countries where we know that financial integration is high. It would be however misleading to conclude that there is a higher degree of risk-sharing within China than within the United States just based on this evidence alone. Indeed, a high level of consumption correlation can reflect a high correlation of local output, coupled with a close association between consumption and output growth rates. As reported in the second row of

²¹ For instance, Obstfeld (1994) notes that among the G-7 countries over the period 1951 to 1988 there has been a tendency for domestic consumption to become more closely correlated with the world consumption

²² The intra-national risk-sharing literature has used regional data within Canada (Crucini (1999) and Bayoumi and McDonald (1995)), Japan (van Wincoop (1995)) and the United States (Atkeson and Bayoumi (1993), Crucini (1999), Hess and Shin (1997), Asdrubali, Sorensen and Yosha (1996).

²³ Finally, consumption-based tests that do not assume asset market completeness provide a more realistic framework for assessing the degree of financial integration on the basis of risk-sharing theoretical predictions.

²⁴ Consumption and GDP series come from the 2001 A11 China Marketing Research database (see appendix for a description of the data). Some of the provinces constitute a non-trivial fraction of national output. We therefore use rest of the country instead of national aggregates (e.g. we exclude the province' contribution) in order to avoid distorting the sample correlations upwards.

Table 6, local output growth rates are highly correlated in China. The correlation coefficients equal to 0.80 over the pre-reform period and 0.65 over the reform period. Furthermore these estimates are higher than that of OECD countries (row 5, Table 6) or that of regions within Japan or United States (column 3, Table 7).

We thus need to express consumption growth rate correlation relative to the corresponding GDP co-movements. We do so by dividing the correlation of local consumption growth rates by the correlation of local output growth rates (rows 3 and 6 in Table 6). Because local consumption growth rates are less correlated across the provinces than GDP growth rates for the pre-reform period, the ratio is statistically significantly below unity while it is not over the reform period. By comparison, the corresponding ratio for OECD economies is not significantly different from one between 1960 and 1977 and between 1978 and 1999 (row 6, Table 6).

Column 3 and 6 of Table 6 report the difference-in-mean test of the change in the correlations between the pre-reform and the reform period and between the 1980s and the 1990s. Both consumption and output correlations decrease between the pre-reform and the reform periods, as revealed by the negative and significant sign of the variation (-0.088 and - 0.149 respectively). Because the output correlation decreases to a larger extent, the relative consumption correlation increases (by 0.149, column 3). Hence risk-sharing appears to be intensified during the reform period.

However, if one splits the reform period into two parts, 1980s and 1990s, a somewhat surprising pattern appears (Table 6, columns 4 and 5). The consumption correlation declines markedly (from 0.70 to 0.20) while the output correlation increases (from 0.63 to 0.77, rows 1 and 2). Those two opposing movements lead to a sharp drop in the relative consumption correlation from 1.29 to 0.39 (row 3). This decline is statistically significant (row 3, column 6). If one performs a similar computation for the OECD countries, one finds that there is also a moderate decline in the relative consumption correlation (row 6, columns 4 and 5). However, unlike in the Chinese case, this decline is not statistically different from zero. In other words, there is a decline in the extent of consumption risk sharing across Chinese regions over the last twenty years.

As an alternative measure of consumption risk sharing, one can also look at the average consumption volatility relative to average output volatility. A higher degree of consumption sharing across geographic units would imply a lower relative consumption volatility. Table 8 reports the average volatilities of per capita consumption and output growth rates across the Chinese provinces as well as across OECD countries for comparison. Consumption and output volatilities are reported in rows 1 and 2 respectively. Generally, there is a significant decline in the volatility of consumption and output in the reform period compared to the pre-reform era. The relative consumption volatilities with respect to output volatilities for China and for OECD countries are reported in rows 3 and 6 in Table 8, respectively. Before 1978 when the Chinese reform started, the relative consumption volatility within China (0.698) was lower than that across the OECD countries (0.947). However, during the 1978-2000 period, the relative

consumption volatility within China (1.33) becomes higher than across OECD countries (1.10). By this measure, the risk sharing ability in China probably has deteriorated since 1978. Moreover, if one breaks down the reform period into the two decades, one finds that the relative consumption volatility has increased, rather than decreased, from 1.32 in the 1980s to 1.54 in the 1990s (row 3, columns 4 and 5), though the increase is not statistically significant. This suggests that the risk sharing opportunities have not improved over the last twenty years.

To summarize, both the evidence on relative consumption correlation (regional consumption correlation relative to that of regional output correlation) and the evidence on relative consumption volatility (average consumption volatility relative to output volatility) appear to suggest that the degree of risk sharing across the Chinese regions is not high and has not improved from the 1980s to the 1990s. However, these measures are not conclusive *per se*. A low degree of capital mobility can come from a low degree of financial integration within China, but also from incompleteness of the asset market. In the next section, we employ a modified measure of regional risk sharing based on Obstfeld (1994), which explicitly accounts for factors other than capital mobility in affecting risk-sharing.

4.3. Conditional Test of Risk-Sharing

Obstfeld (1994) develops a model of international consumption risk-sharing from which several alternative tests are derived. The model allows testing the two extreme cases of perfect and no capital mobility under the complete market hypothesis as well as the case for the broad middle ground where asset markets are incomplete. In this section, we apply this empirical methodology to evaluate the extent of risk-sharing in China²⁵.

The methodology proposed by Obstfeld (1994) relaxes the assumption of a complete market and consists of estimating the following equation:

$$d\ln(C_{it}) = a + b.d\ln(C_{-it}) + c.\ln(LRL_{it}) + u_i + e_{it} \quad (4)$$

where C_{it} is per capita private consumption in real terms, C_{-it} is aggregate per capita private consumption outside province i , u_i is the provincial fixed effect and e_{it} is the error term²⁶. The term LRL_{it} stands for “Local Resource Limit” expressed in per capita terms. It is defined as $LRL_{it} = GDP_{it} - I_{it} - G_{it}$ where I_{it} is the investment rate and G_{it} is government consumption. It corresponds to the maximum consumption level when intra-national and international markets are closed. If local investment is constrained by local saving, then consumption is constrained by the local resource limit and the hypothesis $b=0$ and $c=1$ should not be rejected. Alternatively, if financial integration is high, we would expect b to be closer to one and c closer to zero. Intuitively, equation (4) gives an indication of the extent to which consumption is more closely

²⁵ As we do not intend to discuss the model but simply to apply Obstfeld’s framework to our sample of Chinese provinces, we refer to the original article for further theoretical readings

related to global or local factors respectively represented by aggregate consumption C_{it} or Local Resource Limit LRL_{it} ²⁷.

Table 9 reports the estimates of equation 4 using the sample of Chinese provinces and the test statistics of the relevant hypotheses. The null hypothesis of perfect financial integration (H3: $b=1$ and $c=0$) is rejected for both the pre-reform and the reform periods. At the opposite extreme, the hypothesis of no financial integration is also systematically rejected (H4: $b=0$ & $c=1$). For comparison purpose, Table 10 reports the corresponding results within OECD countries. The coefficient estimate of aggregate consumption increases steadily over time from 0.354 (1960-1977 period) to 0.60 in the 1980s and to 0.897 in the 1990s while the coefficient estimate of the Domestic Resource Limit (DRLit) decreases continuously, from 0.425 (1960-1977 period) to 0.081 in the 1990s. These two opposite movements suggest an increase in the degree of financial integration among OECD countries. This conclusion is supported by the non-rejection of the null hypothesis of high financial integration (H3) over the most recent period (1990-1999).

The results suggest that OECD countries have become financially integrated, while the conclusion is mixed for the Chinese provinces which have reached only a middle range financial integration over transition period. More specifically, there was an increase of regional risk sharing from the pre-reform era to the reform era. However, the extent of risk sharing went the opposite direction from the 1980s to the 1990s. The coefficient on aggregate consumption declined from 0.88 during 1978-1989 to 0.47 during 1990-2000. At the same time, the effect of local resource constraint on consumption increased from 0.06 in the 1980s to 0.14 in the 1990s. Therefore, there was a fairly dramatic decline in the degree of regional risk sharing.

5 Why doesn't capital flow to more productive regions?

In this section, we turn to a more direct examination of how investment in China is allocated across different regions. Under the null hypothesis that capital goes to most productive regions until the value of marginal product of capital is equalized, one would expect that net capital inflow into a region is positively related to that region's growth rate. In our empirical work, we estimate variations of the following specification:

$$(\text{Net capital inflows})_{it} = a + b.(\text{Initial income})_{it} + c. (\text{GDP Growth})_{it} + u_i + e_{it} \quad (5)$$

In Column 1 of Table 11, we estimate how net capital inflow to a province responds to its real GDP growth rate (after controlling for the initial level of income). The result indicates a lack of positive association between net capital inflows and growth performance. This suggests that

²⁶ Because they are collinear with the aggregate consumption variable, fixed time effects are not introduced in equation 4. The series of per capita consumption growth rate is integrated of order one.

²⁷ As emphasized by Obstfeld, this framework is closely related to the investment-saving test for capital mobility. In addition, we also introduced aggregate output growth as a regressor and obtained very similar results.

capital flows within China do not go to the fastest growing regions, on average. To the contrary, the coefficient on local GDP growth is negative and statistically significant, indicating a tendency for capital to go to slower-growing regions.

In Columns 2 to 6, we investigate how various components of a region's investment responds to local GDP growth. The financing source categories of investment are:

(a) Government budget: the appropriation in the budget of the central and local governments earmarked for capital construction and projects;

(b) Bank loans: loans from banks and non-bank financial institutions to local enterprises and institutions;

(c) Foreign Direct Investment (FDI): investment made by foreign-owned firms including joint ventures

(d) "Self-raised funds": investment in local enterprises made by their higher responsible entities ("headquarters" or ministries) and funds raised by the firms themselves.

(e) Others: all other investment not in the above categories.

An interesting pattern emerges. First, foreign direct investment and investment by domestic firms based on self-raised funds do respond positively to real GDP growth. This suggests that when investment is motivated mostly by profit maximization, it tends to go where it is most productive. FDI and self-raised funds are the only two categories of investment that exhibit a positive relationship with real GDP growth. Second, investment allocated through government budget is the one category that exhibits a clear negative relationship with local GDP growth. Bank loans have a statistically insignificant relationship, though the point estimate is negative. From these results, we conclude that it is the allocation of investment by government budget that is primarily responsible for the peculiar pattern that net capital flows go primarily to less productive regions. Bank loans, while do not exhibit the same peculiar pattern, do not respond positively to local GDP growth as FDI or firms' self-raised capital.

Why would the government systematically allocate capital away from more productive regions and towards less productive ones? There are at least three theories one might think of: First, the government may value poverty reduction in its objective function and therefore channels capital to poor regions. If a low initial income coincides with a low GDP growth rate, one could see a negative association between capital inflows and real GDP growth.

Second, state-owned enterprises (SOEs) may act as a bottomless pits in sucking government-channeled investment funds. Here, one might consider two variations of the theory. Version A stresses a political-economy interpretation. SOEs may be politically more powerful than private firms or other non-state-owned firms such as township-and-village enterprises. Consequently, they are able to obtain more investment funds from the government, particularly through government budget allocation, even if they are not productive. Version B is a concern for employment in SOEs. Precisely because SOEs are less productive on average and have trouble competing for funds in a well-functioning and integrated capital market, the government, out of concern for employees in the SOEs, may choose to channel the capital systematically to SOEs

even if they are not productive. Of course, the two versions of the theory are not mutually exclusive. Either way, they could generate a positive association between capital inflows and the importance of SOEs in local economies.

Third, the government could direct capital flows in favor of a particular industrial structure. It is understood in the literature the Chinese central planning before 1978 systematically discriminated against the agricultural and other primary sectors in favor of industries. Since the reform started in 1978, the government rhetoric has been to extend more assistance to peasants/fishermen in the country side. If the rhetoric is reflected in the actual policy, one would see a positive association between net capital inflow into a region and the importance of the primary sector in the local economy.

We undertake an examination of these theories and report the results in Table 12. In the first column, we look at the net capital inflows. Capital inflows respond positively to the share of state production in the province and negatively to the share of agriculture. In the subsequent columns of Table 12, we examine the connections between various components of local investment and the initial income, the share of SOEs in local industrial output, and the share of the primary sector in local output. A few results emerge. First, there is no negative and statistically significant effect of initial income on investment. In other words, if the investment funds are systematically channeled to poorer regions, the effect is not large enough to be picked up by the data. Second, interestingly, the share of SOEs in local industrial production has a clear positive and statistically significant effect on the size of investment allocated by government budget and that financed by bank loans. So the importance of state-owned firms in local economy is a significant factor in explaining investment patterns from these two sources. In contrast, the share of SOEs has a negative sign in the FDI equation, suggesting that the presence of SOEs may act as a barrier to FDI. Third, the share of primary sector in local GDP is not significant in any regression. This suggests that capital allocation in China neither favors nor discriminates the primary sector in general.

To conclude, the strongest determinant of capital allocation rule in China appears to be the prominence of SOEs in local economies. SOEs generally grow more slowly than private and other non-SOE sectors of the economy. Therefore, an investment allocation rule by the government that favors SOEs would allocate capital systematically away from more productive regions and towards less productive ones. In this sense, a smaller role of the government in the allocation of capital might increase the growth rate of the economy.

6 Concluding Remarks

Segmentation of the internal capital market may be a serious drawback for the Chinese financial system (on top of the bad loans problem in its banking sector) as it prevents savings and capital from being used in the most productive areas. However, this issue has not received much research attention. This paper fills this void by analyzing internal financial integration across provinces over the pre-reform and reform periods from 1952 to 2000.

Our analysis is based on two standard tools from the international finance literature, namely tests of local investment-saving correlation and of consumption smoothing. Our results suggest that capital is much less mobile within China than within countries known to have an integrated international capital market. Overall, the patterns of capital flows within China appear closer to the patterns of international capital movements than that of other intra-national studies. Perhaps most surprisingly, we find that the degree of capital mobility in China significantly decreased in the 1990s relative to the 1980s. Finally, we document that the government (as opposed to the private sector) tends to systematically re-allocate capital from more productive regions to less productive ones. In this sense, a smaller role of the government in the financial sector might increase the growth rate of the economy

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Statistical Appendix

The provincial series for consumption, investment and GDP consist of provincial GDP desegregated into household and government consumption, gross capital formation, change in inventory and net exports (provincial accounting). The statistical sources are:

- A11 China Marketing Research, 2001, *1949-1999 China Statistical Data Compilation*
- State Statistical Bureau, 1996, *China Regional Economy, a Profile of 17 years of Reform and Opening-up*, China Statistical Bureau, Beijing
- State Statistical Bureau, 2000 and 2001, *China Statistical Yearbook*, China Statistical Bureau, Beijing.

The dataset includes 28 provinces (or province-level autonomous regions or super-cities) on the mainland during the reform period (1978-2000), and 24 provinces during the pre-reform period (1952-1977).

List of provinces in the sample (1978-2000) : Beijing, Tianjin, Hebei, Shanxi, Nei Monggol, Liaoning, Jilin, Heilongjiang, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangxi, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Guangdong + Hainan, Sichuan + Chongqing,

List of provinces in the sample (1952-1977): the provinces of Jiangxi, Guangdong and Hainan, Sichuan and Chongqing and Ningxia have been excluded for the pre-reform period because of lack of data. The city of Tianjin is excluded for the pre-reform period in the risk-sharing analysis because of the non-availability of population data between 1952 and 1977.

The national account data (consumption, investment, saving, GDP) for OECD come from:

- United Nations Statistical Office, UN National Accounts .

The dataset includes 24 OECD countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.

Variable definition

C_{it} : : Regional private (household) consumption.

S_{it} : : Regional savings defined as regional GDP minus private and government consumption.

I_{it} : : Regional investment defined as the change in gross capital formation both of the private and public sectors.

Some of the provinces constitute a non-trivial fraction of national output. We therefore use rest of the country instead of national aggregates in order to avoid distorting the sample correlations upwards using the following formula (where X_{it} stands for C_{it} , I_{it} or S_{it} and Y_{it} is the provincial GDP).

$$X_{-i,t} = \frac{\sum_{j \neq i}^n X_{j,t}}{\sum_{j \neq i}^n Y_{j,t}}$$

C_{-it} : National consumption rate outside province I

S_{-it} : National saving rate outside province i,

I_{-it} : National investment rate outside province

F_{it} : Ratio of (regional) government consumption to local GDP.

y_{it} : Regional business cycle, generated by applying the Hodrick and Prescott (HP) filter to the local GDP series. We use HP(100) filtered log(province GDP) minus HP(100) filtered log(national GDP).

LRL_{it} (DRL^{it})= $GDP_{it} - I_{it} - G_{it}$: “Local” (Chinese provinces) or “Domestic” (OECD countries) Resource Limit.

G_{it} : government consumption.

All variables are expressed in proportion of provincial GDP in section 2 (Investment-Saving analysis) and in per capita terms and using 1978 prices in section 2(Risk-Sharing analysis).

Table 1: Flow of financial funds - 2000

		Households		Non-financial corporations		Government		Financial institutions		Total	
		uses	sources	uses	sources	uses	sources	uses	sources	uses	sources
Net financial investment*	1	7898		-5269,3		-1000		66,86		611,93	
Financial uses	2	100%		100%		100%		100%		100%	
Financial sources	3		100%		97%		100%		100%		100%
Currency	4	9%		1%		1%			7%	2%	2%
Deposits	7	61%		78%		76%		3%	95%	35%	36%
Loans	14		100%		59%		7%	80%	-2%	32%	32%
Securities	20	20%		14%		1%	84%	19%	5%	6%	5%
bonds	21	6%			1%	1%	84%	19%	5%	5%	5%
share	26	14%			13%					1%	1%
Insurance technical reserves	27	11%		1%			8%		6%	0%	0%
Settlement funds	28	0%		-37%	3%				-21%	2%	2%
Inter-financial accounts	29							-2%	-1%	-1%	0%
Required&excessive reserves	30							3%	4%	8%	10%
Cash in vault	31							-2%	-2%	0%	0%
Central bank lending	32							-14%	-16%	8%	8%
Miscellaneous (net)	33	-2%		44%		23%			28%	-3%	-6%
Balance of Payment											
long-term capital	34			1%	20%					5%	12%
short-term capital	35			12%	10%		1%	8%	-2%	0%	0%
Changes in reserve assets	36							5%		6%	
E&O in the BOP	37				-7%						-3%

* 100 millions of yuans.

source: The People's Bank of China Quarterly Statistical Bulletin, 2002:4. p.78-79.

“uses” refers to the variation in assets, sources refers to the variation in liabilities.

Table 2: Summary of Literature on Investment-Saving Correlation within Developed Countries

Country [time period]	Author	Saving coefficient ^a	Significance
Japan [1975-1988] ^b	Deckle (1996)	-0.30 (0.07)	significant (negative)
		-0.39 (0.09)	significant (negative)
		-0.23 (0.09)	significant (negative)
		-0.21 (0.06)	significant (negative)
Japan [1970-1985]	Yamori (1995)	-0.26 (0.08)**	significant (negative)
		-0.36 (0.06)**	significant (negative)
		-0.29 (0.05)**	significant (negative)
Japan [1971-1985]	Bayoumi and Rose (1993)	-0.48 (0.16)	significant (negative)
		0.24 (0.21)	non significant
		0.01 (0.14)	non significant
USA [1971-1985]	Sinn (1992)	-0.11 (0.07) ^c	non significant
UK [1971-1987]	Thomas (1993)	-0.56 (0.13)	significant (negative)
Canada [1961-1989]		-0.10 (0.02)	significant (negative)
Germany [1970-1987]		-0.06 (0.09) ^d	non significant

Standard errors in parentheses.

^acoefficient of the saving rate in the investment regression

^b excluding Kanto and Kansai

^c correlation

^dprivate saving and investment

Table 3: Unconditional FH test (Chinese Provinces versus OECD Countries)

	(1) 1952-1977	(2) 1978-2000	(3)=(2)-(1) diff. ⁱ	(4) 1978-1989	(5) 1990-2000	(6)=(5)-(4) diff. ⁱ
China						
(1) Investment-saving correlation*	0.534 (0.062)	0.491 (0.103)	-0.043 (0.109)	0.300 (0.102)	0.520 (0.091)	0.225 (0.069)***
OECD						
(2) Investment-saving correlation*	0.717 (0.067)	0.457 (0.069)	0.118 (0.078)*	0.413 (0.099)	0.483 (0.094)	0.069 (0.138)

* average time correlation between investment and saving rates (% GDP)

*(**, ***) significant at the 10% (5%, 1%) level.

Standard errors in parentheses^a average time correlation between investment and saving rates (% GDP)

*(**, ***) significant at the 10% (5%, 1%) level.

Standard errors in parentheses

ⁱ reports the mean of the difference between pairwise correlations of the 2 sub-periods

Source (China): AII China Marketing Research, 2001, 1949-1999 China Statistical Data Compilation, China Statistical Bureau, Beijing.
China Statistical Yearbook, various years, China Statistical Bureau, Beijing.

Source (OECD) : UN National Accounts, World Development Indicators

Table 4: Conditional FH Test

	(1) 1952- 1977	(2) 1978- 2000	(3)=(2)- (1) diff ⁱ	(4) 1978- 1989	(5) 1990- 2000	(6)=(5)- (4) diff ⁱ	(7) Japan	(8) OECD
(1) Raw Data	0.534 * (0.062)	0.491 * (0.103)	-0.043 (0.109)	0.300 * (0.102)	0.520 * (0.091)	0.225 ** (0.069)	0.31 * (0.04)	0.56 ** (0.04)
Controlling for								
(2) national factors	0.192 * (0.083)	0.303 * (0.105)	0.111 (0.096)	0.115 (0.1056)	0.337 * (0.093)	0.222 ** (0.066)	0.04 (0.04)	0.44 ** (0.07)
(3) National & regional factors & business cycle & fiscal policy	0.139 * (0.070)	0.151 * (0.098)	0.011 (0.087)	0.037 (0.102)	0.213 * (0.086)	0.175 ** (0.067)	-0.01 (0.04)	0.28 ** (0.05)
Using one-year lagged regional variables								
(4) & business cycle & fiscal policy (one year lagged)	0.174 * (0.075)	0.187 * (0.094)	0.013 (0.091)	0.062 (0.098)	0.234 * (0.083)	0.172 ** (0.069)		

* (**, ***) significant at the 10% (5%, 1%) level. Standard errors in parentheses
ⁱ reports the mean of the difference between pairwise correlations of the 2 sub-periods.
 Source: own calculations (columns 7 and 8, from Iwamoto and van Wincoop, 2000)

Table 5: Conditional FH Test – Banking Data - (Chinese Provinces versus OECD Countries)

	(1) 1978-1989	(2) 1990-2001	(3)=(2)-(1) diff ¹	(4) 1990-1995	(5) 1996-2001	(6)=(5)-(4) diff ¹
China						
(1) Raw Data	0.664 (0.067)**	0.505 (0.078)**	-0.158 (0.098)*	0.439 (0.098)**	0.569 (0.082)**	0.130 (0.118)
(2) Controlling for national factors	0.301 (0.110)**	0.596 (0.091)**	0.295 (0.125)**	0.539 (0.082)**	0.461 (0.096)**	-0.077 (0.117)
(3) national & regional factors	0.435 (0.094)**	0.5801 (0.095)**	0.145 (0.084)*	0.492 (0.089)**	0.580 (0.100)**	0.088 (0.096)**
OECD countries						
(1) Raw Data	0.630 (0.087)**	0.617 (0.087)**	-0.013 (0.147)			
(2) Controlling for global factors	0.675 (0.081)**	0.241 (0.114)**	0.295 (-0.434)**			
(3) Global & national factors	0.675 (0.084)**	0.285 (0.116)**	-0.390 (0.116)*			

* (**, ***) significant at the 10% (5%, 1%) level.

Standard errors in parentheses

¹ reports the mean of the difference between pairwise correlations of the 2 sub-periods.

Source: own calculations

Table 6: Unconditional Test of Risk-Sharing – Consumption Correlations (Chinese Provinces versus OECD Countries)

	(1) 1952-1977	(2) 1978-2000	(3)=(2)-(1) diff. ¹	(4) 1978-1989	(5) 1990-2000	(6)=(5)-(4) diff. ¹
China						
(1) Correlation of consumption*	0.621 (0.028)	0.533 (0.027)	-0.088*** (0.028)	0.698 (0.030)	0.199 (0.051)	-0.499*** (0.057)
(2) Correlation of output*	0.800 (0.020)	0.651 (0.029)	-0.149*** (0.038)	0.633 (0.038)	0.773 (0.039)	0.140*** (0.048)
(3) Ratio of consumption. to output correlations	0.751 (0.042)	0.900 (0.080)	0.149** (0.068)	1.290 (0.111)	0.389 (0.149)	-0.901*** (0.20)
OECD						
(4) Correlation of consumption*	0.3521 (0.044)	0.352 (0.042)	0.000 (0.048)	0.411 (0.060)	0.355 (0.067)	0.055 (0.099)
(5) Correlation of output*	0.423 (0.053)	0.384 (0.043)	0.038 (0.055)	0.437 (0.062)	0.444 (0.074)	-0.010 (0.101)
(6) Ratio of consumption. to output correlations	1.176 (0.464)	0.699 (0.138)	0.476 (0.428)	0.853 (0.146)	1.063 (0.442)	-0.210 (0.514)

*correlation of per capita provincial (national) consumption and the rest of the country (of the world) per capita consumption.

Per capita consumption and GDP are expressed in real terms and by taking the first difference of the logarithm
 (**, ***) significant at the 10% (5%, 1%) level.

Standard errors in parentheses

¹ reports the mean of the difference between pairwise correlations of the 2 sub-periods.

in bold: not different from 1 at the 10 % (or lower) level

Source (OECD) : UN National Accounts, World Development Indicators

Source (China): A11 China Marketing Research, 2001, 1949-1999 China Statistical Data Compilation, China Statistical Bureau, Beijing.
 China Statistical Yearbook, various years, China Statistical Bureau, Beijing

Table 7: Summary of Studies on Consumption Smoothing within Industrialized Countries

Country [# regions] Time period	Author	1		2		3		4		5	
		Correlation Consumption		Correlation Output		Volatility Consumption		Volatility Output		Volatility Consumption	
Japan [47] 1975-88	van Wincoop (1995)	0.46 (0.36)		0.42 (0.31)		1.97 (nr)		1.58 (nr)			
Canada [10] 1971-91	Crucini (1995)	0.56 (0.17)		0.38 (0.31)		nr (nr)		nr (nr)			
USA [51] 1971-91	Crucini (1995)	0.40 (0.22)		0.50 (0.21)		nr (nr)		nr (nr)			
USA [19] 1977-91	Hess and Shin (1995)	0.31 (0.41)		0.67 (0.43)		3.35 (0.93)		3.2 (1.21)			

Notes: (1) nr = not reported

(2) Standard errors in parentheses

(3) Source: Hess and Shin (1997)

Table 8: Unconditional Test of Risk-Sharing – Consumption Volatilities (Chinese Provinces versus OECD Countries)

	(1) 1952-1977	(2) 1978-2000	(3)=(2)-(1) diff. ¹	(4) 1978-1989	(5) 1990-2000	(6)=(5)-(4) diff. ¹
China						
(1) Volatility of consumption *	9.18 (1.09)	5.24 (0.191)	-3.94*** (1.11)	5.63 (0.22)	4.68 (0.32)	-0.95*** (0.39)
(2) Volatility of output***	14.15 (0.79)	3.99 (0.15)	-10.16*** (0.84)	4.57 (0.23)	3.06 (0.23)	-1.51*** (0.34)
(3) Ratio of consumption. to output volatilities	0.698 (0.081)	1.33 (0.089)	0.632*** (0.137)	1.32 (0.082)	1.54 (0.183)	0.220 (0.200)
OECD						
(4) Volatility of cons.*** Std(Cit)	2.61 (0.365)	2.15 (0.183)	-0.46* (0.252)	2.25 (0.233)	1.84 (0.171)	-0.41** (0.212)
(5) Volatility of output*** Std(Yit)	2.71 (0.221)	1.98 (0.117)	-0.73*** (0.192)	1.96 (0.129)	1.86 (0.157)	-0.10 (0.185)
(6) Ratio of consumption. to output volatilities	0.947 (0.069)	1.101 (0.065)	0.154*** (0.049)	1.168 (0.085)	1.020 (1.168)	-0.148* (0.089)

Volatility: time-series standard deviation of per capita consumption (GDP) for each province (country)

Per capita consumption and GDP are expressed in real terms and by taking the first difference of the logarithm

*(**, ***) significant at the 10% (5%, 1%) level.

Standard errors in parentheses

in bold: not different from 1 at the 10 % (or lower) level

Source (OECD) : UN National Accounts, World Development Indicators

Source (China): A11 China Marketing Research, 2001, 1949-1999 China Statistical Data Compilation, China Statistical Bureau, Beijing.

China Statistical Yearbook, various years, China Statistical Bureau, Beijing

Table 9 : Conditional Test of Risk-Sharing - Incomplete asset market (Chinese provinces)

Dependent variable: logarithm of per capita household real consumption (variation)

Period	1952-1977	1978-2000	1978-1989	1990-2000
dln(C-it)	0.722 *** (0.070)	0.839 *** (0.049)	0.88 *** (0.051)	0.469 ** (0.224)
dln(LRLit)	0.277 *** (0.055)	0.076 *** (0.016)	0.058 *** (0.012)	0.137 *** (0.035)
adj. r2	0.92	0.34	0.5	0.12
# obs	597	631	323	308
# provinces	23	28	28	28
H1: b=1	F(1,562)=15.62	*** F(1,601)=10.78	*** F(1,293)=5.52	** F(1,278)=5.58
H2: d=1	F(1,562)=171.4	*** F(1,601)=3231	*** F(1,293)=5465	*** F(1,278)=585.7
H3: b=1 & d=0	F(2,562)=12.72	*** F(2,601)=14.44	*** F(2,293)=12.79	*** F(2,278)=9.09
H4: b=0 & d=1	F(2,562)=86.22	*** F(2,601)=1649	*** F(2,293)=2820	*** F(2,278)=294.1

C-it: national per capita household real consumption outside the province i

Yit: per capita household real GDP

LRLit= Yit - lit - Git (Local Ressource Limit)

lit: provincial per capita real investment

Git: provincial per capita government real consumption

ln: logarithm, d: first difference

*(**, ***) significant at the 10% (5%, 1%) level.

all the regressions include fixed provincial effects.

Robust standard errors in parentheses

H1: null hypothesis of the consumption (C-it) coefficient b not being different from one (high degree of risk-sharing)

H2: null hypothesis of the local resource limit (LRLit) coefficient b not being different from one (low degree of risk-sharing)

H3: null hypothesis of the joint significance of the consumption coefficient (C-it) not being different from one and the local resource limit (LRLit) coefficient not being different from zero (high degree of risk-sharing)

H4: null hypothesis of the joint significance of the consumption coefficient (C-it) not being different from zero and the local resource limit (LRLit) coefficient not being different from one (low degree of risk-sharing).

Table 10: Conditional Test of Risk-Sharing - Incomplete asset market (OECD Countries)

Dependent variable: logarithm of per capita household real consumption (variation)

Period	1960-1977	1978-1999	1978-1989	1990-1999
dln(C-it)	0.354 *** (0.101)	0.629 *** (0.097)	0.600 *** (0.113)	0.897 *** (0.252)
dln(DRLit)	0.425 *** (0.079)	0.203 *** (0.072)	0.239 *** (0.089)	0.081 *** (0.108)
adj. r2	0.34	0.18	0.31	0.21
# obs	381	528	288	240
# countries	24	24	24	24
H1: b=1	F(1,355)=40.68 ***	F(1502)=14.78 ***	F(1,262)=12.74 ***	F(1,214)=0.17 ***
H2: d=1	F(1,355)=52.45 ***	F(1,502)=122.51 ***	F(1,262)=73.82 ***	F(1,214)=71.53 ***
H3: b=1 & d=0	F(2,355)=31.95 ***	F(2,502)=9.59 ***	F(2,262)=7.99 ***	F(2,214)=0.37 ***
H4: b=0 & d=1	F(2,355)=30.39 ***	F(2,502)=70.86 ***	F(2,262)=41.69 ***	F(2,214)=42.42 ***

C-it: national per capita household real consumption outside the province i

Yit: per capita household real GDP

LRLit= Yit - lit (Local Ressource Limit)

lit: provincial per capita real investment

Git: provincial per capita government real consumption

ln: logarithm, d: first difference

*(**, ***) significant at the 10% (5%, 1%) level.

all the regressions include fixed provincial effects.

Robust standard errors in parentheses

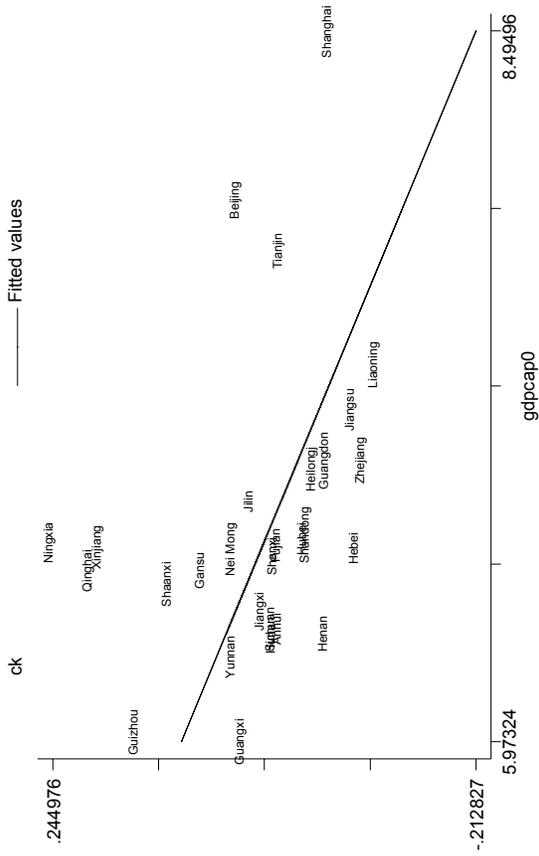
H1: null hypothesis of the consumption (C-it) coefficient b not being different from one (high degree of risk-sharing)

H2: null hypothesis of the local resource limit (LRLit) coefficient b not being different from one (low degree of risk-sharing)

H3: null hypothesis of the joint significance of the consumption coefficient (C-it) not being different from one and the local resource limit (LRLit) coefficient not being different from zero (high degree of risk-sharing)

H4: null hypothesis of the joint significance of the consumption coefficient (C-it) not being different from zero and the local resource limit (LRLit) coefficient not being different from one (low degree of risk-sharing).

Figures 1: Net capital inflows and initial income



Figures 2. State versus foreign investment flows and GDP growth

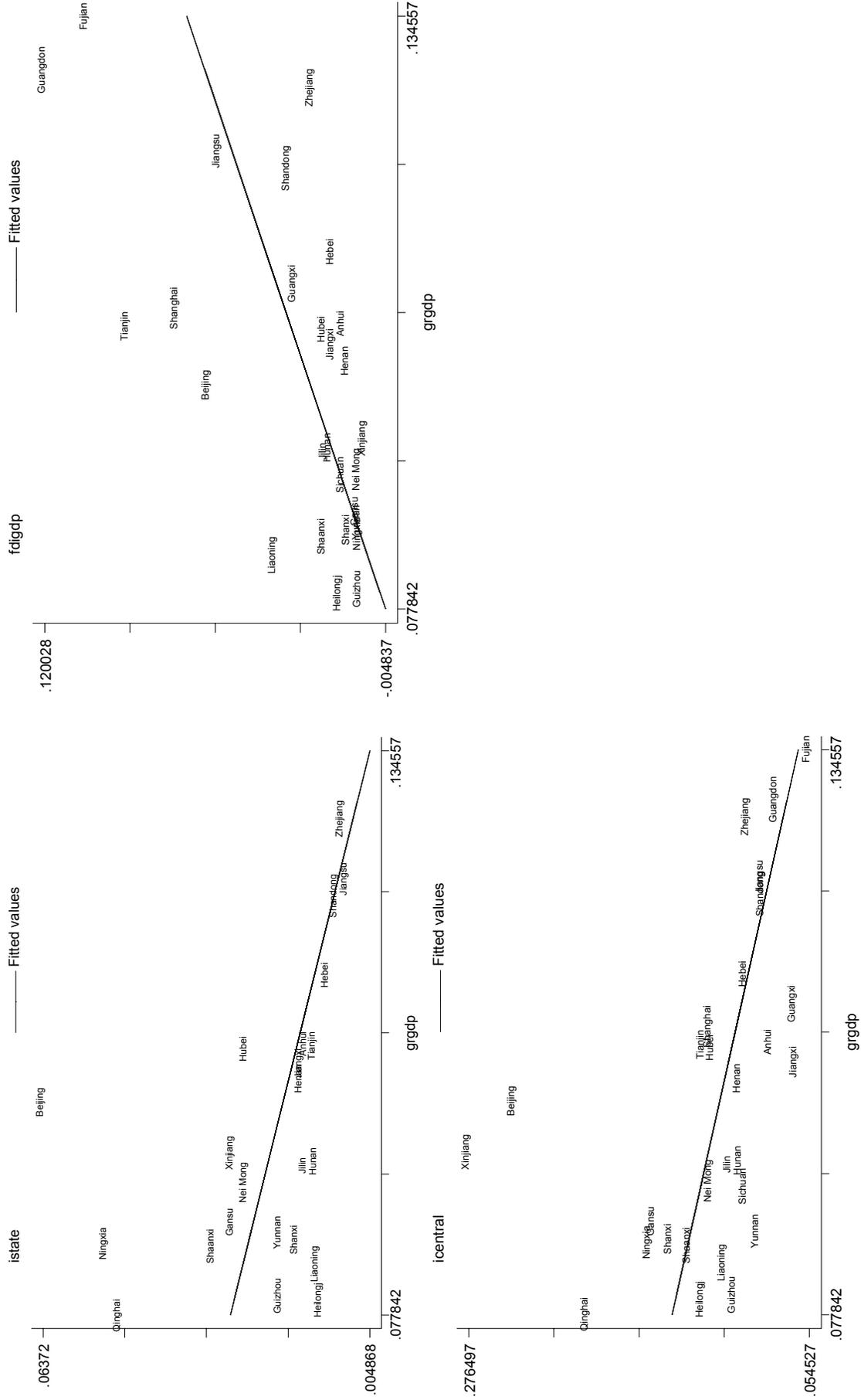
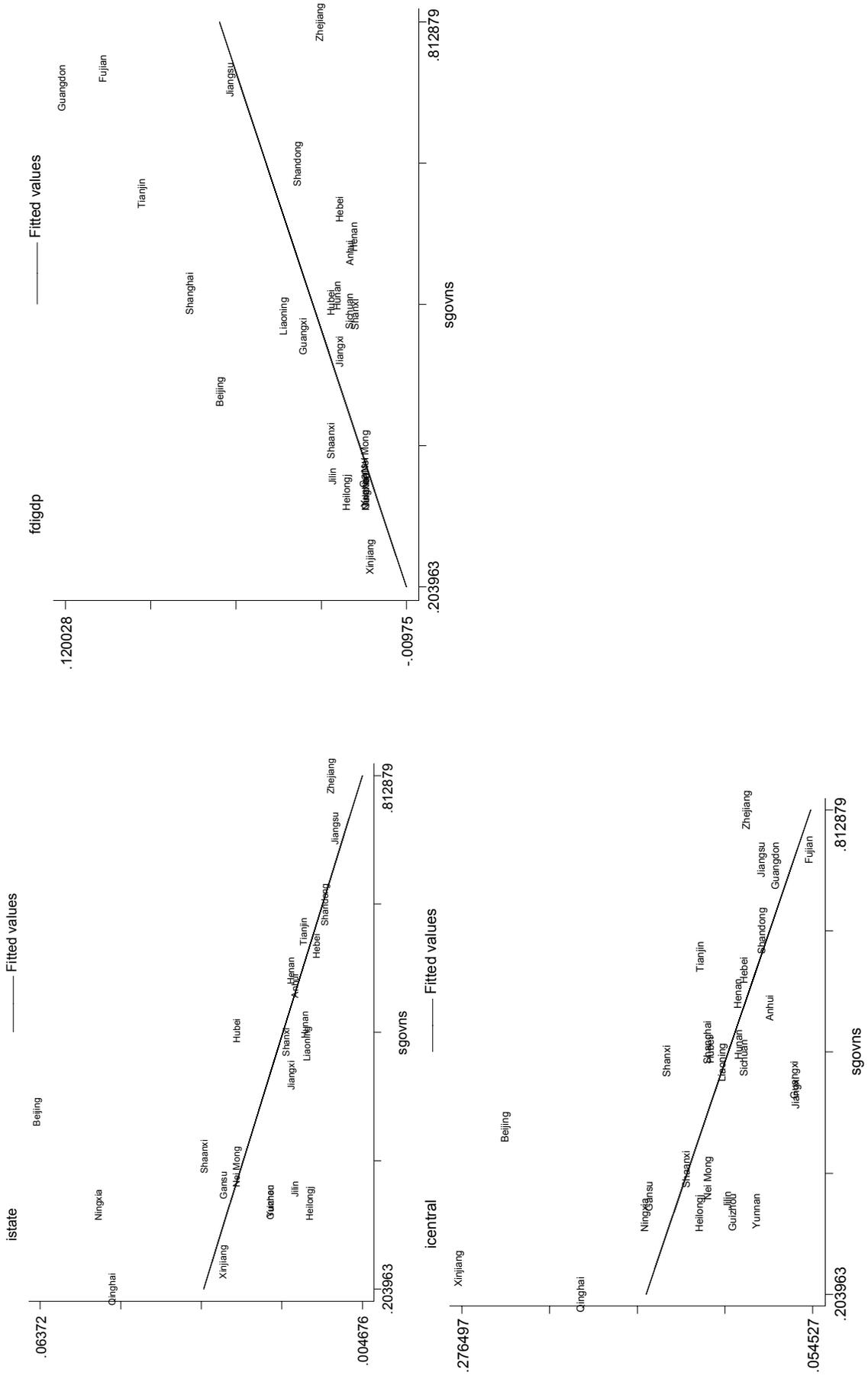


Figure 3: State versus foreign investment flows and the importance of the state sector



Figures 4: State versus foreign investment and initial income

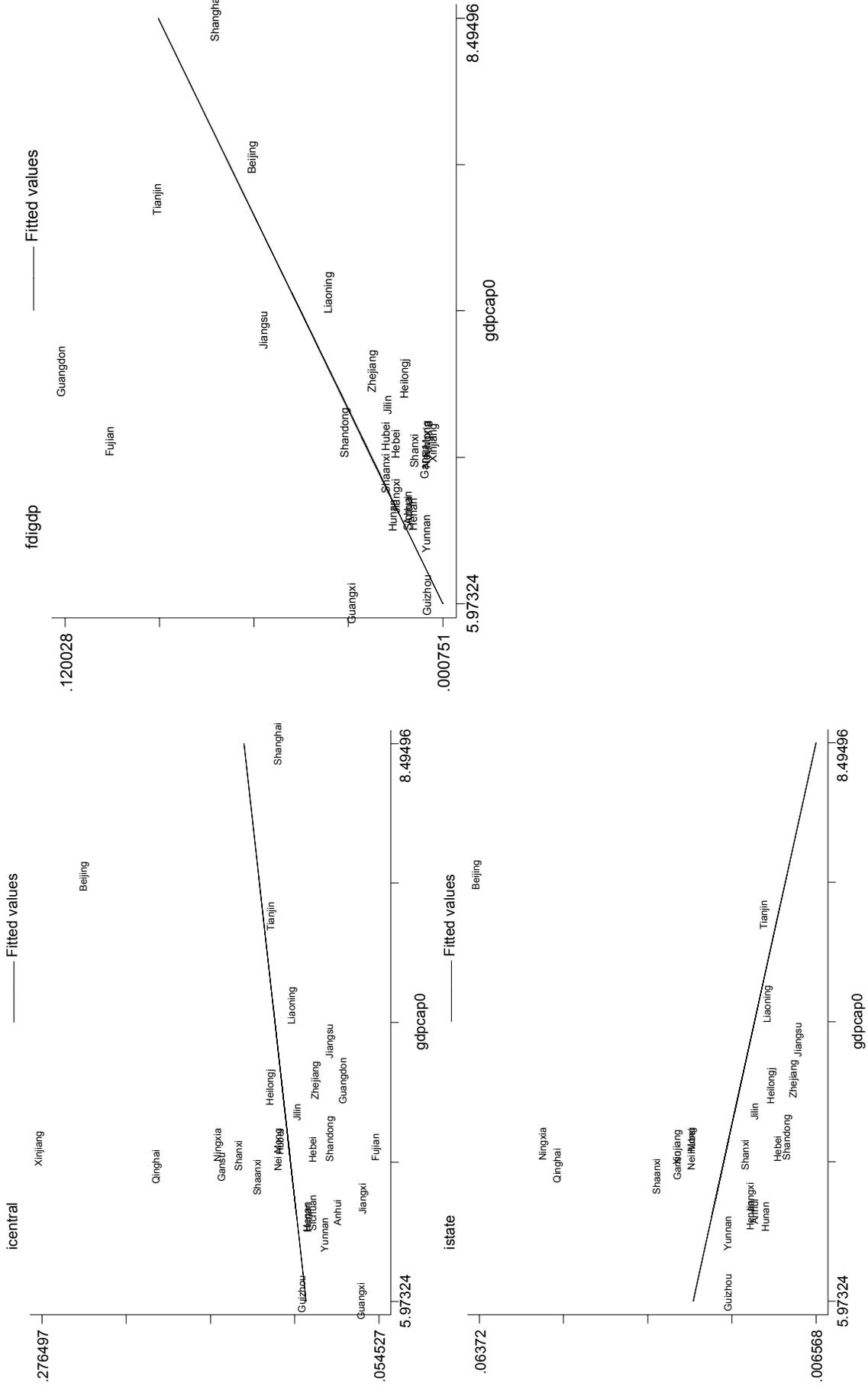


Table 11: Policy- versus market-oriented capital allocation and growth performance

	net capital inflows	Investment by source of funds				
		State budget	bank loans	Fdi	Fundraising	Other
Initial GDP per capita	-0.02 *	-0.01 *	0.03 ***	0.001	0.03 ***	0.006
Real GDP growth rate	0.01	0.004	0.010	0.003	0.005	0.007
Sargan test	-0.57 **	-0.54 ***	-0.12	0.37 ***	0.33 **	-0.073
AR(2) test	0.27	0.14	0.21	0.09	0.14	0.102
# provinces	16.69	16.53	16.99	13.11	9.488	12.26
#obs	-0.97	-1.237 *	-1.725	-1.083	-2.608	1.274
	25	22	20	22	20	20
	150	85	77	85	77	74

GMM system estimator. All regressions use robust standard errors reported below.

All dependent variables are expressed as a ratio of provincial GDP. Net capital inflows are calculated by subtracting net investment from net savings in the province. Central Investment refers to investment supervised by the central government, i.e. the central government formulates the project proposal, seeks or issues its approval and is responsible for its financing. State budget appropriation refers to appropriation in the budget of the central and local governments earmarked for capital construction and innovation projects, and the special appropriation from the budget of the central government for capital construction and for the transfer fund to banks to be issued as loans for earmarked projects. Domestic loans refers to various funds borrowed by enterprises and institutions from banks and non-bank financial institutions during the reference period for the purpose of investment in fixed assets, including loans issued by banks from their self-owned funds and deposits, loans appropriated by higher responsible authorities, special loans by government, loans arranged by local governments for special funds, and working loans, etc... Foreign investment refers to foreign funds received during the reference period for the purpose of investment in fixed assets, including foreign funds borrowed and managed by the government, by individual units, foreign fund in joint venture program and issue of bonds and stocks at the international financial markets. Self-raised funds refer to funds received by enterprises from their higher responsible authorities, local government or raised by enterprises or institutions themselves for the purpose of investment in fixed assets during the reference period. Others refer to fund received during the reference period which are not included in the above mentioned sources. Initial GDP per capita is the initial GDP per capita in 1978 prices (logarithm).

The assumption of no serial correlation is essential for the consistency of estimators which instrument the lagged dependent variable with further lags of the same variable. If the disturbances are not serially correlated, there should be evidence of significant negative first order serial correlation in the differenced residuals and not evidence of second-order serial correlation in the differenced residuals. The Sargan (1964) test of overidentifying restrictions is also reported. This performs a joint test of the model specification and the validity of instruments (i.e. tests if the set of moment conditions are respected).

Table 12: Policy- versus market-oriented capital allocation, the importance of the state sector and primary production

	net capital flows	Investment by source of funds				
		state budget	bank loans	Fdi	Fundraising	Other
Initial GDP per capita	-0.06 **	-0.01	0.01 ***	0.00967	0.022 ***	-0.010
	0.02	0.01	0.018	0.00834	0.021	0.020
Share of state-production in industrial production	0.13 *	0.07 ***	0.05 *	-0.0251 ***	0.015	0.012
	0.07	0.01	0.029	0.00836	0.028	0.033
Share of primary production in GDP	-0.56 **	-0.17	-0.195	0.073	-0.087	-0.082
	0.28	0.11	0.187	0.077	0.244	0.205
Sargan test	23.44	20.10	16.74	17.31	16.56	18.51
AR(2) test	-0.547	-1.601	-1.561	-0.7473	-1.72	0.7073
# provinces	25	22	20	22	20	20
#obs	150	85	77	85	77	74

GMM system estimator.