Households savings in China

by

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Abstract

Domestic saving in China is the highest in the world in terms of GDP and it surpasses the investment share, which in turn is also very high by international standards. This excessive saving results in a large current account surplus. Understanding why Chinese save so much is a central issue in the debate on global imbalances. The goal of our paper is to analyze empirically Chinese households saving behaviour taking into account the disparities within the country, at the provincial level and between rural and urban households. We first show that, notwithstanding the rising contribution of government and firms to national savings the real peculiarity lies with the Chinese families. We move from Modigliani and Cao (2004) attempt to explain rising personal saving in China within the life cycle hypothesis and show how a more careful analysis, indicate that life-cycle determinants do not suffice, especially in the most recent period. Once we consider regional differences and distinguish urban and rural households using provincial-level data it becomes clear that additional explanations are needed and that precautionary motives and liquidity constraints are playing an important role. Our results suggest that in order to reduce the propensity to save of Chinese households it is necessary to improve social services provision and to facilitate the access to credit.

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1. Introduction

Domestic savings in China reached 50% of national income in 2008, the highest level in the world as a share of GDP. Savings have been rising over the last decade, systematically exceeding investment expenditures, notwithstanding the quite sharp surge of the latter as a share of GDP, from 35% in 2000 to 45% in 2009. This widening discrepancy translated into large current account surpluses in China, mirrored by large deficits in advanced countries.[2] Private consumption, on the other hand, fell as a share of GDP, from 46.2 to 34.5 per cent over the same period, as a result of a rising propensity to save and a persistent erosion of households' disposable income. All the while China grew at the remarkable pace of 10.3 per cent per year, an undisputable proof of the success of the development strategy pursued by the Chinese authorities since the start of the market reforms, whereby the rapid industrialization process has been financed by domestic savings and the excess of production absorbed by foreign demand. However, Chinese authorities commitment to a growth rate above 8 per cent is very likely to result irreconcilable with the replication of the same strategy in the medium run.

The rising weight of China (from 7.2 to 11.4 per cent of world GDP since 2000[3]) and the weaker growth prospects of advanced countries are already creating tensions in currency markets and international *fora*. A reproduction of the old growth pattern whereby the excess production of China is absorbed by the US and other advanced economies running widening current account deficits is not sustainable, especially if we consider that if countries were to grow at the rates anticipated by the main international institutions, by 2025 China will be the largest world economy in terms of GDP. At the cornerstone of a change in this pattern lies the excessive amount of money China is storing. Understanding the saving determinants in China has thus become a central issue in the debate on global imbalances.

In a widely quoted address, Ben Bernanke first spoke of a *global saving glut* claiming that excess savings in certain countries were depressing world real interest rates and hindering the possibility of engineering policies to reduce the US current account deficit and symmetrically the Chinese – as well as other big exporters – surplus (see Bernanke, 2005). Since then, many commentators have linked the excess saving of surplus countries like China and the oil exporters to the conditions that fostered the financial crisis whose consequences are still felt today. As Obstfeld and Rogoff recently argued "global imbalances and the financial crisis are intimately connected" and the policies followed in the US and East Asia paved the way for a widening of imbalances.

There are rising political pressures on China to let the renminbi (RMB) appreciate as a step towards a gradual shift from external to domestic demand as a source of growth. Blanchard and Giavazzi recently argued in favor of a "three handed approach" to rebalance growth in China which

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[2] Over the last decade China's current account surplus increased six folds as a percentage of GDP peaking at 11% in 2007, about 372 billion dollars. In 2008 that surplus amounted roughly at 50% of the aggregated surpluses of the rest of Asia (including Japan) and the major oil exporting countries. Foreign reserves rose rapidly, reaching 2.4 trillion dollars at the end of last year (more than half of China's GDP).

[3] At the PPP.

would entail "a decrease in saving, with a focus on private saving, an increase in the supply of services, in particular health services, and an appreciation of the RMB".[4] The actual quantitative effect of this and similar policy recommendations,[5] aimed at stimulating Chinese consumption, has been disputed. Zhang and co-authors[6] argued that the impact of a reduction of Chinese current account surplus engineered through a change in China's saving behaviour would have almost negligible effects on rebalancing world demand and the current accounts unbalancing in deficits countries. The Chinese Government has anyhow recently recognised in its proposals for the 12th five-year plan (2011-16), that promoting a more balanced growth within China and increasing the welfare of the population by sustaining domestic consumption are qualifying aspects of its medium-term policy. In fact, a number of additional reforms are urged in order to reduce domestic saving, such as social-security, financial development, fiscal and tax reforms.

No matter whether one believes that a rebalancing of demand in China will guide the world toward a more sustainable growth path or rather dismiss this argument and judges such a policy useful for China's own sake, the issue of Chinese saving is central to the international (and national) economic policy debate.

So why are savings in China so high and where does the problem lie: with households, firms or Government?

All three institutional sectors are big savers in China. But while the corporate sector behaviour is not so peculiar, especially when compared with other Asian economies, and net savings are negative, the households sector propensity to save is the highest in the world and kept rising over the last few years. As we will argue, this is partly due to the Government budget policies, that kept government consumption low as a share of GDP as the soaring revenues were invested in infrastructures or transferred to firms capital accounts. So it is on personal saving that we will focus our analysis.[7]

The Chinese households saving rate is very high compared to other countries at analogous development level; it has dramatically increased starting from the end of seventies, after the introduction of economic reforms. Before 1979 China was a planned economy characterized by full employment and consumer goods shortages; government provided housing, education, pensions and medical services; households saving was essentially due to unsatisfied consumption rather than the result of wealth accumulation decisions. This social protection network (known as the *iron rice bowl*) has been progressively dismantled as economic reforms proceeded distributing unevenly the profits of the resulting fast growth. Strict family planning policies were enforced ("*one child policy*"), provoking dramatic changes in the demographic structure of the population and in the

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[4] Blanchard and Giavazzi (2005).
[5] See also Blanchard (2009), Krugman (2010) and IMF, October 2009.
[6] Zhang et al. (2010).
[7] Similar conclusion on the centrality of personal savings are reached – among others – by Chamon & Prasad (2010), Horioka & Wan (2006) and Wei & Zhang (2009).

intergenerational relationships as children in the traditional Chinese society were the future source of income for the elders. The household registration system (*hukou*)[8], by restricting migration from the countryside to urban areas, has prevented a more balanced development, maintaining a dual-economy. The system of state owned enterprises (SOEs) has been gradually put aside, as private businesses started flourishing in economic *"special zones"* and spreading from there.

All these factors might have contributed to the sharp rise of Chinese savings from around 5% of disposable income before 1978 to almost 40% in 2009.

In a review of the literature Browning and Lusardi lists nine possible motives that can induce people to save (eight of which already envisaged by Keynes in the General Theory).[9] Among them, the life cycle motive still constitutes the workhorse of the theoretical literature on savings. The life cycle theory, first formalized by Modigliani and Brumberg,[10] states that people maximize their lifetime utility and choose – under standard hypothesis – a smooth consumption pattern, which entails that, facing a reduction of their income after retirement, they will build up assets during their working life to finance consumption after retirement. Demography and growth are the main determinant of aggregate saving in the standard version[11] of the model. Modigliani and Cao tested the life cycle explanation with Chinese aggregate data spanning almost 50 years (1953-2000), concluding that the theory fits the data well. Their evidence has been indirectly called into question by results based on provincial level data by Horioka and Wan (2006) and household level data by Chamon and Prasad (2010) and by Brugiavini et al (2010). Differences between rural and urban households behaviour and the U-shaped age profile of savings are hard to reconcile with the standard version of the life cycle model and are at odds with Modigliani and Cao conclusions. Difficulties in rationalizing empirical facts concerning saving behaviour with economic theory are well known and by no means unique to China. Recognizing this problem most empirical analysis usually starts with a-theoretical specification,[12] while the theoretical literature has proposed several explanations to help bridge this gap. Prominent among them are the presence of *liquidity constraints* that prevent agents from keeping the marginal utility of consumption constant over their lifetime posing a binding constraint on their possibilities to borrow against future income and *precautionary saving* arising from uncertain future income prospects in the presence of a concave marginal utility. Ignoring these factors may lead researchers astray, since borrowing constraint are a common aspects in consumer credit markets, even more so in countries like China, where financial markets are not developed and "intuitions derived from models without a precautionary motive can

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[8] On the functioning of the *hukou* system see Wang (1997).
[9] See Browning and Lusardi (1996).
[10] Modigliani and Brumberg (1954).
[11] There is some ambiguity in the literature concerning what people really mean by life cycle model, see Browning and Lusardi (1996). Here we mean the simple life cycle model with certainty equivalence or the "stripped down version" of the model (see Deaton 1992).
[12] "most of the empirical work on saving itself is descriptive and relatively atheoretical" (Browning & Lusardi, 1996). See for example Loyaza et al. (2000).

be seriously misleading, even if the amount of uncertainty is small".[13] The deep changes occurred in China over the last thirty years have surely radically increased the amount of uncertainty families face concerning their incomes and pensions, so together with liquidity constraints it is highly likely that people are induced to save also for precautionary reasons. In a recent speech, the Governor of the People's Bank of China addressed the issue of high Chinese savings considering first a cultural argument, "East Asian countries are influenced by Confucianism, which values thrift, self-discipline, zhong yong or Middle Ground (low-key)" but ultimately concluding that "under the planned economy, housing, healthcare, and pension were provided by the enterprises and the government… After the reform in the 1990s, the "iron bowl" (lifelong secure job and welfare) system was smashed … However, effective social security system had not been in place either. These significantly increased the incentive for precautionary savings."[14]

We take stock of this debate and revisit the conclusions of Modigliani and Cao, trying to reconcile their evidence with results based on micro data. We show that the life cycle explanation is less robust than what previously believed even looking at national statistics, we then split aggregate time series (updated to 2008) distinguishing between rural and urban households and find clear evidence of different saving patterns. This evidence puts into question the "one size fits all" assumption implicit in the aggregate analysis, hence we focus on provincial level data, which allows us to exploit the variation across provinces as well as among rural and urban realities, taking into account in this way the uneven pace of development of Mainland China. Our conclusion allow us to explain the divergence between aggregate data and micro analysis and motivate our choice of using a panel approach. The policy implication of the evidence thus collected are also addressed in the final part of our work.

The paper is organized as follows. In *section 2* we address the general question of whether China is saving too much, analyzing the different dimensions along which this might be a meaningful question. In *section 3* we give a closer look at aggregate data to prove that the main cause of high savings lies in the household sector. In *section 4* we assess the life cycle explanation of Chinese high personal savings first advanced by Modigliani and Cao to conclude it is not satisfactory from various points of view. In *section 5* we propose alternative explanations and exploit the variability across Chinese provinces to gauge them. *Section 6* concludes. *Appendix A* provides details on data sources, data constructions and discrepancies between national accounts and survey statistics.

2. Is China's savings rate too high?

China's saving are very high in more than one respect: comparing them with those of other countries in general, with those of East Asian economies in particular and with countries in a

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[13] Browning and Lusardi (1996), p. 1798.
[14] Xiaochuan (2009).

similar development stage. Savings are high also with respect to the past, as they kept increasing till the most recent years and their level is "high" also considering the sustainability of excess saving (and hence current account surplus) over the medium term.

A preliminary observation is necessary. International comparisons of saving rates are notoriously insidious: large gaps in saving behaviour across countries might be substantially reduced once relevant differences in accounting procedures and concepts are considered (see Hayashi, 1989, for a convincing case concerning US and Japan) and various definitions of "saving" can lead to different conclusions ('net' or 'gross' saving rates, domestic, private or household savings, see OECD, 2004). The poor quality of the data also hinders the comparison, especially in the early phases of development when a coherent system of accounts is often not available. With this caveat in mind, in what follows we will rely mainly on international sources and use "gross" saving rates (i.e. inclusive of depreciation) in cross-countries comparisons.

As shown in the first column of table 1, gross domestic savings in China are much higher than those recorded in the rest of the world. This was already true at the beginning of the nineties, it became more striking by the end of this decade.

Even focusing only to the other East Asian countries (top part of table 1) where savings are traditionally high, partly for cultural reasons,[15] China stands out with national savings that are 20 points (of GDP) higher than Korea, Indonesia and Vietnam, 15 points higher than India and 25 points more than Japan. The other striking feature that emerges from the data, is the very low level of consumption in terms of GDP, compared with all other countries (column 3).

China is an outlier also considering private saving (*i.e.* domestic savings – government saving). Over the period 2002-2008 on average the Chinese private sectors saved 7 percentage points of GDP more than the thriftiest country in the sample, India. It was also well above the others in terms of capital accumulation, with a share of investment to GDP greater than 42%, that compares with rates in the mid thirties or mid twenties for most other Asian economies.

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[15] See among other Morishima () for Japan and the Governor of PBofC, Zhou Xiaochuan (2009) for China.

Table 1. International comparison of domestic saving, domestic absorption and current account balance

Country	Gross domestic savings	Gross public savings	Household final consumption	Gross capital formation	Current account balance
	2002-2008 average				
China	50.2	8.2	38.1	42.7	7.6
India	37.0	2.1	57.6	34.4	-0.7
Indonesia	27.8	4.8	64.0	25.4	1.7
Korea, Rep.	31.1	10.2	54.5	29.9	1.2
Thailand	29.2	6.2	56.0	27.5	1.8
Vietnam	32.4	7.3	65.2	38.2	-5.7
Japan	27.0	3.9	57.2	23.4	3.6
Brazil	17.7	-1.6	60.5	17.5	0.1
Russian Federation	31.0	10.0	49.1	22.9	7.9
France	20.4	5.3	56.7	20.6	-0.4
Germany	22.7	0.3	58.2	17.7	5.2
Italy	19.2	0.5	58.6	21.1	-2.0
United Kingdom	15.0	3.9	64.6	17.3	-2.3
United States	14.5	10.2	69.9	19.4	-5.2

Source: IMF, WEO April 2010.

One might object that this comparison is flawed since we are dealing with countries at different stages of development (see appendix table A1). In table 2 we consider various economies in their *take-off* phases so that we compare them at a similar level of development. The evidence confirms the exceptionally high level of Chinese savings.[16]

Table 2. Comparison of growth, savings and investment performance over the take-off period in selected Asian countries

Country	Period of fast growth	Per capita GDP at beginning of period ($ PPP)	Per capita GDP end of period ($ PPP)	Average GDP growth (%)	National Savings (% of GDP)	Investment (% of GDP)
China	1999-2008	2162	6188	10.4	47.6	38.8
India	1999-2009	1447	2868	7.0	30.4	28.1
Indonesia	1988-1996	1269	2450	7.3	32.0	24.1
Malaysia	1988-1996	4037	8239	9.4	32.7	37.9
Thailand	1988-1996	2207	5018	9.0	33.8	39.5

Is the current situation sustainable in the long run? There are at least two arguments that can be put forward to demonstrate that the answer might be "no". First, as stated in the April 2010 WEO by the IMF, since in deficit countries demand is likely to remain much weaker than in the pre-crisis

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[16] Results are robust with respect to small variations in the chosen time periods.

era "for surplus economies… the challenge is to rebalance growth from external sources to domestic sources and run smaller surpluses in the future". Second, even if the world were to return to the previous situation the question is: can the growing level of Chinese savings and exports be absorbed? Growing at an average annual rate of 10% (in line with the latest IMF projections and with the pace of the first decade) by 2020 China would outweigh Japan in terms of GDP not only at the PPP but also in dollar term. Chinese GDP would account for 1/6 of world total output and its saving therefore (if stable at more than 50% of GDP) would rise from little more than 4% to 8% of world GDP. A 10% surplus in net exports would translate in a twice as big rest of the world deficit compared with 2009. It seems highly unlikely that such a growing burden in deficit countries can be financed without rising stability risks.

3. China's savings by sector

The scenario depicted at the end of last section, is not only unfeasible from a global point of view, it is also undesirable for China itself, as it is already becoming clear. The growth strategy pursued so far with undisputable success by the Chinese authorities entailed the rapid accumulation of physical capital (machinery and infrastructures) through an intensive plan of public and private investments financed by fast rising domestic savings. As productivity rose, output, firms' profits and government revenues expanded while the labour share contracted in terms of GDP, as wages grew at a slower pace, bringing households' disposable income down to 58% of GDP in 2008, from 69% at the beginning of the previous decade.

Starting from the early nineties capital accumulation has taken place at the expense of private consumption: as a share of GDP, gross fixed capital formation rose from 30% to 45%, while private consumption shrank from 50% to 35% (fig. 1). Private consumption is now by far too low whether we compare it to the rest of developing Asia, or to the industrialized countries where on average it is well above 60% of total output.

Fig. 1 China: intenal and external imbalances
(as % of GDP)
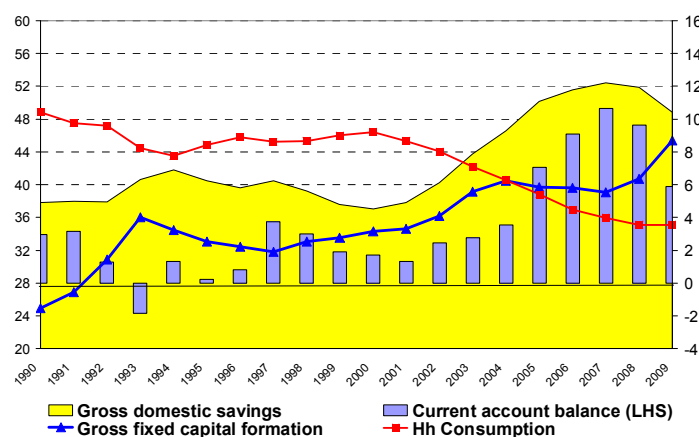
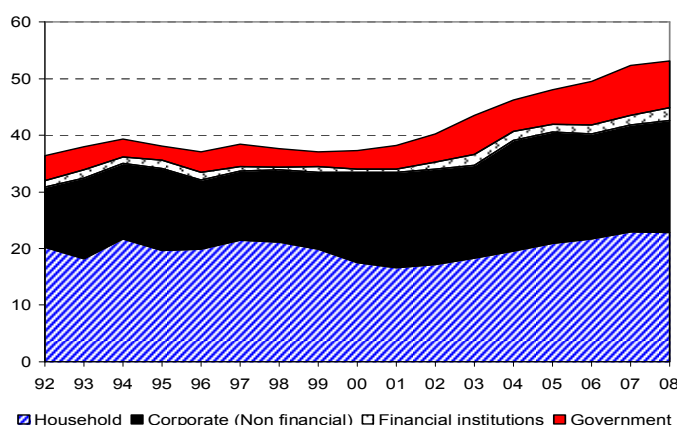*Source*: author's elaborations on CEIC data.

Flow of funds data allow to separate the contribution to China's overall savings of the main economic (institutional) sectors: government, corporate and household.[17] Domestic saving S is the sum of the savings in these three sectors (apart from a negligible contribution from financial institutions), the overall savings to income ratio (average saving rate) can thus be expressed as:

$$s = \frac{S}{Y} = \sum_j \frac{S_j}{Y} = \sum_j \left[\left(\frac{S_j}{Y_j} \right) \cdot \left(\frac{Y_j}{Y} \right) \right] = \sum_j \left(s_j \cdot y_j \right) \tag{1}$$

where S_j and Y_j are gross savings and disposable income in sector j and s_j and y_j are average saving rate and the income share of the sector, while j here stands for government (g), corporate (c), or household (h).

Since 2000 government and corporate saving rose sharply and now account for about 20 and 8 percentage points (in GDP terms) up from 10 and 3, respectively, in the early nineties (Fig. 2). Household saving, instead, as a share of GDP remained quite stable around 20 percent.

Fig. 2 China: saving by sector
(as % of GDP)

Source: author's elaborations on CEIC data.

One might therefore observe that the major driving forces behind the rise of Chinese national savings over the past 20 years can be traced back to non financial firms and to the government. While this is undoubtedly true a closer look at the data, taking stock of the decomposition in (eqn. 1), might point to a different conclusion regarding the agents' behavior behind these numbers.

Looking at the government sector, over the last decade, even though fiscal revenues have been boosted by the rapid expansion of GDP, by the increased efficiency in tax collection (a tax reform was approved in 1994) and by the levies on land sales, public consumption has remained

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[17] Flow of funds data are available only for the 1992-2008 period.

quite low as a share, of GDP (fig. 3), leading to a considerable increase of public sector saving. Such a saving has been invested in fixed capital, both directly and indirectly (through capital transfer to the corporate sector).

Fig. 3 China: Government revenues and consumption expenditure
(as % of GDP)
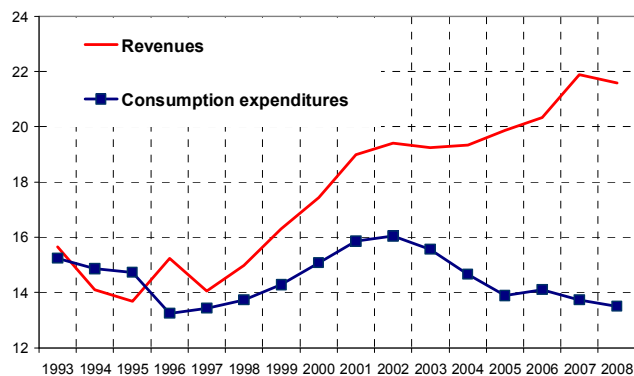
Source: author's elaborations on CEIC data.

In the corporate sector, following the 1997-98 Asian financial crisis, saving grew globally, increasing more in Asia than in the rest of the world. China was no exception to this global trend. Its corporate saving peaked at 20% of GDP in 2004, fluctuating around that level ever since (Fig 4).[18]

Fig. 4 Non-Financial Corporate gross saving in selected countries
(as % of GDP)
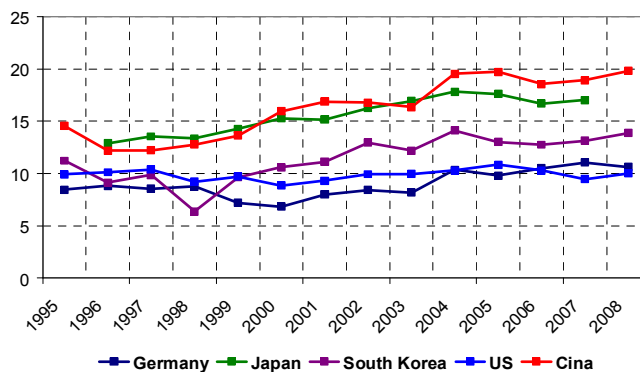
Source: authors' elaborations on OECD and national accounts data.

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[18] At global level, while the rise of corporate saving was in general offset by an equal decline in household saving this was not true in emerging Asia and in China in particular (IMF 2009). Also, the available micro evidence shows that China corporate sector is not particularly thrifty. Chinese firms (either SOE or private) do not distribute systematically less dividends than other firms in Asia, the common held belief that poor corporate governance in the SOEs and windfalls in resource sectors are causing high saving rates in China is not borne by a firm-level dataset comprising China and other Asian countries (see Bayoumi et al. , 2010).

The high rates of corporate saving in Asia, and in China in particular, reflect tax distortions and poor financial development, both inducing firms to finance investments mainly through self-retained earnings (table 3). Notwithstanding the high and increasing level of savings, however, it is worth noting that the saving-investment balance of the corporate sector remains largely negative (-11% of GDP in 2008; fig. 5).

Table 3. China: Sources of Funds for Investment in Fixed Assets

	State Budget	Domestic Loans	Foreign Investment	Self-rising Funds
	in % of total investment			
1981	28.1	12.7	3.8	55.4
1990	8.7	19.6	6.3	65.4
2000	6.4	20.3	5.1	68.2
2005	4.4	18.5	4.4	72.7
2008	5.0	14.5	2.9	78.3

Source: China Statistical Yearbook 2009 and CEIC

Fig. 5 Saving-Investment balance to GDP ratio by sector
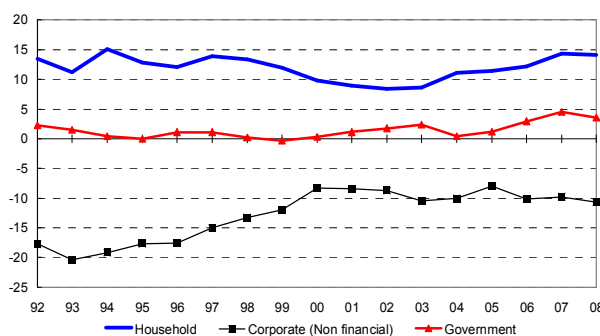
Source: authors' elaborations on CEIC data.

We can conclude that government saving arose from insufficient spending while corporate sector savings soared following a trend common to other countries and remaining nonetheless below investment; what instead stands out as peculiar and challenging to explain (and to change) is the saving behaviour of Chinese households.

Personal saving rates in China rose continuously during the last decade (from 28% to 38% of disposable income; fig. 6), so that, even though their disposable income share fell, personal savings remained high as a percentage of GDP, even recording a slight increase over the 2002-2008 period (up to 23%).

Fig. 6 China: household's saving and disposable income
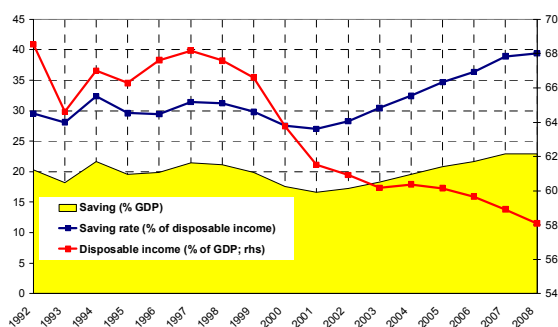
Source: author's elaborations on CEIC data.

Fig. 7 Household gross saving in selected countries
(as % of GDP)
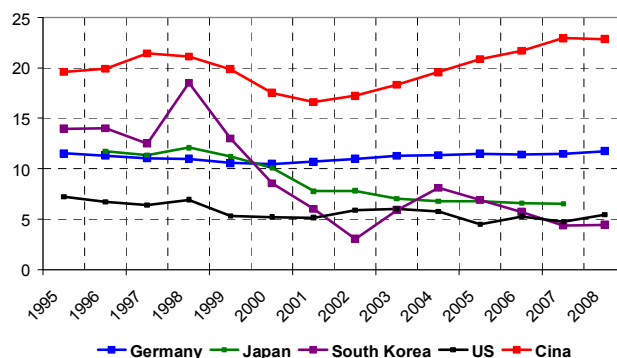
Sou*rce*: authors' elaborations on OECD and national accounts data.

These rates are high not only vis à vis other economies today (Fig. 7), but also in historical comparison. Other countries have experienced high saving rates during phases of rapid growth. In Italy, for instance, private and households savings were very high during the 60's and 70's, but nowhere near the peaks reached nowadays in China (Ando et al., 1994). Also considering other Asian economies to control for a potential "cultural bias" (Zhou, 2009), Chinese households' savings appear exceptionally high. In Japan between the 60's and the 70's private savings peaked at almost 25% of net product, those of households passed 20% of disposable income (Hayashi, 1986).

Despite such an impressive saving rate, opinion polls reveal persistent concern of Chinese households for the levels of their savings. According to a recent Gallup survey (see Gallup, 2007) more than two-thirds of the people interviewed claimed that they were dissatisfied with the amount of savings they had and wanted more.

The evidence presented so far reveals, on the one hand, that the saving behaviors of the three institutional sectors are strictly related, as they are the outcome of the same development strategy, and, on the other hand, that Chinese households are storing an exceptionally high share of their disposable income and wish to continue to do so. It is therefore upon this behaviour that we would like to shed light with our analysis.

4. A reappraisal of the life cycle explanation of Chinese households savings

The life cycle hypothesis (LCH), according to which the main motivation for personal saving is financing consumption after retirement, is still the prominent theory or at least the starting point for most empirical research on the topic (see Deaton 1992, Deaton & Paxson 2000 and Browning & Lusardi 1996 for a review of the literature). Basing their analysis on aggregate data spanning from 1953 to 2000, Modigliani and Cao (2004; henceforth M&C), reached the conclusion that the rising amount of personal savings in China can be explained within the framework of the life cycle model. The main explanatory factors driving up Chinese households saving from the very low levels of the 50's, when it trailed around 5% of disposable income, to the heights of late 90's, when it reached 30%, have been the rapid growth of the economy and the dramatic changes in the demographic structure, induced by the one-child policy.[19] M&C measure these determinants by a long-term average of real per capita disposable income growth and by the ratio of employees to

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[19] In the last thirty years China experienced a dramatic demographic change: in 1978 the share of young population (aged 0-14) in total population was 65%, by 2008 such a share was below 30%.

minors, the latter being defined as people below 14 years of age.[20] The first factor can be rationalized within the life cycle framework by the fact that, in a fast growth environment, young generations in their saving phase are much richer than older generations in their dissaving phase pushing up overall personal savings and saving rates.[21] The one-child policy affected the saving behaviour of Chinese households in two ways: reducing consumption needs (and so the income share of consumption, C/Y) for families with children and removing what was in the Chinese tradition a substitute for savings for retirement (children were supposed to take care of the elder members of the extended family). The core equation in M&C paper is:

$$sr_t = a_0 + a_1 g_t + a_2 (E/M)_t + a_3 (\Delta y_t - g_t) + a_4 \Delta p_t \tag{1}$$

where (sr) is the saving rate, (g) is disposable income long term growth, E/M the ratio of employees to minors, $\Delta y - g$ is annual deviation from long term growth and Δp is CPI inflation.

Table 4: *Modigliani and Cao* regressions
on the original (1953-2000) period

	Constant (*a0*)	Long term income growth (*a1*)	E/M (*a2*)	Deviation from long term income growth (*a3*)	inflation (*a4*)
	I. 1953-2000 (all years)				
R^2 = 0.98	0.1	2.07	0.1	0.1	0.26
tvalue	-11	8.85	9.04	2.08	3.78
	II. 1953-1985				
R^2 = 0.92	-0.13	1.52	0.14	0.14	0.74
tvalue	-3.23	3.5	3.04	1.95	1.79
	III. 1978-2000				
R^2 = 0.96	-0.1	2.52	0.09	0.13	0.18
tvalue	-6.22	8.8	7.9	2.23	2.81

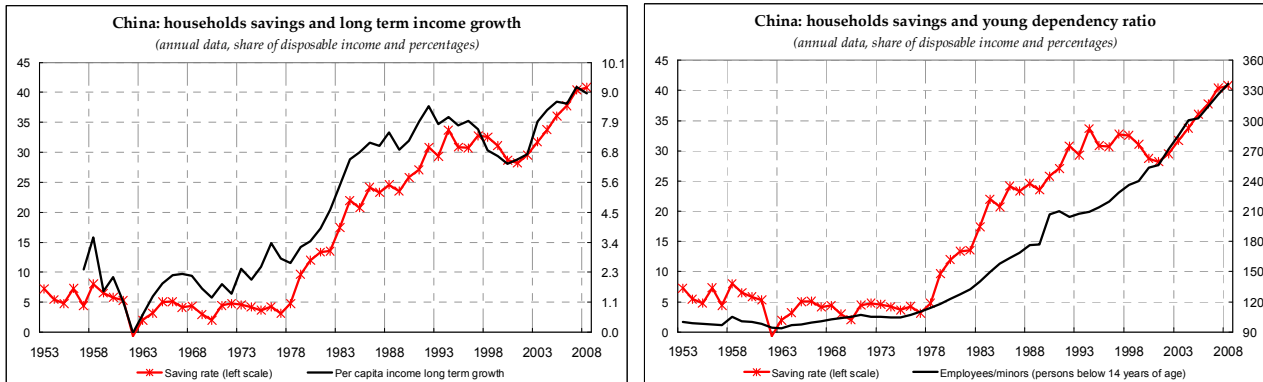*Source: Modigliani and Cao 2004*

Since then, the personal saving rate rose even higher, reaching 40% of disposable income in 2008. Extending the sample to cover these most recent figures and taking into account the data

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[20] In their paper Modigliani and Cao consider different alternatives for the long-term growth, here we chose a fourteen years average growth rate from 1966 onwards, approximating it with the longest possible average for the period 1957-1965. This choice allows us to reproduce almost exactly the regression results reported in table 3 of the M&C paper. The variable they select to take into account the changes in the population structure is a proxy of the young dependency ratio, given by the number of employees divided by the number of persons below 14 years of age.

[21] Several theories consider the role of income growth. At aggregate level the relationship between saving rates and income growth is positive; in standard growth models the direction of causation goes from saving rates to growth rates. The evidence, however, suggests that the causation could also run in the other direction, with the saving rate responding to income growth, both at aggregate and microeconomic level (Carroll, 2001). The LCH reconciles the evidence with the theory arguing that in fast growing economies, like China, young generations in their saving phase being much richer than older generations in their dissaving phase push progressively up the average saving rate of the economy. Additional refinements to the theory include the habit formation hypothesis (HFH) according to which individuals care about both the level and the rate of growth of consumption, smoothing the two. As a consequence, following a positive (negative) income shock consumption adjusts slowly and the saving-to-income ratio increases (decreases).

revisions intervened in the meantime[22] does not seem to change the good fit of M&C regressors, at least visually (see fig 8).

Fig. 8: Chinese households saving rate & disposable income; overall dependency ratio

Source: Modigliani and Cao 2004, CBS and authors computations

Estimation of the same relation postulated by M&C, extending the sample to cover the years 2001-08 confirms their results for long term growth (g), that is always highly significant and positively related to the saving rate (sr), and for the ratio of employees on minors (E/M; see table 5).

Table 5: *Modigliani and Cao* regressions
on the "extended" (1953-2008) period

	Constant (*a0*)	Long term income growth (*a1*)	E/M (*a2*)	Deviation from long term income growth (*a3*)	inflation (*a4*)
I. 1953-2008 (all years)					
R^2 = 0.98	-0.09	2.49	0.08	0.05	0.12
DW = 0.74	*-11.98*	*9.46*	*8.94*	*0.78*	*2.05*
II. 1953-1985					
R^2 = 0.92	-0.14	1.49	0.15	0.14	0.18
DW = 0.93	*-2.75*	*2.57*	*2.53*	*1.85*	*1.75*
III. 1978-2008					
R^2 = 0.96	-0.07	2.75	0.07	0	0.05
DW = 0.76	*-4.67*	*6.5*	*6.37*	*0.02*	*0.72*

Source: Modigliani and Cao 2004, CBS and authors computations

On the other hand, the extended sample[23] weakens the relation between saving rate and deviations from long run income ($\Delta y_t - g_t$) and also the link with inflation (Δp_t) appears flimsy, being significant only in the regression that includes the entire sample.

However, the specification suffers from a number of econometric problems as can be easily spotted noting that DW statistics lay all around 1, signaling positive autocorrelation in the residuals.

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[22] See appendix for details.
[23] and data revisions.

Introducing in (1) the lagged dependent variable among the regressors solves the problem[24], but on the most recent sample the dependency ratio is barely significant, long-term growth has a somewhat reduced effect, while deviations from long-term growth have a much stronger (positive) effect on the saving rate (see eq. 2).

$$sr_t = \underset{(-2.52)}{-0.03} + \underset{(7.82)}{0.66}sr_{t-1} + \underset{(3.99)}{1.21}g_t + \underset{(1.94)}{0.02}(E/M)_t + \underset{(4.24)}{0.22}(\Delta y_t - g_t) + \underset{(0.47)}{0.02}\Delta p_t$$

$$R^2 = 0.99, \; DW = 2.51, \; sample : 1978 - 2008$$

(2)

Taken together this evidence seems to weaken the case put forward by Modigliani and Cao. But this is not the main objection that can be moved to the life cycle explanation of Chinese households savings. There are other, deeper reasons to doubt that the life cycle framework really captures the whole story of rising personal savings in China. Studies based on province-level and household-level data (see Horioka and Wan 2006, Chamon and Prasad 2010) have shown that demographic changes and long-run growth are far from being the one and only cause of rising saving in China. Inertia and current income growth play a major role in these data, while demographic variables are rarely relevant. The age-profile of urban households saving rate became U-shaped starting in the mid-90's, and the saving rate itself peaks in old age. Clearly it is hard to reconcile these facts with life-cycle hypothesis.

It is our opinion that while the determinants singled out by M&C can partly explain the surge of Chinese personal savings from the very low levels preceding the economic reforms to the high levels of the nineties, they fall short of fully accounting for the persistent growth of the saving rate since then and for differences that emerge across provinces as well as between rural and urban households. M&C evidence rests on China being treated as an homogeneous reality but this is far from being true, one explanation will most likely not "fit the whole China". The development strategy followed since 1978 by Chinese authorities was based on the gradual opening to "free market" in designated areas of the country (*special economic zones*), characterized by big urban agglomerates and proximity to major ports. It led to a fast but unevenly distributed growth of income, both among provinces and between rural and urban population. Today there still exist large gaps in development levels among Eastern, Central and Western provinces (see fig. 9).
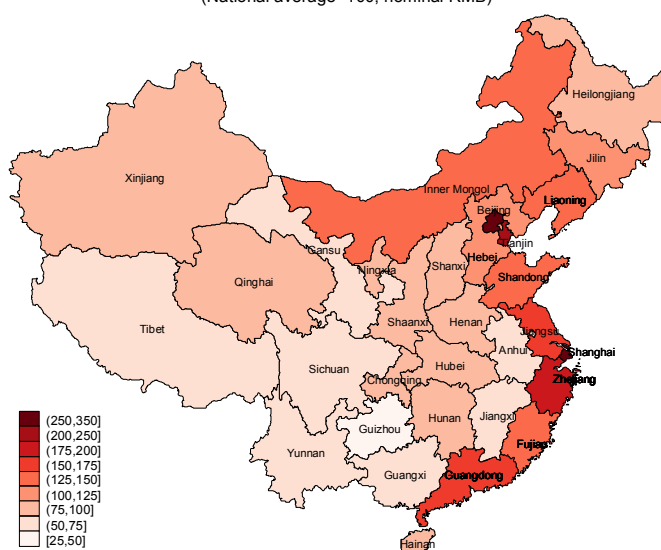
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[24] Godfrey test for serial correlation up to the fourth order shows no evidence of autocorrelation in the residuals of the estimated equation (Chi-Square(4) *p-value* = 0.2014).

Fig. 9   GDP per capita

(National average=100; nominal RMB)

Source: authors' elaborations on CEIC data.

In the last twenty years the share of urban population has almost doubled, reaching 46% of total population in 2008 (Table 6). The rapid urbanization process has been accompanied by an increasing income gap between rural and urban areas: in 2008 average disposable income was 3.3 times higher in urban than in rural areas; the income share of urban households now represents more than 60 per cent of total household income and such a share is due to increase. For our purposes it is important to bear in mind that it is exactly the saving rate of urban households that rose sharply over the last decade: according to the NBSC survey data (which underestimate the flow of funds figures presented before, see Appendix), the urban households' saving rate went from 20.4% in 2000 to 28.8% in 2008, while that of rural families declined slightly (from 25.9% to 23.1%).

Table 6 China: Urbanization and saving rates in urban and rural China

Year	Urbanization rate	Urban to rural disposable income ratio	Urban household saving rate	Rural household saving rate	Average household saving rate
1990	26.4	2.2	15.3	14.8	15.0
1995	29.0	2.7	17.4	16.9	17.2
2000	36.2	2.8	20.4	25.9	22.5
2005	43.0	3.2	24.3	21.5	23.5
2008	45.7	3.3	28.8	23.1	27.3

Source: China Statistical Yearbook, various years, and authors' elaborations.

In our opinion such an evidence advises us that is not possible to tell a coherent story about Chinese savings by looking only at country-wide statistics. For this reason, we believe that an analysis based on more disaggregated data is crucial to uncover more recent saving dynamics.

5. One size does not fit all China: the provincial-level analysis

5.1 Household savings and disparities across China

In the last twenty years household savings in China increased faster than disposable income in both urban and rural areas. According to NSBC's household survey data, from 1991 to 2008 in urban areas household savings grew by 12.9 per cent per annum in real terms, compared to an average growth of disposable income of 10.3 per cent, pushing the saving to income ratio up from 15.3 to 28.8 per cent; in rural areas savings and disposable income grew respectively by 8.5 and 6.4 per cent and the saving rate climbed to 23.1 per cent, from 14.8 (table 6).[25] These numbers are quite impressive, not least because per capita income is on average still very low, around 4,000 dollars a year in urban areas and just 1,300 dollars in rural ones (expressed in 2008 purchasing power parities).
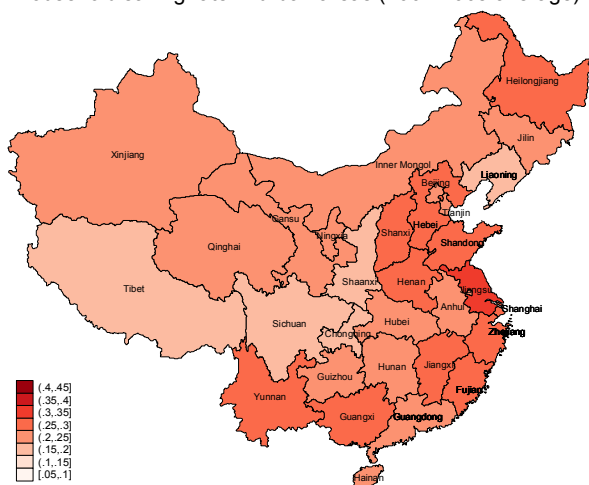
Although aggregate saving rates have risen in both urban and rural areas, they followed a different path over time and across provinces. In urban areas saving rates have increased steadily and quite evenly across provinces; in rural areas, instead, saving rates have been more volatile and more dispersed across provinces. Taking averages over the period 2001-2008, urban households saving rates ranges from 16.6 per cent in Chongqing to 30.1 in Jangsu, while that for rural households goes from 7.9 in Shaanxi to 48.8 per cent in Tianjin (see table B2 in appendix). A quick look to the map reveals that the households residing in the richest provinces along the coast are those that save more out of disposable income, while those residing in the poorest provinces located in central China in general can afford to save less, particularly in rural Shaanxi, Hunan, Yunnan and Guizhou (fig. 10).

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[25] According to flow of funds data the household savings reached 38 per cent of disposable income in 2007. The discrepancies between flow of funds and survey data are well known and highlighted often in the literature as puzzling. An inspection of the data reveals that survey data are more volatile and tend to underestimate both income and savings, the underestimation of the latter is more pronounced. All in all, however, the dynamics of the saving rate results quite comparable (see appendix).

Fig. 10 Map of urban and rural household saving rates by province

Household saving rate in urban areas (2001-2008 average)   Household saving rate in rural areas (2001-2008 average)
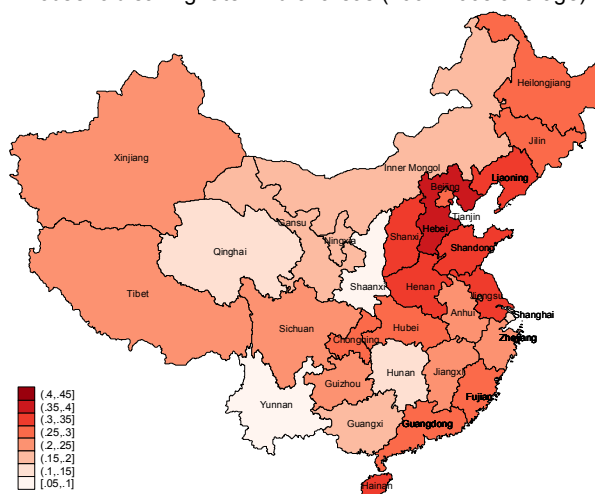
Source: CEIC and authors' calculations

Also, the saving rates of rural households, that in the past were generally higher than those of urban households in most provinces, since 2000, as we saw, started trending downward falling below those of urban counterparts in several provinces. These trends likely reflect, among other things, the urbanization of youngest workers, which, despite the limitations imposed by the household registration system (*hukou*), proceeded steadily in the last few years, enlarging the gap between urban and rural income.[26] In the last decade the further increase of the personal saving rate is entirely attributable to urban households.

A growing body of literature attributes the increase of household saving rate in urban areas to precautionary motives and liquidity constraints (Horioka and Wan, 2006; Chamon and Prasad, 2010; Jin et al. 2009; Wei and Zhang, 2009). While in M&C regressions these elements were not considered, we deem very important to consider them in our analysis.

Since the introduction of the reforms in 1978, aimed at transforming China into a market economy, traditional safety nets have progressively eroded in both rural and urban areas, increasing the need for individuals to save in order to self-insure against adverse shocks. Along with increasing urbanization, in the last fifteen years the urban pension system, previously based on state-owned enterprises (SOEs), where the majority of urban workers were employed, underwent major changes. The downsizing of the public sector and the restructuring process of the SOEs has led to a significant drop in the number of their employees and to a gradual dismantling of benefits for those

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[26] Unfortunately, to our knowledge, there are no data that allow to estimate internal migration flows from rural to urban areas by age. Nevertheless, it is plausible that such flows consist primarily of young working-age individuals. Assuming that those workers were formerly employed in rural areas, when they move to urban areas the working-age population in rural areas decreases and so does the average saving rate there, while in urban areas, where such a population increases, the average saving rate tends to increase.

still working there. At the same time the burden of social spending shifted from enterprises to local governments.[27]

According to the recent OECD Survey (2010), while almost all the workers employed in SOEs are covered under the new pension system, the participation is much lower for workers employed in private enterprises and almost nil for self-employed and workers without labor contracts. These last two categories, which account for 66% of total employment in urban areas, are largely composed by immigrants. This last category, therefore, need to save in order to self-insure for old-age, as well as to send money to relatives left in the countryside.[28] One important reason why workers may choose not to participate is because the system is fragmented in thousands of different municipal systems. As different municipalities have different dependency ratios, contribution rates differ among them while benefits are still hardly portable from one municipality to the other. For mobile workers the lack of portability represent a strong limitation leading them to keep savings high in order to self-insure.

Another important source of uncertainty is represented by health care expenditures. Analogously to the pension system, the health care system is managed locally: medical insurance is based on local schemes and insured patients can access health care only in the area of residency. As a consequence, migrant workers and their family have no coverage in the city where they live if they are not resident there. Medical care outlays have grown fast in recent years, impacting uninsured as well as insured people, which still have to pay 45% of their own medical expenses (OECD, 2010).

It is difficult to quantify how much of the household saving is due to precautionary motives. Jin et al. (2009) estimated the impact of the mid-1990 pension reform on urban savings and found that it increased the saving rate by 6 percentage points for young cohorts and by 3 percentage points for the cohort aged 50-59. Barnett and Brooks (2010) estimated the impact of public health care spending on household's savings and found that in urban areas for each Yuan increase in government health spending savings decrease by 2 Yuan. Baldacci et al. (2010) using a panel of 24

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[27] In 1978, out of 95 millions of urban workers 75 were employed in SOEs, enjoying generous benefits, for pensions, health insurance, schooling and housing. In 2008 65 millions of urban workers, out of 302, were employed in SOEs, with considerably lower benefits. The new pension system has set the replacement rate at 58.5% of average earnings on retirement, down from 80% in the pre-reform period. Such a replacement rate, however, will be hardly reached, as the interest rate used to revalue part of the contributions is considerably lower than the rate of growth of average wages. In 2005 the ratio of the average pension to the average wage was 49% (it was 77% in 1990) and it is projected to decline further, provoking a considerable cut in the pension wealth for the youngest cohort in the labor force (OECD 2010).

[28] In China, as well as in many other Asian countries, children have the obligation to take care of the elderly, not only by social norms but also by law. In rural areas, where no other forms of government support was in place until very recently, elderly have traditionally relied on their children; however, the rapid urbanization of younger generations together with the evolution of social norms have progressively put at risk such an extended-family arrangement (OECD 2010). In 2009 the government launched a new rural pension scheme, aimed at providing a universal coverage by 2020, however the level of benefits remain very low (at most 35% of the average wage in the area of residency).

OECD countries, calculated that an increase in social spending equal to 1 percentage point of GDP could reduce savings by 0.6-1 percentage points of GDP in China. The impact of heath spending could be much higher, around 2 percentage points of GDP, while a 1 percent increase in education spending could reduce saving by 1.3 percentage points of GDP. Precautionary motives can explain the high saving rate of elders, for which health care expenditures are of a growing relevance, as well as the foregone consumption of young households with little children that might want to save expecting high education spending in the future.

Finally, Chinese households are financially constrained mainly due to lack of collaterals. Even though in recent years housing and consumer credit expanded rapidly, the high level of down payments (relative to income) still required in purchasing a house or buying expensive durable goods, force households to save in order to overcome liquidity shortages (Zhang and Wan, 2004).

5.2 Econometric analysis of households savings with provincial-level data

To assess the significance of the main determinants of the household saving behavior singled out in previous sections we now exploit the variation across provinces as well as among rural and urban realities. To this purpose we construct a panel of 29 Chinese provinces over the period 1995-2008, using household survey data.[29] We run separate regressions for urban and rural households while also splitting the sample in two subgroups, distinguishing Eastern and Central from Western provinces.[30] We estimate a regression of the form:

$$SR_{it}^h = \alpha^h + X_{it}^{'} \beta^h + v_i^h + \varepsilon_{it}^h$$

where h denotes the type of household (h = urban, rural); i and t denote region (i = 1, 2,…, 29) and year (t = 1995–2008). The dependent variable is the household saving rate (SR). X is a vector of explanatory variables which includes the same variables as in M&C as well as additional variables aimed at capturing liquidity constraints and precautionary motives in saving decisions. Compared to M&C regressions, we re-introduce the reciprocal of current real disposable income, a variable that should capture "Keynesian" motives for savings as well as the inability of households to smooth consumption. This variable was considered by M&C but dismissed because not significant in their regressions. To capture precautionary motives, in urban regressions we include the share of urban employment in state-owned enterprises (*SOEempsh*) while in rural households' regressions we include the share of urban employment in total employment in the province (*URBempsh*). We

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[29] Survey data by province are collected annually by the National Bureau of Statistics of China. A description of the survey can be found on the NBSC website: http://www.stats.gov.cn/tjsj/ndsj/2009/indexeh.htm.

[30] China has 31 provinces, we excluded Tibet and Chongqing because data were missing for several years.There are good reasons to consider the Western provinces separately, over and above their lower development level. In Western provinces government transfers for redistributive purposes are higher, furthermore, as Western China is largely populated by ethnic minorities (it accounts for 75% of the country's ethnic minority population) the "one-child" policy is barely in place there.

postulate that as workers in the SOEs enjoy more stable jobs and higher protection for retirement and health care precautionary motives should play a lesser role in their case. Also, higher shares of urban employment likely imply higher remittances from urban workers toward rural relatives, thereby lowering the saving needs of the latter.

Results reported in tables 7a and 7b show that the determinants of the saving rate are indeed quite different for urban and rural households as well as for Central-Eastern and Western provinces. Focusing on the first group of provinces results show that for urban households, over the sample period considered here, long-run growth is not significant. Instead annual deviations from it and the (reciprocal of) current real disposable income have a negative impact on the saving rate, pointing to the presence of credit constraints that limit the ability of smoothing consumption over time. The young dependency ratio has a negative and significant impact on saving rates as one would anticipate from LCH. But when the employment share in SOEs is introduced, the young dependency ratio loses explanatory power, while the coefficient associated with the employment share in the SOEs is negative and highly significant. A possible interpretation is that more children as well as higher employment in SOEs reduce the need to save for old age.[31]

For urban households living in the west (columns 5 and 6 of table 7a) only current disposable income turns out significant, indicating that the traditional Keynesian explanation seems sufficient to explain savings in the poorer parts of the Country.

Table 7a – Household saving in urban China: MC regressions on a panel of 29 provinces, 1995-2008 – dependent variable: saving rate

Explanatory variables	Urban total		Urban East and Central		Urban West	
Long term income growth	0.24	0.12	0.13	-0.04	0.54	0.48
Deviation from long term income growth	-0.28**	-0.33***	-0.30***	-0.36***	-0.23	-0.29
M/E (young dependency ratio)	-0.17**	-0.13	-0.15*	-0.09	-0.16	-0.14
Reciprocal of current real disp. income	-5.07***	-5.00***	-5.74***	-5.62***	-4.22*	-4.10*
Inflation	0.08***	0.08***	0.10**	0.11*	-0.04	-0.04
SOEempsh		-0.05***		-0.06***		-0.03
No. Obs	377	377	247	247	130	130
R^2	0.65	0.67	0.73	0.75	0.52	0.53

Note: Regional dummies included in all regressions; standard errors are robust to heteroskedasticity and serial correlation; *** $p<0.01$; ** $p<0.05$; * $p<0.1$. All the variables are at provincial-level. For each geographic group we run two regressions: the first replicate exactly MC's regressions on provincial-level data, the second includes the variable SOEempsh, not considered by MC.

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[31] The young dependency ratio variable is particularly important for its trend component. In the sample period such a component is common to young dependency ratio and the SOEs' employment share, as they both decreased sharply. On the other hand the cross sectional dimension of the latter has a much greater explanatory power for provincial saving rates, hence when both are considered in the same regression only the SOE variable remain significant.

Table 7b – Household saving in rural China: MC regressions on a panel of 29 provinces, 1995-2008 – dependent variable: saving rate

Explanatory variables	Rural total		Rural East and Central		Rural West	
Long term income growth	-1.46**	-1.36**	-1.09	-1.02	-2.21	-1.85
Deviation from long term income growth	-0.07	-0.07	-0.43	0.04	0.04	-0.33
M/E (young dependency ratio)	0.14	0.16	0.13	0.13	0.28	0.42*
Reciprocal of current real disp. income	-1.52*	-1.45**	-1.50	-1.28	-2.04	-2.38**
Inflation	-0.57***	-0.49***	-0.59***	-0.53***	-0.49*	-0.33
URBempsh		-0.36***		-0.29***		-1.12
No. Obs	377	319	247	209	130	110
R^2	0.4	0.42	0.39	0.43	0.41	0.53

Note: Regional dummies included in all regressions; standard errors are robust to heteroskedasticity and serial correlation; *** $p<0.01$; ** $p<0.05$; * $p<0.1$. All variables are at provincial-level. For each geographic group we run two regressions: the first replicate exactly MC's regressions on provincial-level data, the second includes the variable URBempsh, not considered by MC.

In rural household regressions (table 7b), long-run growth is barely significant in Eastern and Central regions while deviations from long-run growth and young dependency ratio do not matter. Higher urban employment shares tend to reduce the saving rate, as we would expect. Current income is slightly significant only in Western regions. The inflation rate is negative and significant in all regressions, indicating that, in rural areas, households tend to anticipate consumption when inflation rises.

Our findings prove that results drawn form aggregate data might hide very different responses, to the same variables, at a disaggregated level. This is an important fact to recognize when it comes to tailor policy interventions.

6. Conclusions and policy implications

Revisiting Modigliani and Cao (2004), in this paper we show that the life cycle explanation is less robust than what previously believed in explaining household saving behavior in China, even looking at national statistics. Moreover, evidence at a more disaggregated level puts into question the "one size fits all" assumption implicit in the aggregate analysis. Hence we focus on provincial level data, exploiting the variation across provinces as well as among rural and urban realities, taking into account in this way the uneven pace of development of Mainland China. Our regression results point to precautionary motives and liquidity constraints as the main explanations for the recent increase in household saving in urban China. Behind such findings lie primarily the lack of adequate social safety nets and a shortage of financial instruments to smooth consumption over time.

As far as social safety nets are concerned, self-insurance needs are rapidly rising especially for pension and health care purposes. As discussed in section 5.1, while all stable workers employed in SOEs are automatically covered under the new pension system, the participation is much lower for workers employed in private enterprises and almost nil for self-employed and workers without a labor contract. These last two categories, which are a growing share of total urban employment (accounting now for 66% of it), are largely composed by migrants from the countryside.[32] One important reason why workers may choose not to participate is because the system is fragmented in many different municipal systems. As municipalities have different dependency ratios, contribution rates vary among them while benefits are still hardly portable from one municipality to the other. For highly mobile workers the lack of portability represents a strong limitation. Another important source of concern is the health care system which suffer of similar weaknesses.

This need to self-insure is not temporary in nature. Addressing this question requires government intervention primarily aimed at improving and harmonizing welfare provisions across municipalities and provinces, facilitating the portability of benefits and granting the access to public services for rural immigrants. The increase of public spending on these fundamental items would not only boost households' welfare but also reduce public and private savings.

Table 8 below shows that the government has indeed plenty of room to act quickly in increasing (and reallocating) spending for education, social security and health care. Total public expenditure in these areas is very low in terms of GDP and as a share of total government outlays.[33] As urbanization will continue to increase, central government intervention should be targeted not only at reducing labor market segmentations, but also at enforcing formal labor contracts which would raise migrant workers' wages while requiring employers to contribute to social insurance funds.[34] A side effect of the advancement of urban workers economic situation, as shown by our results, is to reduce the propensity to save in the countryside through remittances.

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[32] See also Park et al. (2010).

[33] Even compared with South Korea, which has the lowest public social expenditure as percentage of GDP within the OECD countries and a demographic structure similar to China, the Chinese government spends about fifty percent less as a share of GDP overall in social and education programs.

[34] These policies should be implemented at central level, since local governments might have incentives to not enforce labor market regulations in order to attract businesses (see Park et al., 2010).

Table 8 China: overall (central and local) government expenditures

	Other expenditures	Education	Social security and employment	Health care
% of total government expenditures				
2007	70.8	14.3	10.9	4.0
2008	70.3	14.4	10.9	4.4
2009	71.1	13.7	10.0	5.2
% of GDP				
2007	13.3	2.7	2.0	0.7
2008	14.0	2.9	2.2	0.9
2009	15.9	3.1	2.2	1.2
Memorandum:	*2006*	*2007*	*2008*	*2009*
Government Balance as % of GDP	*-1.0*	*0.2*	*-0.8*	*-2.8*

Source: authors' elaborations on CEIC data.

Furthermore, as we showed in our regressions, personal savings are also kept high by the obstacles that the financial underdevelopment poses to consumption smoothing. In the medium-run government intervention should enhance financial development to facilitate households' access to credit and financial assets diversification.[35] We believe that these policies will help soften the tensions and inconsistencies that China growth model is generating at home. They are also likely to help reducing global imbalances by stimulating consumption in China.

Recently the Chinese authorities have increasingly stressed the importance of enhancing households' welfare. Some progress, in fact, has lately been made: by encouraging minimum wage increases, improving the provision of health insurance and other welfare benefits to rural households, reintroducing a certain degree of exchange rate flexibility. These policies go in the right direction as our analysis suggests. However, it is clear that China is still far from having attained the objective of developing a new growth model, less dependent on exports. There is still plenty of room for policies like those envisaged in this paper and still a long way to go before China becomes the world engine of growth.

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[35] An important area of intervention, not analyzed in this paper, is land property rights. A better definition of these rights, particularly in rural areas, would provide a much needed collateral for households (see Marconi and Santoro, 2006).

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Appendix A: Data

A1. *Data Sources*

"Modigliani and Cao" regressions over the sample period 1953-2000, reported in Table 4, are conducted using original data from Modigliani and Cao (2004; Table 1, p. 147).

"Modigliani and Cao" regressions on the "extended" period (1953-2008), reported in Table 5, are run on an updated version of the original dataset. We updated the variables as follows:

Table A1 "Modigliani and Cao" extended dataset

Variable	Method	Source
Household Consumption (nominal)	1952-1991 data from Modigliani and Cao 1992-2008 data from National Accounts - Flow-of-Funds statistics.	Modigliani and Cao (2004; Table 1 p. 147) National Bureau of Statistics China.
Household Saving (nominal)	1952-1991 data from Modigliani and Cao 1992-2008 data from National Accounts - Flow-of-Funds statistics.	Modigliani and Cao (2004; Table 1 p. 147) National Bureau of Statistics China.
Household Income (nominal)[36]	Household Consumption + Household Saving	Modigliani and Cao (2004; Table 1 p. 147) National Bureau of Statistics China.
Household Saving Ratio	Household Saving/Household Income	Modigliani and Cao (2004; Table 1 p. 147) National Bureau of Statistics China.
CPI	1952-2000 data from Modigliani and Cao 2001-2008 Consumer Price Index, previous year=100	Modigliani and Cao (2004; Table 1 p. 147) National Bureau of Statistics China.
Population	1952-2008 Total population by census	National Bureau of Statistics China.
E/M	1952-1988 data from Modigliani and Cao 1988-2008 Total Employment/Population aged 0-14	Modigliani and Cao (2004; Table 1 p. 147) Ministry of Human Resources and Social Security National Bureau of Statistics

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[36] Real figures for household income are obtained deflating nominal figures by the consumer price index.

Regressions reported in table 7a and 7b are based on household survey data by province. Household survey data at provincial level are collected annually by the National Bureau of Statistics and available for urban and rural households. Disposable income and consumption expenditures are available only in nominal per-capita terms. A complete set of data for rural and urban households span from 1995 to 2008. Data sources and methodologies are described in table A2.

Table A2 Provincial-data dataset

| Variable	Period/Method/Availability	Source
Disposable Income per Capita (nominal) [37]	1995-2008 For urban household data refers to disposable income; for rural households it refers to net income	Household survey - National Bureau of Statistics China.
Consumption Expenditure per Capita (nominal)	1995-2008 Available for urban and rural households	Household survey - National Bureau of Statistics China.
Household Saving Ratio	1995-2008 Urban Household: (disposable income per capita-consumption expenditure per capita)/disposable income per capita Rural Household: (net income per capita-consumption expenditure per capita)/net income per capita	Household survey - National Bureau of Statistics China.
CPI	1995-2008 For rural and urban areas CPI is available as previous year=100	National Bureau of Statistics China.
Population	1995-2008 population by census available at provincial level	National Bureau of Statistics China.
Young dependency ratio	1995-2008 population aged 0-14 in the province/ population aged 15-64 in the province	Population survey (Registered population) National Bureau of Statistics China.
Employment in SOE	1995-2008 Available at provincial level	China Statistical Yearbook- National Bureau of Statistics China; Ministry of Human Resources and Social Security.
Employment	1995-2008 Urban employment; Total employment	Ministry of Human Resources and Social Security

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[37] Real figures for household income are obtained deflating nominal figures by the consumer price index.

*A2. **Discrepancies between flow-of-funds-based and household survey-based measures of saving in China.***

It is well known that national level statistics are seldom completely coherent with aggregations derived from survey and we do not expect this to be contradicted by data on China. Data may not only be affected by measurement errors but also they often refers to different concepts. Differences in the definition of consumption, population of reference and income sources prevent a direct comparison between aggregate measures of saving rates and measures derived from micro sources. However it is important to establish to what extent the main trends showed by national level data are borne also by the evidence derived aggregating micro data. A comparison between household saving rates derived from flow-of-funds statistics and those derived from urban and rural household surveys highlights wide differences in time profiles over the period 1992-2008.

Fig. A1 China: households saving rate (%)

Comparison between flow of funds and households' survey data
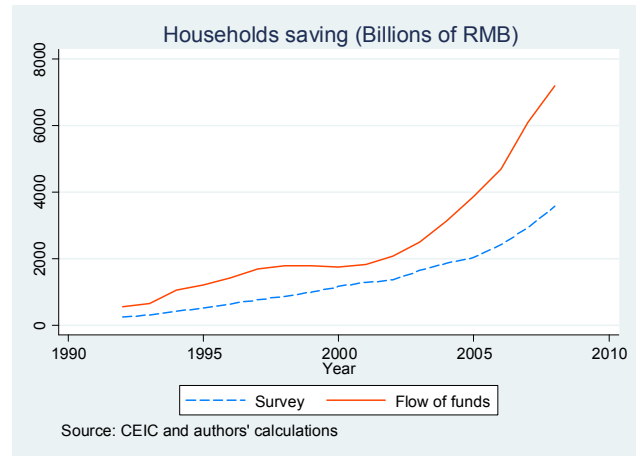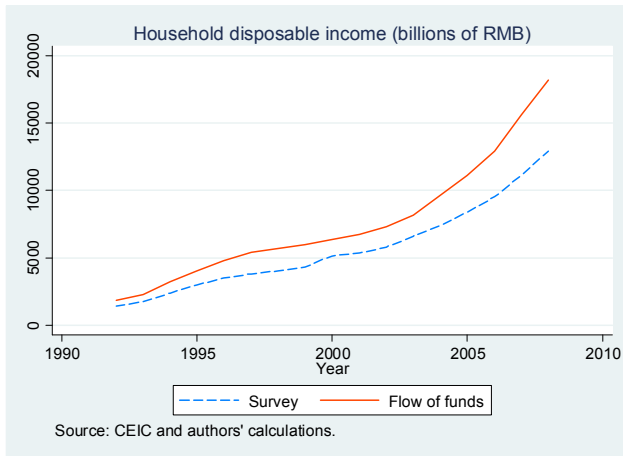

Source: CEIC and author's calculations
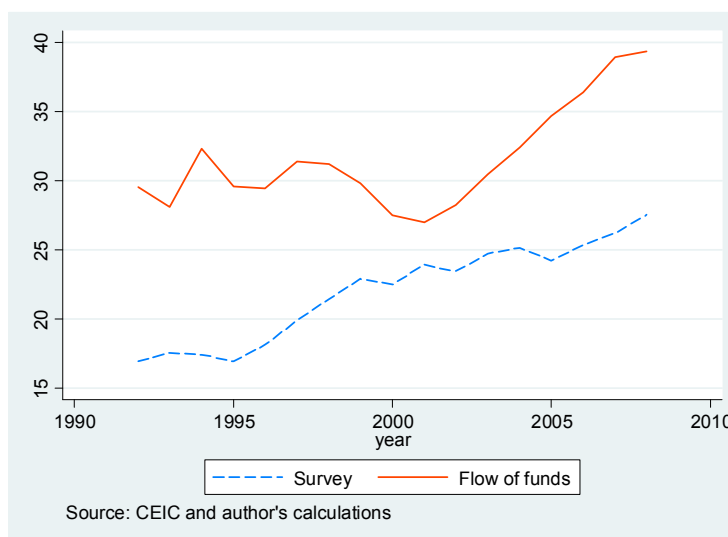
Major differences emerges from 1995 to 2000, when the flow of funds saving rate is more or less stable while household survey's one is trending upward steeply, on the contrary from 2000 onwards the flow of funds saving rate start to increase at a much faster pace compared to that derived from the household survey. As for the levels, wide gaps emerge with the flow of funds saving rate lying always above that of survey (about 12 points of disposable income in 2008, fig. A1). Further insight can be gained by looking separately at the two determinants of the saving rate: income and saving per capita. As can be seen (fig. A2) in both cases survey data give a lower estimate in terms of levels and the gap between the series, almost constant considering disposable income, is widening in the case of savings, likely reflecting different definition of consumption in the two accounting systems. In particular, household saving derived from survey data does not include household investment (Kraay, 2000). In addition, underestimation might due to low coverage or underreporting of high income households.

Despite these large differences, however, we maintain that the main trend we are interested in, i.e. the sharp rise in savings, are not affected by the choice of data. We can therefore be confident that the internal coherence of data allow us to carry a meaningful analysis on provincial-level data with a bearing also in explaining aggregate behavior.

Fig. A2 China households disposable income and savings

Comparison between flow of funds and households' survey data

Household disposable income (billions of RMB)

Source: CEIC and authors' calculations.

Households saving (Billions of RMB)

Source: CEIC and authors' calculations

Appendix B: Tables and Figures

Table B1
International comparison of key indicators of overall economic structure and performance

	Gross domestic savings (% of GDP)		Household final consumption (% GDP)		Industry, value added (% GDP)		Sector value added (% GDP - 2007)		GDP per capita, PPP (current international $)		% growth in p.c. GDP (PPP)	
	1990	*2007*	*1990*	*2007*	*1990*	*2007*	*Exports*	*Manufacturing*	*1990*	*2008*	*overall*	*annual*
China	39.6	52.2	46.2	34.1	41.3	48.5	39.7	34.0	793.5	5970.8	752	11.9
India	22.7	35.2	65.6	54.7	26.9	29.5	21.2	16.3	871.7	2946.5	338	7.0
Indonesia	32.3	29.0	58.9	62.7	39.1	46.8	29.4	27.1	1506.6	3993.7	265	5.6
Korea, Rep.	36.4	30.9	51.7	54.4	41.6	37.1	41.9	27.3	8187.6	27657.8	338	7.0
Thailand	33.8	34.1	56.8	53.7	37.2	44.7	72.7	35.6	2859.2	8086.4	283	5.9
Vietnam	3.3	28.2	84.3	66.7	22.7	41.5	76.9	21.4	651.4	2787.3	428	8.4
Japan	34.1	25.8	52.5	56.3	39.7	29.3	17.6	21.2	18796.9	34129.5	182	3.4
Brazil	21.4	19.3	59.3	60.8	38.7	28.1	13.7	17.4	5181.7	10304.3	199	3.9
Russian Federation	30.3	32.9	48.9	49.9	48.4	37.7	30.3	18.5	9116.5	15922.5	175	3.1
France	21.2	20.3	57.1	56.6	27.1	20.4	26.5	12.3	17267.9	33058.4	191	3.7
Germany	23.1	25.3	57.6	56.7	37.3	30.4	46.9	23.9	18372.6	35373.9	193	3.7
Italy	22.5	21.6	57.3	58.7	32.1	27.5	29.0	18.2	17595.1	31282.6	178	3.2
United Kingdom	18.1	14.9	62.2	64.0	34.1	23.0	26.4	*13.3*	16319.5	35467.5	217	4.4
United States	16.3	13.2	66.7	70.7	27.9	21.8	12.1	13.7	23063.6	46350.4	201	4.0
High income	22.7	20.6	59.8	61.5	32.5	25.7	28.1	16.8	17992.2	37124.4	206	4.1
Middle income	26.5	31.3	60.1	55.0	37.2	37.4	32.7	21.7	2246.2	6213.5	277	5.8
Low & middle income	25.8	30.8	60.8	55.6	36.5	37.1	32.8	21.4	1998.6	5369.3	269	5.6
Low income	8.1	15.2	79.6	75.0	21.6	28.9	34.2	14.4	607.6	1351.9	223	4.5

Source: World Development Indicators, 2009 and authors' calculations

Table B2. Household real disposable income, saving rate and government spending by province

(2006-08 averages)

| Region | geo | Real disposable income (RMB) | | Household saving rate | | Dependency ratios (% total population) | | Government spending % of regional GDP | | | Share of urban employment in SOE |
		Urban	Rural	Urban	Rural	young (0-14)	old (65+)	total (ex. education & health care)	education & health care	social security [1]	
Beijing	East	20467	8705	28.3	31.6	12.3	13.3	13.7	3.9	2.0	23.3
Fujian	East	14082	4922	29.3	25.5	24.5	13.5	7.4	2.5	1.0	22.9
Guangdong	East	16119	5156	20.9	24.2	26.3	10.0	7.9	2.2	1.0	19.1
Hainan	East	9826	3405	24.7	32.8	31.2	12.7	16.1	4.3	3.4	41.4
Hebei	East	10186	3708	30.2	34.8	22.0	11.6	8.3	2.6	1.7	47.3
Jiangsu	East	14298	5745	34.0	27.8	19.3	15.2	7.8	2.2	0.8	18.2
Liaoning	East	10974	4276	22.8	28.7	16.2	14.2	13.1	2.7	3.5	33.3
Shandong	East	12469	4374	31.8	27.7	20.6	12.9	6.6	2.0	0.9	30.4
Shanghai	East	21565	9340	27.6	15.2	10.2	17.8	15.1	3.0	2.4	21.5
Tianjin	East	14810	6263	27.8	49.2	14.7	14.5	10.4	2.7	1.7	32.6
Zhejiang	East	18277	7378	30.6	17.9	19.4	13.9	7.2	2.6	0.7	15.5
Eastern regions average		**14825**	**5752**	**28.0**	**28.7**	**19.7**	**13.6**	**10.3**	**2.8**	**1.7**	**27.8**
Anhui	Central	9918	3104	25.9	21.0	30.2	15.3	13.2	3.7	2.6	35.2
Heilongjiang	Central	9038	3650	26.6	23.9	17.0	11.2	13.6	3.4	2.8	45.2
Henan	Central	9684	3244	32.3	31.3	28.4	10.9	9.2	2.9	1.8	41.5
Hubei	Central	9697	3398	25.6	21.4	21.3	13.4	11.1	3.0	2.5	38.3
Hunan	Central	10435	3363	25.7	13.4	23.7	14.5	11.9	3.0	2.8	36.3
Jiangxi	Central	9993	3600	31.5	26.1	34.2	12.6	12.9	3.8	2.8	38.9
Jilin	Central	9818	3696	24.4	27.6	16.3	11.1	13.9	3.4	3.1	42.0
Shanxi	Central	10062	3173	30.4	26.8	26.3	10.1	14.9	3.9	3.1	52.8
Central regions average		**9831**	**3404**	**27.8**	**23.9**	**24.7**	**12.4**	**12.6**	**3.4**	**2.7**	**41.3**
Gansu	West	8429	2024	22.5	12.8	29.6	11.0	20.0	6.2	4.8	52.7
Guangxi	West	10312	2759	32.2	15.6	32.0	13.3	12.5	4.0	1.8	41.7
Guizhou	West	9002	2037	27.1	20.0	41.3	12.6	21.5	7.7	3.2	49.8
Inner Mongolia	West	10665	3429	25.3	19.0	20.4	10.5	14.7	3.1	2.5	41.9
Ningxia	West	9315	2722	25.2	18.3	33.4	8.9	22.1	5.8	3.4	39.6
Qinghai	West	8412	2205	28.0	7.3	31.4	9.6	29.0	6.7	6.8	39.8
Shaanxi	West	9606	2349	21.4	3.9	23.8	12.8	15.2	4.3	3.6	51.4
Sichuan	West	9199	2966	21.5	22.3	26.9	16.1	15.1	3.5	3.6	35.9
Xinjiang	West	8791	2706	24.0	25.0	30.3	9.6	18.2	5.1	2.6	49.9
Yunnan	West	9963	2284	29.8	2.0	32.1	10.9	18.4	5.6	3.9	37.9
Western regions average		**9369**	**2548**	**25.7**	**14.6**	**30.1**	**11.5**	**18.7**	**5.2**	**3.6**	**44.1**

Source: China Statistical Yearbook, various years, and authors' elaborations.