WHY DOES CHINA SAVE SO MUCH?*

Charles Yuji Horioka**

Institute of Social and Economic Research, Osaka University, and

National Bureau of Economic Research, Inc.

Junmin Wan

Osaka School of International Public Policy, Osaka University

July 1, 2006

Abstract: In this paper, we present data on saving rates and related variables in China and conduct an econometric analysis of the determinants of the household saving rate using a life-cycle model with habit formation and panel data on Chinese provinces for the 1995-2004 period. To summarize our main findings, we find that China's saving rate has been high and that it has generally shown an upward trend over time and that the main determinants of variations over time and over space in China's household saving rate are the age structure of the population (especially the young dependency ratio), the real interest rate, and the lagged saving rate. These results provide support for the life cycle model, are also consistent with the existence of habit formation, and imply that China's household saving rate will remain high for some time to come.

Journal of Economic Literature classification numbers: D12, D91, E21, J10

Key words: Saving, saving rate, household saving, household saving rate, household, age structure, demographics, dependency ratio, life cycle hypothesis, life cycle model, permanent income hypothesis, habit formation, China

1. Introduction

China has attracted increasing attention because it is the world's most populous nation and because it has maintained phenomenal rates of economic growth in recent years. For example, the Asian Development Bank now projects that China will attain a growth rate in excess of 9% in 2006 for the fifth consecutive year, thereby serving as the engine of growth in the Asian-Pacific region (*Nihon Keizai Shimbun*, evening edition of April 6, 2006, page 1). Furthermore, China is now the third largest exporter and importer in the world behind the United States and Germany (*Nihon Keizai Shimbun*, morning edition of April 12, 2006, page 1).

Moreover, there are at least two other reasons for being interested in China. First, China was a socialist economy during the 1949-77 period, but Deng Xiaoping implemented dramatic reforms in 1978, which turned China into a capitalist economy and caused rates of economic growth to skyrocket.[1] Thus, it is of interest to know whether the laws of economics apply in China both before and after the 1978 regime change. Second, China introduced a so-called "one-child policy" in 1979 as a way of controlling population growth. This is an interesting natural experiment that makes fertility largely exogenous and enables us to assess the impact of the age structure of the population on the household saving rate without worrying about endogeneity issues.

Yet another noteworthy aspect of China's economy is its high saving rate. China has had by far the highest overall saving rate in the world since at least 2000, and her saving rate has increased even further since 2000—to nearly 50% of GDP. As a result, China has been running a net saving surplus and that surplus has been growing--from 1.9% of GDP in 2000 to 4.2% in 2004--even though China is investing at a staggering rate of 46% of GDP and even though China is still relatively poor. This has made China one of the world's largest capital exporters, and moreover, China's net saving surplus shows no signs of abating (*The Economist*, September 24-30, 2005, edition, page 13 of "A Survey of the World Economy").

In this paper, we present data on saving rates and related variables in China and conduct an econometric analysis of the determinants of the household saving rate using a life cycle model with habit formation and panel data on Chinese provinces for the

---

[1] For example, Lin (1992) finds using province-level panel data that rural reforms raised agricultural growth in China.

1995-2004 period.

The paper is organized as follows: In section 2, we conduct a survey of the previous literature; in section 3, we present data on saving rates and related variables; in section 4, we derive a closed form solution for the household saving rate based on the life cycle model with habit formation; in section 5, we discuss the estimation model and data sources; in section 6, we present the estimation results; and section 7 is a concluding section.

To preview our main findings, we find that China's saving rate has been high and that it has generally shown an upward trend over time and that the main determinants of variations over time and over space in China's household saving rate are the age structure of the population (especially the young dependency ratio), the real interest rate, and the lagged saving rate. These results provide support for the life cycle model, are also consistent with the existence of habit formation, and imply that China's household saving rate will remain high for some time to come.

2. Literature Survey

In this section, we conduct a selective survey of previous analyses of household saving in China. We focus on two seminal papers—Kraay (2000) and Modigliani and Cao (2004)--but a more comprehensive survey can be found in Kraay (2000). Kraay (2000) uses panel data on Chinese provinces from China's household survey to analyze the determinants of the saving rates of rural and urban households during the 1978-83 and 1984-89 periods and finds that, in the case of rural households, future income growth has a negative and significant impact on their saving rates, that the share of food in total consumption has a negative and significant impact on their saving rates, presumably because households closer to the subsistence level have less ability to save, and that neither the dependency ratio (proxied by the ratio of population to employment) nor future income uncertainty has a significant impact on their saving rates. In the case of urban households, virtually none of the explanatory variables has a significant impact on their saving rates.

Turning to Modigliani and Cao (2004), they conduct a regression analysis of the determinants of the household saving rate using times series data for the 1953-2000 period and find that the long-term growth rate, the reciprocal of the dependency ratio

(proxied by the ratio of the employed population to the number of minors), the deviation of growth from the long-term growth rate, and inflation all have positive and significant impacts on the household saving rate.

Thus, the two studies obtain somewhat conflicting results. Kraay (2000) finds that the dependency ratio does not have a significant impact on the household saving rate, whereas Modigliani and Cao (2004) find that it does. Moreover, Kraay (2000) finds that future income growth has a negative and significant impact on the household saving rate, whereas Modigliani and Cao (2004) find that the long-term growth rate and the deviation of growth from the long-term growth rate have a positive and significant impact on the household saving rate.

The current study improves upon these earlier studies in a number of respects: (1) the data are much newer, (2) the dependent variable (the household saving rate) is defined more carefully and includes household investments in real assets, (3) the dependency ratio is defined more carefully and the young dependency ratio and the old dependency ratio are entered separately, (4) we include variables not included by previous authors such as the interest rate and the lagged saving rate, and (5) we obtain results for the sample of urban households, the sample of rural households, and the full sample (unlike Kraay (2000), who obtains results only for urban and rural households, and Modigliani and Cao (2004), who obtain results only for the full sample).

3. Data on Saving Rates and Other Related Variables

In this section, we present data on saving rates and other related variables. Figure 1 shows data on trends over time in the national gross investment rate (the ratio of national gross investment to GNP or GDP) during the 1952-2004 period because the national accounts of China do not provide data on saving and because saving and investment were more or less equivalent until 1978 because the Chinese economy was a closed economy until then. As can be seen from this figure, the national gross investment ratio has been relatively high throughout the postwar period, fluctuating in the 20-35% range during the 1952-77 period (except for a temporary spike in 1958-60 and a temporary dip in 1961-63) and fluctuating in the 28-45% range during the 1978-2004 period. Thus, China's investment (saving) rate has been relatively high and has shown an upward trend throughout most of the postwar period.

Turning to demographic data, Figure 2 shows data on trends over time in the total population of China and in life expectancy at birth during the 1949-2004 period, and as can be seen from this figure, there has been a steady and pronounced improvement in life expectancy during the past half century (with the exception of the 1958-61 period) from about 40.8 in 1950 to more than 71.96 in 2004. It is this steady and pronounced increase in life expectancy that is the primary cause of the rapid increase in the old dependency ratio (see Figure 3).

Next, Figure 3 shows data on trends over time in the age structure of the population during the 1949-2004 period, and as can be seen from this figure, there have been pronounced trends in both the young dependency ratio (the ratio of the population aged 0-14 to the population aged 15-59) and the old dependency ratio (the ratio of the population aged 60 or older to the population aged 15-59). The former increased from 0.57 in 1950 to 0.77 in 1964 before starting to decline, falling to 0.28 by 2004 (due in large part to the "one-child policy" and other population control measures), while the latter increased more or less steadily from 0.13 in 1950 to 0.18 in 2004. Finally, the total dependency ratio (the ratio of the population aged 0-14 or 60 or older to the population aged 15-59) showed more or less the same trends over time as the young dependency ratio, increasing from 0.70 in 1950 to 0.89 in 1964 before starting to decline, falling to 0.46 by 2004 (also due in large part to the "one-child policy" and other population control measures). The life cycle model predicts that the age structure of the population will have a significant impact on the saving rate and in particular that the dependency ratios will have a negative impact on the saving rate, and if we compare trends over time in the national gross investment rate (a proxy for the national saving rate) with trends over time in the dependency ratios, it can be seen that the upward trend in the investment (saving) rate during the 1968-2004 period coincides with a downward trend in the young and total dependency ratios during the same period, suggesting that the latter may be a cause of the former.

Looking next at the age structure of China's population in international comparison, China's young dependency ratio was higher than the worldwide level in 1975 (0.74 vs. 0.67) but fell at an unprecedented rate due to the one-child policy and other population control measures. As a result, it was far less than the worldwide level by 2005 (0.32 vs. 0.46) (the demographic data in this paragraph and the two following paragraphs are based on United Nations data and hence do not coincide precisely with

the earlier data).

By contrast, the old dependency ratio was somewhat lower than the worldwide level in 1975 (0.13 vs. 0.16) but has gradually increased due to the steady increases in life expectancy, and was just under the worldwide level by 2005 (0.16 vs. 0.17).

However, because trends over time in the young dependency ratio have been more pronounced than trends over time in the old dependency ratio, trends in the total dependency ratio mirror trends in the youth dependency ratio: it was just over the worldwide level in 1975 (0.87 vs. 0.83) but declined sharply thereafter, falling to far less than the worldwide level by 2005 (0.48 vs. 0.63).

The fact that the young and total dependency ratios were formerly relatively high by international standards can explain why China's investment (saving) rate was formerly relatively low by international standards, and the fact that the young and total dependency ratios are now relatively low by international standards can explain why China's investment (saving) rate is now relatively high by international standards.

Figure 4 shows data on the income sources of the elderly in China in 2004, and as can be seen from this figure, family support (support from one's children) is the dominant income source for nearly half (47.5%) of the elderly in China, making it by far the dominant income source of the elderly. Few, if any, elderly rely on dissaving (which is presumably included in "other" in Figure 4). This may explain why trends over time in the investment (saving) rate and trends over time in the old dependency ratio are not opposite, as predicted by the life cycle model.

Figures 5 and 6 show data on urban, rural, and (in the case of Figure 6) all households for the 1995-2004 period from China's household survey. First, Figure 5 shows the per capita income and consumption of urban and rural households, and as can be seen from this figure, there is a considerable gap between urban and rural households in their per capita income and consumption. For example, for the 1995-2004 period as a whole, the per capita income of rural households was a mere 37.7% of that of urban households, and the per capita consumption of rural households was a mere 35.20% of that of urban households (see Table 3). Moreover, this gap has been increasing over time.

Figure 6 shows data on trends over time in the saving rates of urban, rural, and all households, and as can be seen from this figure, the saving rates of the three categories of households are roughly comparable with respect not only to their levels

but also with respect to trends over time therein. With respect to the level of the saving rate, the saving rates of all three categories of households fluctuated in the 15-30% range and the saving rates of urban, rural, and all households averaged 26%, 25%, and 25%, respectively, during the 1995-2004 period (see Table 3). The close similarity in the levels of the saving rates of urban and rural households is very surprising since their income levels are so different and even widening (see Figure 5), but it could be due to the greater income volatility of rural households, the vast majority of whom are farmers.

Turning to trends over time in the saving rates of urban, rural, and all households, all three showed upward trends until 1999 before leveling off (except that the saving rate of urban households shows some evidence of an upward trend even after 1999). The upward trends in the saving rates of all three categories of households coincide with the downward trends in the young and total dependency ratios, and thus it is possible that the latter are one of the causes of the former.

Table 1 shows data on the average saving rates of urban, rural, and all households during the 1995-2004 period by province, and as can be seen from this table, there has been enormous variation among provinces in their saving rates, with the saving rate of urban households ranging from 12% to 35%, that of rural households ranging from 10% to 44%, and that of all households ranging from 13% to 39%.

Finally, Table 2 shows data on the age structure of urban, rural, and all households by province during the 1995-2004 period, and as can be seen from this table, there has been enormous variation among provinces in the age structure of their populations. For example, the young dependency ratio ranged from 0.17 to 0.39 for urban households, from 0.18 to 0.52 for rural households, and from 0.18 to 0.48 for all households, the old dependency ratio ranged from 0.07 to 0.18 for urban households, from 0.07 to 0.16 for rural households, and from 0.07 to 0.18 for all households, and the total dependency ratio ranged from 0.29 to 0.48 for urban households, from 0.34 to 0.66 for rural households, and from 0.31 to 0.56 for all households. We will now conduct a regression analysis in sections 5 and 6 to see if variations in the saving rate correlate with variations in the age structure of the population.

4. Theoretical Considerations

In this section, we discuss theoretical considerations that provide the justification for our estimation model. We first derive a closed form solution for consumption based on the life cycle/permanent income hypothesis with habit formation and then use it to calculate the aggregate household saving rate.

Alessie and Lusardi (1997) construct a model of habit formation and derive closed form solutions for consumption and saving under certainty equivalence and uncertainty. To derive our estimation model, we use Alessie and Lusardi (1997) as our point of departure and modify it by omitting non-human wealth but introducing YOUNG and OLD, the young and old dependency ratios, which are defined as the ratio of the young and old dependent populations to the working-age population, respectively. Thus, we first solve the following individual problem:

$$\max E_t \sum_{\tau=t}^{\infty} (1+\rho)^{t-\tau} u_\tau (c_\tau - \gamma c_{\tau-1})$$

$$s.t. \sum_{\tau=t}^{\infty} (1+r)^{t-\tau} c_\tau = \sum_{\tau=t}^{\infty} (1+r)^{t-\tau} y_\tau$$

where E_t denotes the expectations operator, c_τ consumption in period τ, y_τ non-capital income, r the real interest rate, and ρ the subjective rate of time preference. We also assume that the intra-temporal utility function is quadratic and that the interest rate is equal to the subjective rate of time preference. Given these assumptions, we obtain the following closed-form solution for consumption at time t:[2]

$$c_t = \frac{\gamma}{1+r} c_{t-1} + (1 - \frac{\gamma}{1+r}) Y_{pt}, \tag{1}$$

$$Y_{pt} = (\frac{r}{1+r}) \sum_{\tau=t}^{\infty} (1+r)^{t-\tau} E_t y_\tau, \tag{2}$$

where Y_{pt} is permanent income.

---

[2] It seems that 1/(1+r) is missing from the first term and r/(1+r) is missing from the last term of equation (4) in Alessie and Lusardi (1997).

Next, we derive the aggregate saving rate in this economy at time t. If we assume that there are v_t children and m_t old persons who are not working and that the working-age population is n_t, the aggregate saving rate can written as follows:

$$SR_t = \frac{v_t\left[-\dfrac{\gamma}{(1+r)}c_{t-1} - \left(1-\dfrac{\gamma}{(1+r)}\right)Y_{pt}\right]}{n_t y_t} + \frac{n_t\left[y_t - \dfrac{\gamma}{(1+r)}c_{t-1} - \left(1-\dfrac{\gamma}{(1+r)}\right)Y_{pt}\right]}{n_t y_t}$$

$$+ \frac{m_t\left[-\dfrac{\gamma}{(1+r)}c_{t-1} - \left(1-\dfrac{\gamma}{(1+r)}\right)Y_{pt}\right]}{n_t y_t},$$

(3)

which can be rewritten as follows:

$$SR_t = \frac{\gamma}{(1+r)}\frac{(v_t+n_t+m_t)/(v_{t-1}+n_{t-1}+m_{t-1})}{n_t/n_{t-1}}\frac{1}{y_t/y_{t-1}}SR_{t-1} - \left[1-\frac{\gamma}{(1+r)}\right]\frac{Y_{pt}}{y_t}\frac{v_t}{n_t}$$

$$-\left[1-\frac{\gamma}{(1+r)}\right]\frac{Y_{pt}}{y_t}\frac{m_t}{n_t} - \frac{\gamma}{(1+r)}\frac{(v_t+n_t+m_t)/(v_{t-1}+n_{t-1}+m_{t-1})}{n_t/n_{t-1}}\frac{1}{y_t/y_{t-1}}$$

(4)

$$+\left[1-\frac{\gamma}{(1+r)}\right]\frac{Y_{pt}}{y_t}+1.$$

In equation (4),[3] v_t/n_t and m_t/n_t are YOUNG and OLD, respectively.

When $\gamma = 0$, equation (4) collapses back to a standard life cycle/permanent income hypothesis. Thus, in equation (4), which is our estimation model, the saving rate depends not only on present and future income changes, the age structure of the population, and the real interest rate but also on past saving. The coefficient of the lagged saving rate provides an indication of whether or not habit formation is present.

5. The Estimation Model and Data Sources

In this section, we discuss the estimation model and data sources we use in our empirical analysis.

The dependent variable we use in our analysis is SR = the household saving

---

[3] The detailed derivation of equation (4) is available upon request.

rate, defined as the ratio of household saving to household disposable income (net household income in the case of rural households) and where household saving is calculated as household disposable (or net) income minus household consumption.

Pursuant to the theoretical considerations in the previous section, we include the following explanatory variables:

(1) YOUNG = the young dependency rate, defined as the ratio of the population aged 0-14 to the population aged 15-64

(2) OLD = the old dependency rate, defined as the ratio of the population aged 65 or older to the population aged 15-64

(3) DEP = the total dependency rate, defined as the ratio of the population aged 0-14 or 65 or older to the population aged 15-64

(4) RINT = the real interest rate, defined as NINT – INFL, where NINT = the nominal interest rate on one-year bank deposits and INFL = the rate of change of the consumer price index

(5) CHGDP = the GDP growth rate, defined as the real rate of growth of per capita GDP

(6) SR(-1) = the one-year lag of the saving rate

In the instrumental variables estimations, the instrumental variables used were the one-year lag of the real interest rate (RINT) in the case of urban households, the one-year lags of the real interest rate (RINT) and the inflation rate (INFL, defined as the rate of change of the consumer price index) in the case of rural households, and the one-year lags of the real interest rate (RINT), the inflation rate (INFL), the young dependency ratio (YOUNG), and the old dependency ratio (OLD) in the case of all households.

The data we use in our analysis are panel data for 1995-2004 on Chinese provinces. All variables are available for urban, rural, and all households with the exception of the nominal interest rate, which is available only for the country as a whole, and the GDP growth rate, which is available only for each province as a whole, and thus we are able to obtain separate results for urban, rural, and all households.

All data from China's household survey are taken from the *China Statistics Yearbook*, all demographic data are taken from the *China Population Statistics Yearbook*, and data on nominal interest rates are taken from the International Monetary Fund's

International Financial Statistics.

Data were available for all 31 provinces with the following exceptions: data were not available for Chongqing Province during the 1994-96 period because this province only recently become independent of Sichuan Province, and data on the CPI and/or on household income and consumption were not available for Tibet Province during the 1995-98 period. This reduces the number of usable observations from 310 to 303.

Descriptive statistics on the variables used in our analysis are shown in Table 3.

6. Estimation Results

In this section, we present our estimation results. The estimation results for the saving equations of urban, rural, and all households are shown in Tables 4, 5, and 6, respectively. We estimate a random effects model as well as a fixed effects model and find that, in most cases, the Hausman-We test supports the random effects model.

Looking first at the coefficients of the demographic variables, the coefficient of the young dependency ratio is positive and significant in all three samples (with just one exception), regardless of whether or not the GDP growth rate and/or the lagged saving rate are included, and its magnitude is also reasonable. By contrast, the coefficient of the old dependency ratio is totally insignificant in the case of urban households and positive and almost always positive and significant in the case of rural and all households, regardless of whether or not the GDP growth rate and/or the lagged saving rate are included. When the total dependency ratio is used, its coefficient is negative and significant in all three samples, regardless of whether or not the GDP growth rate and/or the lagged saving rate are included, and its magnitude is also reasonable. The negative coefficients of the young and total dependency ratios are consistent with the life cycle hypothesis, but the positive and significant coefficient of the old dependency ratio in the case of rural and all households is at first glance inconsistent with the life cycle hypothesis. However, please recall from Figure 4 that the elderly in China rely heavily on family support (support from their children) and very little, if at all, on dissaving. Moreover, the elderly in China may be planning to leave a bequest to their children in order to repay them for financial support received during old age and may be saving for this purpose. Thus, it is not surprising that the old dependency ratio does

10

not lower, and may even raise, the household saving rate.

Turning to the coefficients of the other variables, the coefficient of the interest rate is positive and significant about half the time in the case of the urban households and positive and always significant in the case of rural and all households, regardless of whether the dependency ratios are included separately or together and regardless of whether or not the lagged saving rate is included, which suggests that the interest elasticity of saving is positive.

As for the coefficient of the concurrent GDP growth rate, it is positive and significant about half the time in the case of urban households and never significant in the case of rural and all households, regardless of whether the dependency ratios are included separately or together and regardless of whether or not the lagged saving rate is included.   As our theoretical model in section 4 showed, the concurrent GDP growth rate should have a positive impact on the household saving rate, and thus our findings are consistent with our theoretical model.

Next, we tried introducing the lagged saving rate as an additional explanatory variable to account for habit formation. We try instrumental variables as well as ordinary least squares and find that both sets of results are broadly consistent and that the Hausman-Wu test supports the former in the case of urban households and the latter in the case of rural and all households.   Looking at the results, the coefficient of the lagged saving rate is positive and highly significant in all three samples, and moreover, the explanatory power of the equation is much greater when the lagged saving rate is introduced.   These results are consistent with the presence of habit formation.

Finally, since our theoretical model in section 4 predicts that the household saving rate will depend not only on the concurrent growth rate but also on the future (expected) growth rate, we also tried including the growth rate of GDP in the following year (on the assumption that households have perfect foresight).   Its coefficient is totally insignificant in the case of rural households and all households, but in the case of urban households, the ordinary least squares estimate of the coefficient of the future growth rate is totally insignificant but the instrumental variables estimate thereof is positive and significant, and the Hausman test favors the latter.   Our theoretical model predicts that the coefficient of the future growth rate will be negative, and thus our result for urban households is contrary to expectation, but note that the coefficient of the concurrent growth rate becomes totally insignificant when the future growth rate is

added, suggesting that there is a serious problem of multicollinearity between the two. Thus, the wrong sign on the coefficient of future growth rate is not cause for undue concern.

7. Conclusion

In this paper, we presented data on saving rates and related variables in China and conduct an econometric analysis of the determinants of the household saving rate using a life cycle model with habit formation and panel data on Chinese provinces for the 1995-2004 period. To summarize our main findings, we found that China's saving rate has been high and that it has generally shown an upward trend over time and that the main determinants of variations over time and over space in China's household saving rate are the age structure of the population (especially the young dependency ratio), the real interest rate, and the lagged saving rate. These results provide support for the life cycle hypothesis and are also consistent with the existence of habit formation.

Turning finally to the policy implications of our findings, our finding that the total dependency ratio has a negative and significant impact on the household saving rate, combined with United Nations projections that the total dependency ratio will remain at 2005 levels until 2010, then begin increasing, implies that (unless there are changes in the levels of the other determinants of household saving) China's household saving rate will remain high until 2010, then begin decreasing. Moreover, habit formation will also cause China's household saving rate to remain high. Thus, it seems likely that China's household saving rate will remain high in the short to medium run, and to the extent that this causes China's current account surplus to remain high, this may cause continued frictions with the United States and China's other trading partners.

To alleviate such frictions, it may be desirable to (1) improve the infrastructure of the economy, (2) increase the availability of consumer credit, (3) improve social security, (4) relax the one-child policy and other population control measures, and (5) further strengthen the Chinese yuan. Such measures would not only reduce China's saving-investment imbalances and hence her current account surpluses but also improve the quality of life in China, thereby enabling two birds to be killed with one stone.

References

Alessie, Rob, and Lusardi, Annamaria (1997), "Consumption, Saving and Habit Formation," *Economics Letters*, vol. 55, no. 1 (August 15), pp. 103-108.

Banister, Judith (1984), "An Analysis of Recent Data on the Population of China," *Population and Development Review*, vol. 10, no. 2 (June), pp. 241-271.

Banister, Judith (1987), *China's Changing Population.*   Stanford, California: Stanford University Press.

"The Frugal Giant," *The Economist*, September 24-30, 2005, issue, pp. 12-14 of "A Survey of the World Economy."

Kraay, Aart (2000), "Household Saving in China," *World Bank Economic Review*, vol. 14, no. 3 (September), pp. 545-570.

Modigliani, Franco, and Cao, Shi Larry (2004), "The Chinese Saving Puzzle and the Life-Cycle Hypothesis," *Journal of Economic Literature*, vol. 42, no. 1 (March), pp. 145-170.

Lin, Justin Yifu (1992), "Rural Reforms and Agricultural Growth in China," *The American Economic Review*, vol. 82, no. 1 (March), pp. 34-51.

Data Sources

Central Intelligence Agency, *CIA World Factbook.* http://www.indexmundi. com/g/g.aspx?c=ch&v=30

Department of Population, Social, Science and Technology Statistics, National Bureau of Statistics of China, ed., *China Population Statistics Yearbook*, 1991-2005 editions. Beijing: China Statistics Press.

International Monetary Fund   *International Financial Statistics,* 1995-2005. Washington.

National Bureau of Statistics of China., ed., *China Statistical Yearbook*, 1988-2005 editions.   Beijing: China Statistics Press.

United Nations (2002), *World Population Prospects: The 2002 Revision* (New York: United Nations).

Figure 1: National Gross Investment Rate and Per Capita GDP in China, 1952-2004
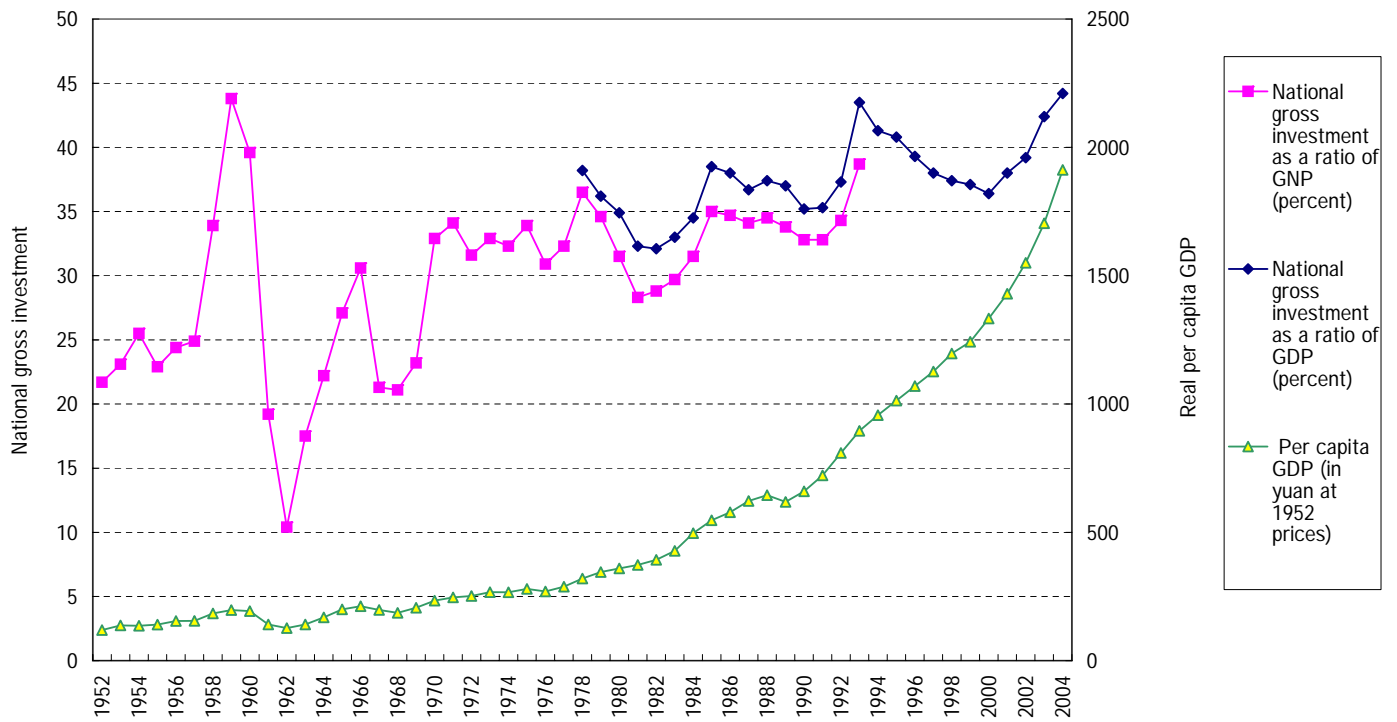
Source: China Statistics Yearbook, 1991-2005

Figure 2: Population and Life Expectancy in China, 1949-2004
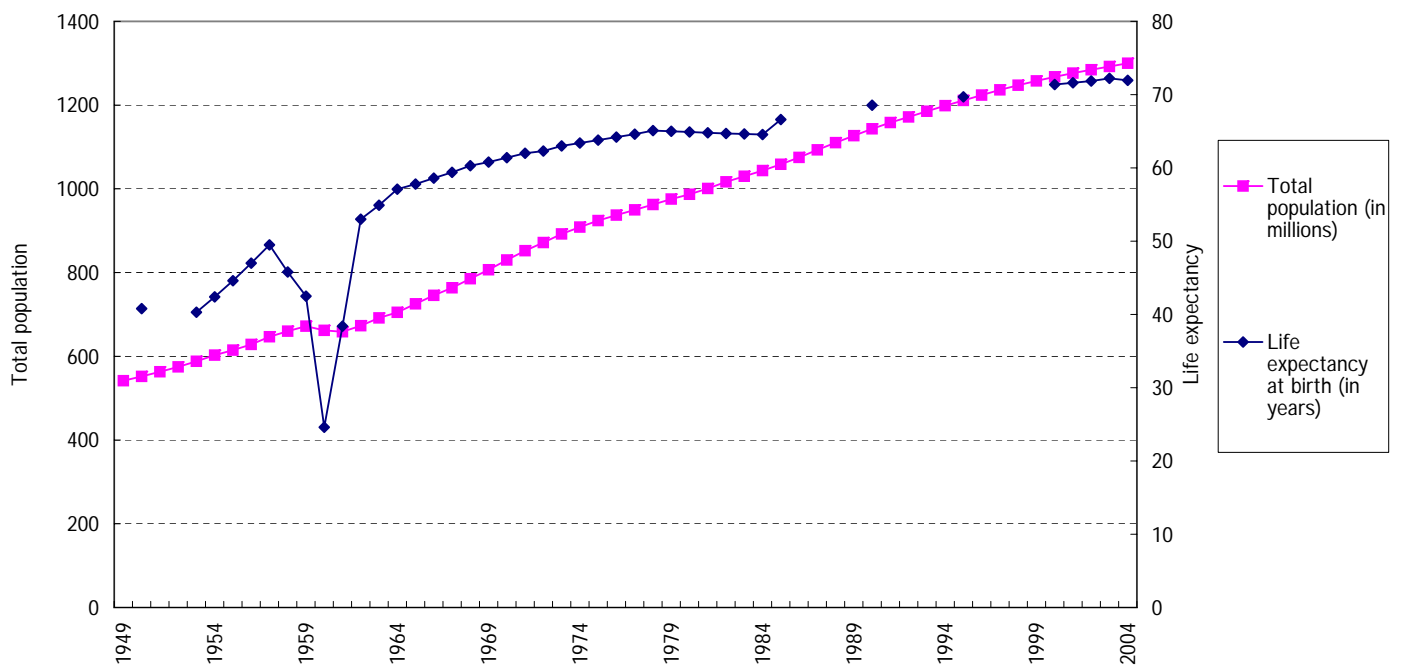
Sources: China Population Statistics Yearbook; 1988-2005, Banister (1987); and U.S. CIA Factbook

Figure 3: Age Structure of the Population in China, 1949-2004
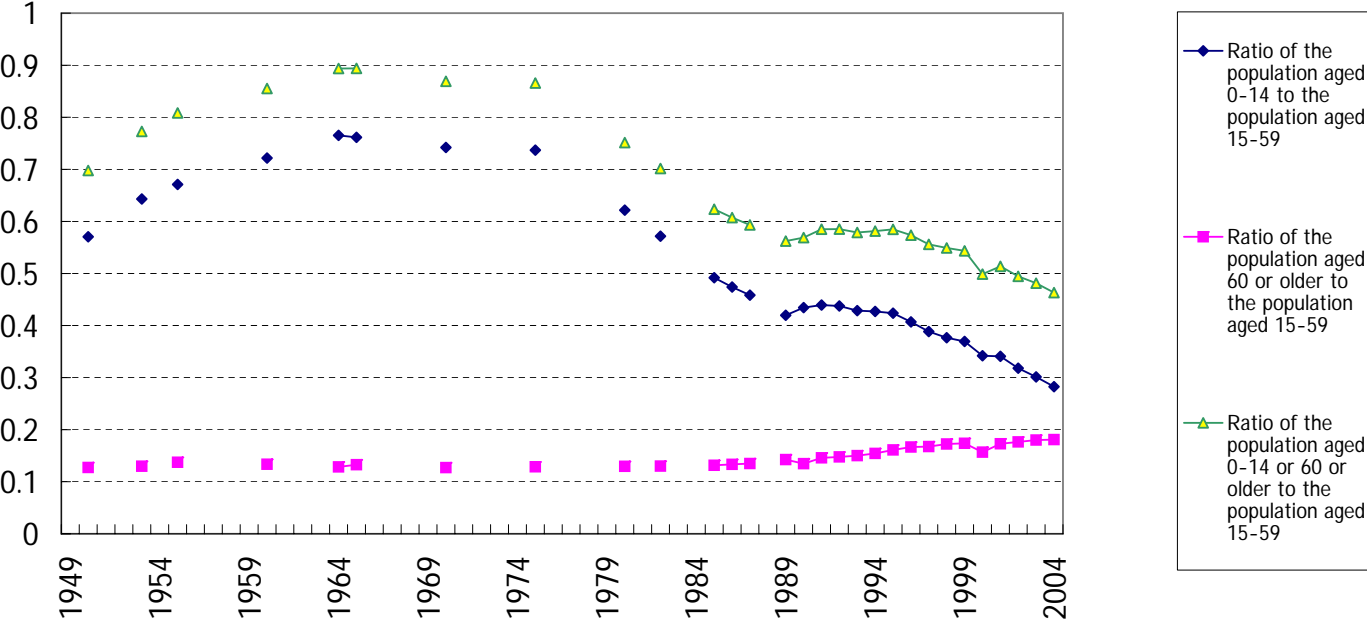
Sources: China Population Statistics Yearbook, 1988-2005, and World Population Prospects: The 2002 Revision (United Nations)

Figure 4: The Income Sources of the Aged in China in 2004

Legend: The ratio of those aged 60 or older for whom each income source is their primary source of income (in percent)
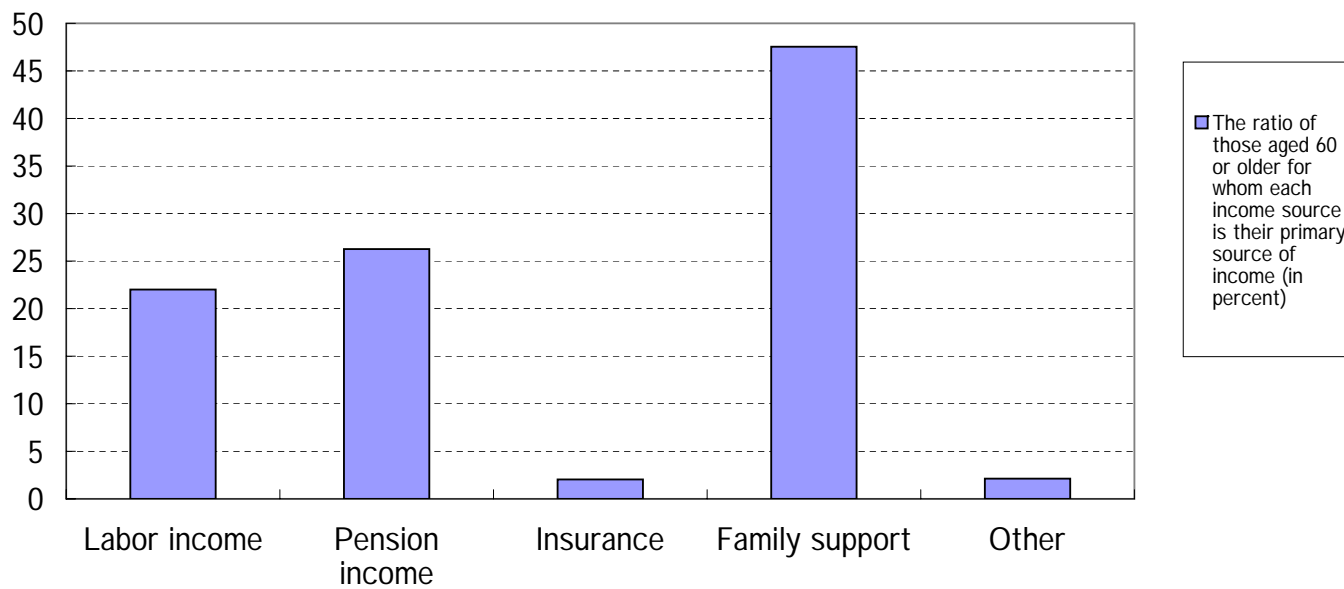
Source: China Statistics Yearbook, 2005

Figure 5: Household Income and Consumption in China, 1995-2004
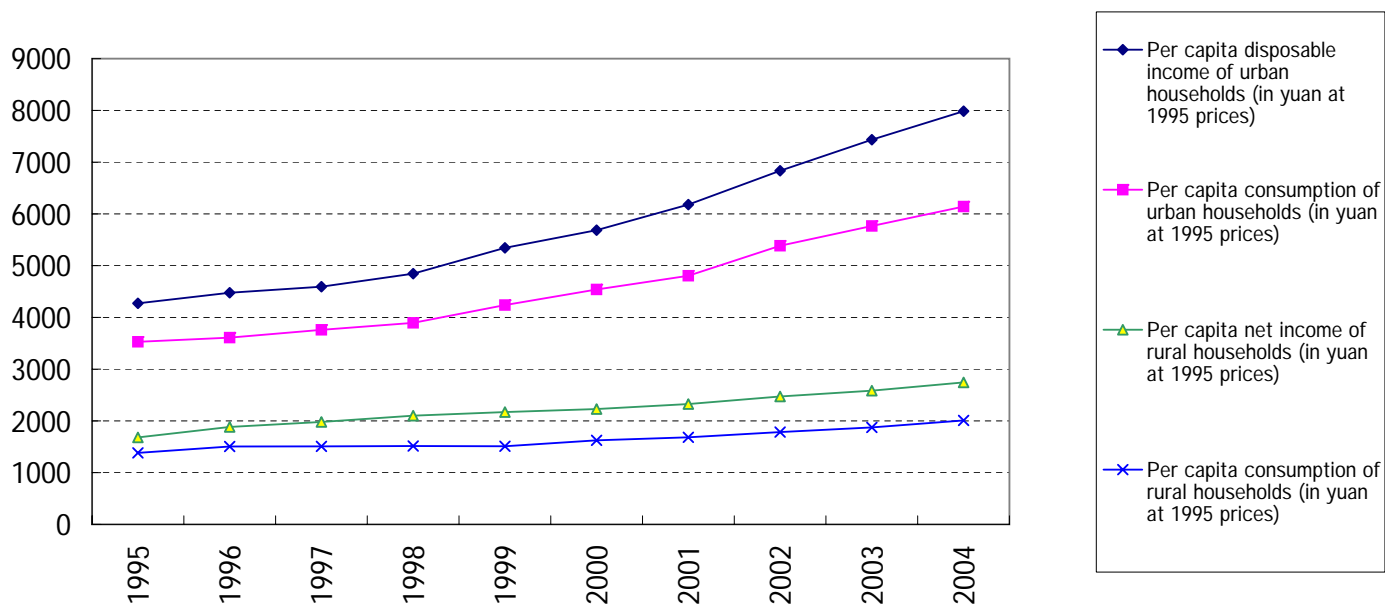
Source: Authors' calculations based on China Statistics Yearbook, 1996-2005

Figure 6: Household Saving Ratio in China, 1995-2004
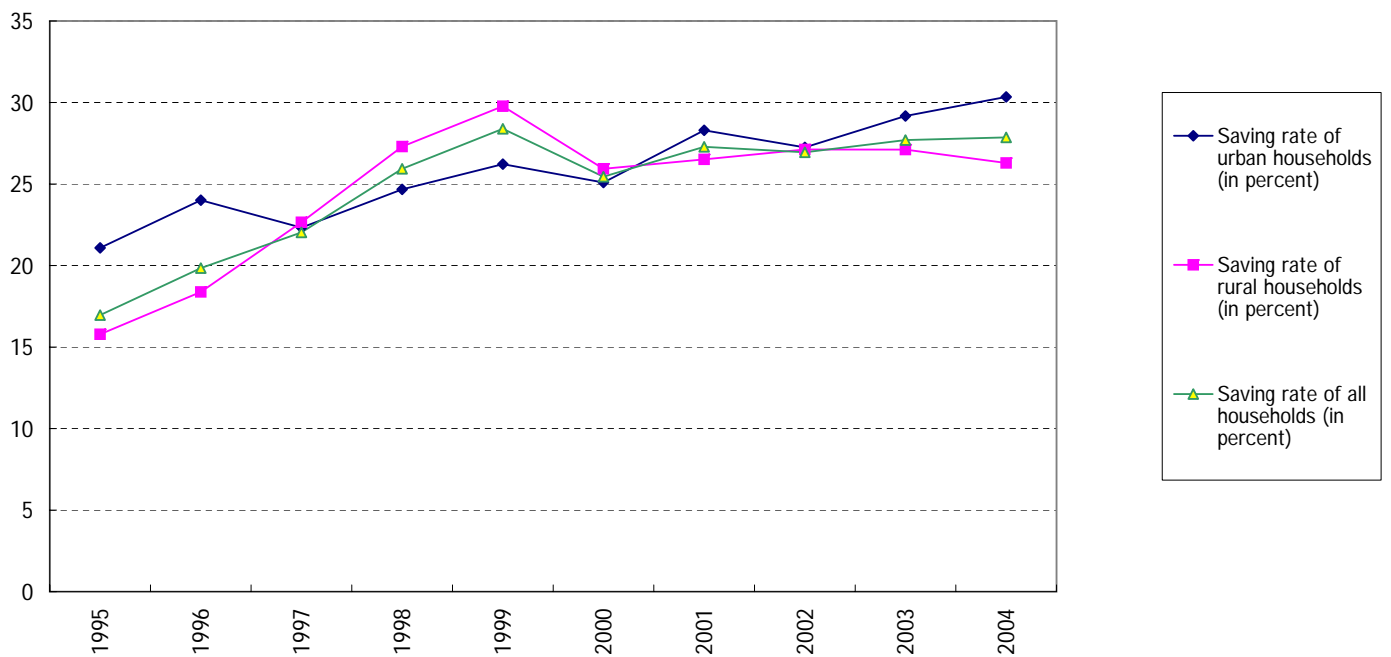
Source: Authors' calculations based on China Statistics Yearbook, 1996-2005

Table 1: Household Saving Rate by Province
(Average for the 1995-2004 Period)

Province	Saving rate (in percent)		
	Urban households	Rural households	All households
Beijing	24.2	27.2	24.7
Tianjin	28.9	43.7	33.8
Hebei	30.9	41.7	39.1
Shanxi	28.1	35.5	33.0
Inner Mongolia	29.4	17.4	22.1
Liaoning	21.4	29.0	24.8
Jilin	24.0	27.7	25.9
Heilongjiang	29.3	31.1	30.1
Shanghai	29.1	19.6	27.9
Jiangsu	30.9	31.0	31.0
Zhejiang	28.4	23.3	25.7
Anhui	26.9	26.7	26.8
Fujian	30.0	26.1	28.2
Jiangxi	34.9	22.6	26.7
Shandong	32.7	30.3	31.4
Henan	29.9	31.9	31.6
Hubei	20.5	24.9	23.2
Hunan	22.8	10.4	14.0
Guangdong	24.2	24.8	24.5
Guangxi	24.8	20.8	22.1
Hainan	29.5	34.5	32.8
Chongqing	12.0	24.4	19.8
Sichuan	20.0	18.2	18.6
Guizhou	25.1	20.3	22.2
Yunnan	24.3	10.0	12.7
Tibet	24.9	31.2	26.6
Shaanxi	19.0	10.9	13.3
Gansu	22.4	21.0	21.3
Qinghai	21.9	16.1	18.0
Ningxia	20.5	17.8	18.6
Xinjiang	29.1	16.6	21.7

Source: Authors' calculations based on China Statistics Yearbook, 1996-2005, and China Population Statistics Yearbook, 1996-2005.

Table 2: Age Structure of the Population by Province (Average for the 1995-2004 Period)

Province	Urban households			Rural households			All households		
	Young dependency ratio	Old dependency ratio	Total dependency ratio	Young dependency ratio	Old dependency ratio	Total dependency ratio	Young dependency ratio	Old dependency ratio	Total dependency ratio
Beijing	0.167	0.123	0.290	0.276	0.125	0.401	0.188	0.123	0.311
Tianjin	0.204	0.136	0.340	0.338	0.109	0.447	0.245	0.127	0.372
Hebei	0.264	0.092	0.357	0.355	0.104	0.459	0.333	0.101	0.435
Shanxi	0.304	0.088	0.392	0.419	0.101	0.519	0.378	0.096	0.474
Inner Mongolia	0.269	0.078	0.347	0.326	0.088	0.414	0.303	0.084	0.387
Liaoning	0.207	0.119	0.325	0.278	0.098	0.375	0.239	0.109	0.349
Jilin	0.216	0.094	0.310	0.280	0.078	0.357	0.248	0.086	0.333
Heilongjiang	0.227	0.080	0.308	0.291	0.068	0.359	0.257	0.075	0.332
Shanghai	0.175	0.185	0.360	0.182	0.160	0.341	0.176	0.181	0.357
Jiangsu	0.236	0.122	0.358	0.328	0.158	0.486	0.287	0.138	0.425
Zhejiang	0.223	0.123	0.347	0.278	0.145	0.423	0.255	0.135	0.390
Anhui	0.300	0.107	0.407	0.396	0.115	0.511	0.369	0.112	0.481
Fujian	0.272	0.103	0.375	0.427	0.119	0.546	0.368	0.110	0.479
Jiangxi	0.303	0.099	0.402	0.428	0.101	0.529	0.388	0.100	0.488
Shandong	0.265	0.100	0.365	0.321	0.130	0.450	0.299	0.117	0.417
Henan	0.290	0.098	0.388	0.407	0.110	0.518	0.381	0.108	0.488
Hubei	0.266	0.092	0.358	0.409	0.111	0.520	0.353	0.103	0.456
Hunan	0.257	0.109	0.366	0.360	0.117	0.477	0.330	0.114	0.444
Guangdong	0.315	0.098	0.412	0.525	0.134	0.659	0.429	0.116	0.545
Guangxi	0.290	0.120	0.410	0.427	0.118	0.545	0.393	0.118	0.511
Hainan	0.342	0.080	0.422	0.486	0.121	0.607	0.436	0.106	0.542
Chongqing	0.231	0.133	0.364	0.356	0.127	0.483	0.305	0.129	0.435
Sichuan	0.255	0.129	0.384	0.355	0.110	0.465	0.321	0.117	0.437
Guizhou	0.313	0.101	0.414	0.479	0.092	0.572	0.431	0.095	0.526
Yunnan	0.270	0.111	0.381	0.423	0.095	0.518	0.391	0.098	0.490
Tibet	0.389	0.093	0.481	0.497	0.083	0.580	0.479	0.086	0.565
Shaanxi	0.280	0.107	0.387	0.412	0.095	0.507	0.371	0.099	0.470
Gansu	0.247	0.090	0.337	0.433	0.078	0.511	0.383	0.081	0.465
Qinghai	0.265	0.077	0.342	0.460	0.069	0.529	0.394	0.072	0.466
Ningxia	0.276	0.071	0.347	0.509	0.068	0.577	0.427	0.069	0.496
Xinjiang	0.282	0.075	0.357	0.494	0.074	0.568	0.402	0.075	0.477

Notes: The young dependency ratio is defined as the ratio of the population aged 0-14 to the population aged 15-64; The old dependency ratio is defined as the ratio of the population aged 65 or older to the population aged 15-64; The total dependency ratio is defined as the ratio of the population aged 0-14 or 65 or older to the population aged 15-64.

Source: Authors' calculations based on China Population Statistics Yearbook, 1996-2005.

Table 3: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
SR (all)	304	0.248	0.081	0.000	0.435
SR (urban)	304	0.258	0.067	0.078	0.455
SR (rural)	304	0.246	0.102	-0.065	0.494
YOUNG (all)	304	0.338	0.086	0.116	0.578
YOUNG (urban)	304	0.263	0.057	0.110	0.588
YOUNG (rural)	304	0.383	0.095	0.136	0.602
OLD (all)	304	0.106	0.025	0.053	0.219
OLD (urban)	304	0.104	0.028	0.027	0.225
OLD (rural)	304	0.107	0.028	0.057	0.314
DEP (all)	304	0.444	0.076	0.267	0.652
DEP (urban)	304	0.367	0.051	0.245	0.649
DEP (rural)	304	0.490	0.090	0.262	0.771
NINT (all)	304	0.040	0.029	0.020	0.110
INFL (all)	304	0.031	0.055	-0.036	0.214
INFL (urban)	304	0.031	0.055	-0.036	0.203
INFL (rural)	304	0.032	0.056	-0.037	0.247
RINT (all)	304	0.009	0.032	-0.104	0.074
RINT (urban)	304	0.009	0.031	-0.093	0.074
RINT (rural)	304	0.008	0.034	-0.137	0.074
CHGDP (all)	302	0.093	0.053	-0.272	0.284
POP	304	4107.613	2609.393	256.000	11430.000
CHPOP	304	8.664	17.095	-49.865	188.721
INCOME (urban)	304	6409.922	2350.950	2863.030	16682.820
INCOME (rural)	304	2433.669	1121.632	880.340	7066.330
CONS (urban)	304	5074.927	1773.960	2482.150	12631.030
CONS (rural)	304	1798.933	827.148	767.140	6328.849
RURAL_RATIO	304	0.612	0.165	0.058	0.862
CPI (all)	304	103.136	5.494	96.400	121.400
CPI (urban)	304	103.098	5.493	96.400	120.300
CPI (rural)	304	103.236	5.578	96.300	124.700

Source: Authors' calculations based on China Statistics Yearbook, 1996-2005, China
Population Statistics Yearbook, 1996-2005, and International Financial Statistics, 1995-2005.

Table 4: The Determinants of the Household Saving Rate in China (Urban Households)

	Dependent variable = SR									
	FE	RE	FE	RE	FE	RE	FE	RE	IV, FE	OLS, FE
YOUNG	-0.615	-0.541			-0.572	-0.485			-0.189	-0.299
	(0.141)***	(0.134)***			(0.149)***	(0.133)***			(0.156)	(0.085)***
OLD	0.030	0.059			-0.052	-0.154			0.062	0.023
	(0.166)	(0.160)			(0.174)	(0.161)			(0.154)	(0.144)
DEP			-0.542	-0.490			-0.497	-0.442		
			(0.116)***	(0.113)***			(0.116)***	(0.110)***		
RINT	0.131	0.161	0.237	0.238	0.162	0.199	0.253	0.255	-0.083	-0.079
	(0.096)	(0.092)*	(0.087)***	(0.082)***	(0.102)	(0.094)**	(0.088)***	(0.082)***	(0.111)	(0.109)
CHGDP					0.107	0.146	0.165	0.182	0.033	0.062
					(0.066)	(0.063)**	(0.059)***	(0.058)***	(0.064)	(0.053)
SR(-1)									0.692	0.519
									(0.212)***	(0.056)***
Constant	0.416	0.405	0.455	0.435	0.403	0.403	0.424	0.401	0.129	0.203
	(0.042)***	(0.041)***	(0.043)***	(0.042)***	(0.044)***	(0.044)***	(0.045)***	(0.042)***	(0.094)***	(0.034)***
Observations	303	303	303	303	302	302	302	302	272	272
Number of groups	31	31	31	31	31	31	31	31	31	31
R-sq: within	0.227	0.225	0.185	0.184	0.235	0.232	0.211	0.210	0.426	0.448
between	0.003	0.003	0.001	0.001	0.001	0.001	0.000	0.000	0.904	0.748
overall	0.031	0.033	0.037	0.038	0.047	0.060	0.066	0.072	0.641	0.569
rho(fraction of variance due to u_i)	0.626	0.534	0.574	0.512	0.606	0.503	0.562	0.488	0.271	0.426
Hausman-Wu test (p-value)	0.377		0.134		0.656		0.000		0.982	

Note: Standard errors are in parentheses; *, **, *** denote significant at the 10%, 5% and 1% levels, respectively.

Table 5: The Determinants of the Household Saving Rate in China (Rural Households)

	Dependent variable = SR									
	FE	RE	FE	RE	FE	RE	FE	RE	IV, FE	OLS, FE
YOUNG	-0.413	-0.384			-0.435	-0.392			-0.203	-0.210
	(0.059)***	(0.057)***			(0.074)***	(0.074)***			(0.080)**	(0.064)***
OLD	0.587	0.546			0.595	0.544			0.110	0.165
	(0.203)***	(0.194)***			(0.158)***	(0.169)***			(0.189)	(0.176)
DEP			-0.400	-0.373			-0.394	-0.359		
			(0.098)***	(0.091)***			(0.110)***	(0.099)***		
RINT	0.798	0.814	0.782	0.803	0.784	0.807	0.784	0.810	0.703	0.717
	(0.089)***	(0.091)***	(0.118)***	(0.115)***	(0.123)***	(0.118)***	(0.125)***	(0.121)***	(0.120)***	(0.118)***
CHGDP					-0.065	-0.035	0.010	0.034	0.022	0.025
					(0.071)	(0.074)	(0.079)	(0.080)	(0.061)	(0.059)
SR(-1)									0.491	0.418
									(0.080)***	(0.045)***
Constant	0.335	0.329	0.436	0.423	0.349	0.336	0.432	0.413	0.187	0.201
	(0.035)***	(0.036)***	(0.047)***	(0.043)***	(0.034)***	(0.036)***	(0.058)***	(0.052)***	(0.044)***	(0.035)***
Observations	303	303	303	303	302	302	302	302	272	273
Number of groups	31	31	31	31	31	31	31	31	31	31
R-sq: within	0.373	0.372	0.313	0.312	0.375	0.373	0.314	0.313	0.441	0.446
between	0.085	0.088	0.063	0.068	0.079	0.087	0.066	0.077	0.861	0.812
overall	0.175	0.180	0.146	0.151	0.168	0.178	0.149	0.158	0.712	0.68
rho(fraction of variance due to u_i)	0.723	0.655	0.703	0.625	0.728	0.650	0.702	0.619	0.527	0.585
Hausman-Wu test (p-value)	0.391		0.432		0.000		0.769		0.000	

Note: Standard errors are in parentheses; *, **, *** denote significant at the 10%, 5% and 1% levels, respectively.

Table 6: The Determinants of the Household Saving Rate in China (All Households)

	Dependent variable = SR									
	FE	RE	FE	RE	FE	RE	FE	RE	IV, FE	OLS, FE
YOUNG	-0.407	-0.390			-0.416	-0.388			-0.147	-0.271
	(0.052)***	(0.050)***			(0.075)***	(0.073)***			(0.070)**	(0.058)***
OLD	0.815	0.704			0.850	0.692			0.582	0.638
	(0.232)***	(0.215)***			(0.188)***	(0.185)***			(0.198)***	(0.191)***
DEP			-0.492	-0.465			-0.467	-0.434		
			(0.072)***	(0.070)***			(0.079)***	(0.076)***		
RINT	0.632	0.649	0.685	0.698	0.625	0.650	0.696	0.712	0.465	0.531
	(0.069)***	(0.070)***	(0.094)***	(0.092)***	(0.094)***	(0.091)***	(0.098)***	(0.095)***	(0.090)***	(0.085)***
CHGDP					-0.036	-0.006	0.055	0.073	0.004	-0.011
					(0.061)	(0.062)	(0.055)	(0.056)	(0.043)	(0.041)
SR(-1)									0.509	0.343
									(0.067)***	(0.043)***
Constant	0.294	0.300	0.461	0.449	0.297	0.301	0.445	0.428	0.110	0.187
	(0.037)***	(0.036)***	(0.031)***	(0.029)***	(0.032)***	(0.031)***	(0.037)***	(0.034)***	(0.043)***	(0.035)***
Observations	303	303	303	303	302	302	302	302	272	273
Number of groups	31	31	31	31	31	31	31	31	31	31
R-sq: within	0.491	0.490	0.428	0.428	0.492	0.49	0.431	0.431	0.528	0.556
between	0.091	0.093	0.059	0.061	0.089	0.095	0.069	0.075	0.764	0.520
overall	0.209	0.214	0.178	0.182	0.206	0.218	0.192	0.200	0.686	0.530
rho(fraction of variance due to u_i)	0.761	0.717	0.729	0.688	0.764	0.697	0.723	0.668	0.584	0.585
Hausman-Wu test (p-value)	0.111		0.123		0.000		0.502		0.065	

Note: Standard errors are in parentheses; *, **, *** denote significant at the 10%, 5% and 1% levels, respectively.

Data Appendix for Figures 1, 2, and 3

year	National gross investment as a ratio of GNP (percent)	National gross investment as a ratio of GDP (percent)	Per capita GDP (in yuan at 1952 prices)	Total population (in millions)	Life expectancy at birth (in years)	Young dependency ratio	Old dependency ratio	Total dependency ratio
1949				541.67				
1950				551.96	40.80	0.57	0.13	0.70
1951				563.00				
1952	21.70		119.00	574.82				
1953	23.10		137.33	587.96	40.30	0.64	0.13	0.77
1954	25.50		136.13	602.66	42.40			
1955	22.90		140.40	614.65	44.60	0.67	0.14	0.81
1956	24.40		154.44	628.28	47.00			
1957	24.90		154.93	646.53	49.50			
1958	33.90		184.07	659.94	45.80			
1959	43.80		197.02	672.07	42.50			
1960	39.60		192.87	662.07	24.60	0.72	0.13	0.86
1961	19.20		140.85	658.59	38.40			
1962	10.40		126.89	672.95	53.00			
1963	17.50		141.09	691.72	54.90			
1964	22.20		168.36	704.99	57.10	0.77	0.13	0.89
1965	27.10		199.65	725.38	57.80	0.76	0.13	0.89
1966	30.60		211.94	745.42	58.60			
1967	21.30		197.46	763.68	59.40			
1968	21.10		186.36	785.34	60.30			
1969	23.20		206.25	806.71	60.80			
1970	32.90		233.88	829.92	61.40	0.74	0.13	0.87
1971	34.10		246.66	852.29	62.00			
1972	31.60		251.85	871.77	62.30			
1973	32.90		267.05	892.11	63.00			
1974	32.30		266.32	908.59	63.40			
1975	33.90		279.52	924.20	63.80	0.74	0.13	0.87
1976	30.90		269.58	937.17	64.20			
1977	32.30		288.34	949.74	64.60			
1978	36.50	38.20	320.12	962.59	65.10			
1979	34.60	36.20	345.31	975.42	65.00			
1980	31.50	34.90	359.35	987.05	64.90	0.62	0.13	0.75
1981	28.30	32.30	373.06	1000.72	64.80			
1982	28.80	32.10	393.05	1016.54	64.70	0.57	0.13	0.70
1983	29.70	33.00	427.81	1030.08	64.63			
1984	31.50	34.50	496.52	1043.57	64.55			
1985	35.00	38.50	546.95	1058.51	66.60	0.49	0.13	0.62
1986	34.70	38.00	578.30	1075.07		0.47	0.13	0.61
1987	34.10	36.70	622.39	1093.00		0.46	0.14	0.59
1988	34.50	37.40	644.64	1110.26				
1989	33.80	37.00	618.51	1127.04		0.42	0.14	0.56
1990	32.80	35.20	659.84	1143.33	68.55	0.43	0.13	0.57
1991	32.80	35.30	721.96	1158.23		0.44	0.15	0.59
1992	34.30	37.30	809.14	1171.71		0.44	0.15	0.59
1993	38.70	43.50	895.62	1185.17		0.43	0.15	0.58
1994		41.30	956.38	1198.50		0.43	0.15	0.58
1995		40.80	1013.14	1211.21	69.70	0.42	0.16	0.58
1996		39.30	1069.70	1223.89		0.41	0.17	0.57
1997		38.00	1126.30	1236.26		0.39	0.17	0.56
1998		37.40	1196.56	1247.61		0.38	0.17	0.55
1999		37.10	1242.47	1257.86		0.37	0.17	0.54
2000		36.40	1333.23	1267.43	71.38	0.34	0.16	0.50
2001		38.00	1429.66	1276.27	71.62	0.34	0.17	0.51
2002		39.20	1550.28	1284.53	71.86	0.32	0.18	0.49
2003		42.40	1704.23	1292.27	72.22	0.30	0.18	0.48
2004		44.20	1912.35	1299.88	71.96	0.28	0.18	0.46

Note: Young dependency ratio is defined as the ratio of the population aged 0-14 to the population aged 15-59; Old dependency ratio is defined as the ratio of the population aged 60 or older to the population aged 15-59; Total dependency ratio is defined as the ratio of the population aged 0-14 or 60 or older to the population aged 15-59.

Data Appendix for Figure 4

The ratio of those aged 60 or older for whom each income source is their primary source of income (in percent)

Labor income	22.0
Pension income	26.3
Insurance	2.0
Family support	47.5
Other	2.1

Data Appendix for Figure 5

year	Per capita disposable income of urban households (in yuan at 1995 prices)	Per capita consumption of urban households (in yuan at 1995 prices)	Per capita net income of rural households (in yuan at 1995 prices)	Per capita consumption of rural households (in yuan at 1995 prices)
1995	4271.66	3528.51	1680.61	1381.15
1996	4476.76	3608.22	1882.48	1505.39
1997	4592.35	3758.83	1979.05	1507.55
1998	4845.94	3894.46	2101.93	1515.43
1999	5343.63	4238.14	2170.32	1509.66
2000	5684.37	4538.28	2228.11	1624.31
2001	6179.97	4805.21	2325.40	1683.97
2002	6833.60	5383.34	2472.76	1783.79
2003	7433.60	5765.25	2585.20	1873.47
2004	7985.20	6140.46	2744.87	2008.52

Data Appendix for Figure 6

Year	Saving rate of urban households (in percent)	Saving rate of rural households (in percent)	Saving rate of all households (in percent)
1995	21.08	15.78	16.96
1996	24.01	18.38	19.84
1997	22.32	22.65	22.04
1998	24.67	27.30	25.93
1999	26.22	29.77	28.39
2000	25.09	25.93	25.45
2001	28.29	26.51	27.28
2002	27.25	27.12	26.94
2003	29.17	27.11	27.70
2004	30.34	26.29	27.86