International Institute for Applied Systems Analysis
Schlossplatz 1 • A-2361 Laxenburg • Austria
Telephone: (+43 2236) 807 342 • Fax: (+43 2236) 71313
E-mail: publications@iiasa.ac.at • Internet: www.iiasa.ac.at

**Interim Report IR-99-057/November**

# Demographic Trends and Household Saving in China

*Masayo Wakabayashi (m-waka@criepi.denken.or.jp)*

*Landis MacKellar (mckellar@iiasa.ac.at)*

**Approved by**

*Gordon MacDonald (macdon@iiasa.ac.at)*
Director, IIASA

November 1999

## Contents

## Abstract

A key source of economic growth in China has been the abundance of household savings, especially in rural regions. In this paper, we estimate saving functions for urban and rural areas of China, paying particular attention to the role of demographic structure. Our results confirm other researchers' finding that saving rates vary inversely with both the elderly and youth dependency ratios, but that the former effect is more significant. This suggests that prospective demographic trends in China will put downward pressure on household savings. Combining our estimation results with reasonable assumptions about economic growth and U.N. population projections, we predict that total household savings in China will begin to decline about 2025. A significant shortage of *ex ante* savings could develop as a result. These results confirm the results and reinforce the concerns expressed by Heller and Szymansky (1997) about the long-run prospect for savings in the East Asian region and possible implications for the global economy.

## About the Authors

Masayo Wakabayashi is a senior researcher at the Socioeconomic Research Center, Central Research Institute of Electric Power Industry, Tokyo, Japan. She was a participant in IIASA's Young Scientists Summer Program in 1999.

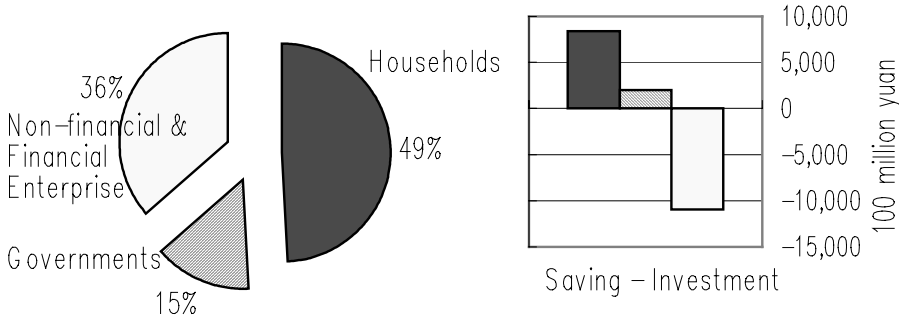
Landis MacKellar is leader of the Social Security Reform Project at IIASA.

# Demographic Trends and Household Savings in China

*Masayo Wakabayashi and Landis MacKellar*

## Introduction

A high domestic saving rate has been one of the keys to China's rapid economic development. As shown in Figure 1, household saving accounted for almost half of the total domestic savings in 1995 and was the main source of investment capital for the enterprise sector.

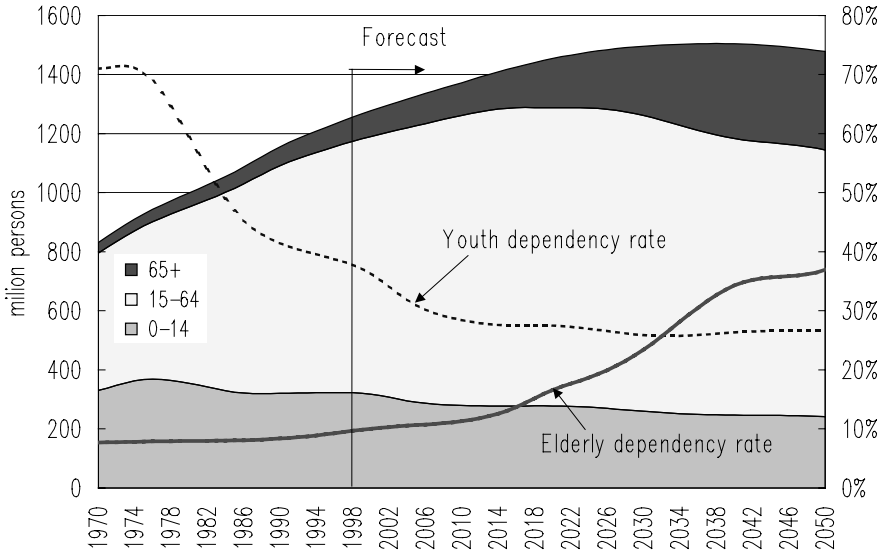



Saving = Total disposable income - final consumption

Data source: Flow of Funds physical transactions, China Statistical Yearbook 1998

**Figure 1. Composition of domestic savings and I–S balance by sector (1995)**

It is well known that China faces dramatic demographic changes in the near future due to rapid changes in population age structure. Figure 2 shows U.N. estimates and projections of the age composition of the Chinese population from 1970 to 2050. The number of elderly persons will increase rapidly after 2000 because of aging process, whereas the number of young persons will decrease owing to the one-child policy. While the youth dependency ratio (population under 15 relative to population 15-64) is projected to decline at a decelerating rate, the elderly dependency ratio (population over 65 relative to population 15-64) is projected to rise at an accelerating rate, especially after 2020. These two phenomena are the main aspects of demographic changes in China. Because of demographic inertia, relaxation of the one-child policy will not change this picture significantly except in the long term.




Data: United Nations World Population Prospects, the 1998 revision

**Figure 2. Demographic changes in China**

A basic compositional implication of the life-cycle hypothesis (LCH) of household saving is that the aggregate saving rate will vary inversely with the number of retirement-age households (i.e., the elderly dependency ratio) relative to the number of working-age households. Closely related the LCH is the hypothesis that households with young children, who are going to the expense of rearing their children, will save a lower proportion of income than will households in which children are grown. Aggregated to the population-wide level, this translates into the Coale-Hoover (1958) hypothesis that the aggregate saving rate will also vary inversely with the youth dependency ratio.

As illustrated in Figure 2, China's working age population is projected to decrease after around 2025 and the elderly dependency ratio will rise rapidly. On the other hand, China's youth dependency ratio will continue to decline. The net impact of these trends on *ex ante* aggregate household saving is uncertain. In this paper, we estimate standard LCH-based saving functions on the basis of panel data at the province level. Based on these results, we project the implications of projected demographic trends for savings in China.

## Household saving behavior in urban and rural areas: theory and evidence

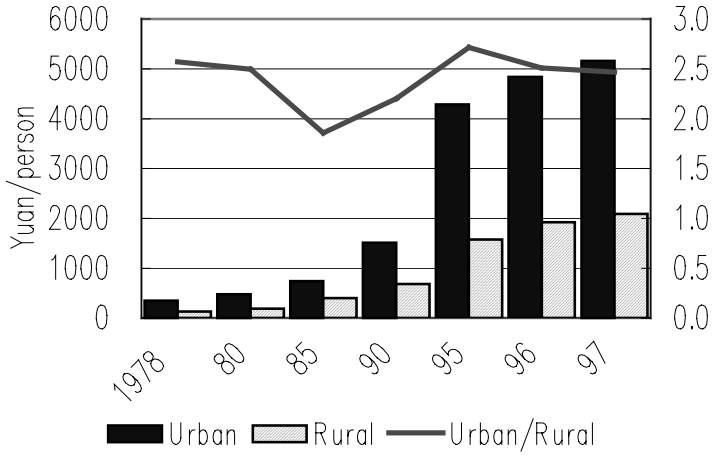
The economic theory of saving is evolving rapidly. Traditionally, household saving was explained by the LCH, according to which households were predicted to accumulate assets during the prime working years, then draw them down after retirement. This pattern of asset accumulation and decumulation gives rise to a familiar "hump-shaped" saving profile, in which the proportion of income saved (income minus consumption expenditure divided by income) is low in the twenties and thirties, rises to a peak in the forties and fifties, after which it declines and becomes negative when

consumption financed by the sale of assets exceeds income. It is only in recent years that the mathematical expertise, data, and computing resources necessary to rigorously formulate and test the LCH have become widely available. Results have been mixed. Among the saving motivations which have been added to the picture are

1. bequests, in other words, saving motivated by the desire to transfer assets to children upon death,
2. liquidity constraints, which may lead to saving in order to accumulate capital for major purchases such as a home or auto, and
3. precautionary motives, which give rise to saving in order to accumulate a hedge against ill fortune such as a period of bad health.

Because of its simplicity, however, and because research has so far failed to reject it categorically, the LCH continues to be the vehicle for a large amount of empirical work on saving behavior.

In looking at household savings in China, the urban-rural distinction is crucial. Over 70 percent of the Chinese population is rural. Partly because of strict controls on internal population movement, China is characterized by a persistent welfare gap: urban residents enjoy a considerably higher standard of living than their rural counterparts. Moreover, this gap is widening. According to official data, per capita annual income of urban residents was almost 2.5 times that of rural residents in 1997 whereas it had been less than 2 times greater in 1985 (Figure 3).




Data: China Statistical Yearbook 1998

**Figure 3. Comparison of per capita annual income between urban and rural households**

From several points of view, Chinese urban households might be expected to have less need for savings than rural households. Urban workers receive a pension based on years of service and final salary, which reduces the need for classic LCH retirement saving. Their income is relatively stable and they are covered by enterprise health and welfare schemes, thus weakening the precautionary motive. Until recently, they did not have to save to purchase homes because enterprises provided low-cost housing, and

even today, in spite of ongoing housing reform, most urban workers can obtain housing at sub-market prices through their enterprise. More generally, urban residents have far superior access to credit markets than do rural households.

In rural areas, by contrast, income fluctuates depending on weather and the prices of farm products. While rural household income has increased rapidly, it is still low compared with urban household income. There is no rural retirement pension system comparable to that which is available for urban workers. Rural households cannot depend on any enterprise to assist them with housing. Finally, the rural saving rate is boosted by own-account investment in the form of farm improvements, acquisition of livestock, etc. From a conceptual point of view, the saving which corresponds to such investment might be more realistically considered as enterprise saving, but since the enterprise and the household are identical, it ends up being credited to households.

Data in Table 1 indicate that, as these generalizations would suggest, the urban saving rate was substantially lower than the rural saving rate in 1985. The generalizations break down, however, if they are applied to data from the 1990s, when urban and rural saving rates were not significantly different. The cause is not in question: assuming that 1985 is a representative data point, the urban saving rate during the 1990s was roughly double its level in the 1980s, while the rural saving rate was slightly lower. Some of the increase in the urban saving rate may be attributable to extremely rapid rate of increase in urban household income (15% per annum in 1985-90 and almost 20% p.a. in 1990-97), but rural areas have seen not-insignificant economic growth as well. More generally, perhaps urban areas have simply seen a much greater expansion of saving opportunities and financial infrastructure than have rural areas.

## Previous Studies

A general specification for examining the impact of demographic changes on saving is

$$s = A + D * \gamma + Z * \theta + u$$

where $s$ is the saving rate, $A$ is a constant, $D$ is a vector of demographic variables and $Z$ is a vector of other variables such as income, and $u$ is an error term.

Table 2 summarizes results of recent studies which have adopted such an approach (for references to studies outside Asia, see Table 1 in Heller and Szymanski 1997). Typically, panel data of several countries are used for these studies and demographic factors are represented by the dependency ratio. Some studies distinguish between the elderly and youth dependency ratios while others do not. The results in Table 2 indicate that most researchers have found significant negative associations between savings and demographic dependency rates. In most studies where the impacts of youth and elderly dependency ratios have been estimated separately, the influence of the elderly dependency ratio exceeds that of the youth dependency ratio. Based on these results, we might expect that demographic trends in China will, on balance, depress the household saving rate. However, the applicability of these results to China is open to doubt.

**Table 1. Per capita household income and savings, 1985-1997**

(at current price :yuan)

| **Urban Households** | **1985** | **1990** | **1993** | **1994** | **1995** | **1996** | **1997** |
|---|---|---|---|---|---|---|---|
| Income per capita | 749 | 1523 | 2583 | 3502 | 4288 | 4845 | 5189 |
| *of which* disposable income | 739 | 1510 | 2577 | 3496 | 4283 | 4839 | 5160 |
| Consumption per capita | 673 | 1279 | 2111 | 2851 | 3538 | 3919 | 4186 |
| Saving rate % | 8.9% | 15.3% | 18.1% | 18.4% | 17.4 | 19.0% | 18.9% |
| Annual Growth rate (%) | | **85-90** | **90-93** | **93-94** | **94-95** | **95-96** | **96-97** |
| Disposable income | | 15.4% | 19.5% | 35.6% | 22.5% | 13.0% | 6.6% |
| Consumption | | 13.7% | 18.2% | 35.1% | 24.1% | 10.8% | 6.8% |

| **Rural Households** | **1985** | **1990** | **1993** | **1994** | **1995** | **1996** | **1997** |
|---|---|---|---|---|---|---|---|
| Total Revenue per capita | 547 | 990 | 1334 | 1789 | 2338 | 2807 | 2999 |
| *of which* net disposable income | 398 | 686 | 922 | 1221 | 1578 | 1926 | 2090 |
| Expenditure per capita | 486 | 903 | 1211 | 1636 | 2138 | 2535 | 2537 |
| *of which* consumption | 317 | 585 | 770 | 1017 | 1310 | 1572 | 1617 |
| Saving rate (%) | 20.2% | 14.8% | 16.5% | 16.7% | 16.9% | 18.4% | 22.6% |
| Annual growth rate (%) | **80-85** | **85-90** | **90-93** | **93-94** | **94-95** | **95-96** | **96-97** |
| Net disposable income | 15.8% | 11.5% | 10.3% | 32.5% | 29.2% | 22.1% | 8.5% |
| Consumption | 14.4% | 13.0% | 9.6% | 32.1% | 28.9% | 20.0% | 2.9% |

Data: China Statistical Yearbook 1998

Note: Includes income and consumption in kind (significant in rural areas). Consumption includes purchases of consumer durables.

**Table 2. Summary of the previous studies on the relationship of savings to dependency ratio**

| **Author** | **Covered Countries; Definition of saving** | **Coefficients of Dependency Ratio** | |
|---|---|---|---|
| | | **Elderly** | **Youth** |
| Schmidt-Hebbel et al. (1992) | 10 developing economies 1970-85; household saving | -0.48* (-3.2) | |
| Weil (1994) | Panel of 14 countries 1960-1985; private saving | -0.5* (-2.53) | -0.27* (-2.41) |
| Horioka (1991) | Japan, macro data 1956-87; private saving | -1.037 (-1.80) | -0.29* (-2.90) |
| Heller & Symansky (1997) | East and Southeast Asia[1)] 1990-96; private saving | -0.89 (-1.92) | -0.23 (-1.48) |

*significant at the 95% confidence level (T-statistics are in parentheses)

1) China included

Worthy of special attention, since it focuses on China, is a paper by Yingyi Qian (1988). Yingyi estimated two basic household saving models. In the Absolute Income Model (AIM), based Keynesian theory, saving is expressed as a linear function of current disposable income. The saving function is written as:

$$S = \alpha + \beta \cdot Y + u$$

where *S* is savings, *Y* is disposable income, and *u* is a stochastic error term. The aggregate saving rate is then

$$\textit{Average propensity to save (APS)} = S/Y = \alpha/Y + \beta + u$$

Assuming as $\alpha < 0$ and $0 < \beta < 1$, the saving rate (APS) increases with growing disposable income. The $\beta$ coefficient is interpreted as the marginal propensity to save (MPS). In the case $\alpha < 0$, MPS exceeds APS. The salient features of the AIM are that saving is determined only by current income and the response to a change in current income is identical in both the short run and the long run.

The Permanent Income Model (PIM) separates disposable income into the permanent portion, which a household expects to receive in perpetuity, and transitory income, defined as the residual left when permanent is subtracted from actual current income. The impact on saving of a change in income will depend, according to the PIM, on which kind of income shifts:

$$S = \alpha + \beta_p \cdot Y_p + \beta_t \cdot Y_t + u$$

where p and t index transitory and permanent income and $Y = Y_p + Y_t$. The logic behind the PIM is that, while a shift in permanent income will change households' expectations regarding their future income level, desired level of assets, and the saving rate necessary to achieve any given target, a shift in transitory income will have no such impacts. Consumption, the argument runs, should be more sensitive at the margin to changes in permanent income than changes in transitory income. For example, if a bad harvest reduces household income in year *t* by $\Delta Y$, household consumption in Year t may be reduced by only a small fraction of $\Delta Y$; if, on the other hand, loss of a portion of the household's land allotment leads to a permanent income loss of $\Delta Y$ (in year t and, in expected terms, in Years t+1, t+2, …) then the consumption decline in Year t might be substantial relative to $\Delta Y$. Since the MPS is the complement of the marginal propensity to consume, this is the same as arguing that the MPS out of transitory income is likely to be greater than the MPS out of permanent income.

Yingyi's results are summarized in Table 3. In the case of urban households, Yingyi used urban household time series data. Since time series were not available for rural households, he relied on cross- provincial panel data. The column headed "Current Income" gives estimation results for the AIM; the other two columns give results of estimating the PIM. Looking first at the AIM, the urban MPS is estimated to be virtually zero for the period 1955-78. Data are so uncertain for this period, and the economic structure of China was so radically different from that observed today, that there is little reason to dwell on this result. In 1979-85, the MPS is estimated to be 0.26 in urban areas and 0.41-0.58 in rural areas. *Grosso modo*, then the AIM estimates of the MPS are one-quarter for urban areas and one-half for rural areas. This makes sense in terms of the discussion of urban and rural saving behavior above.

When income is disaggregated into permanent and transitory components, no significant difference in marginal propensities to save is observed for urban areas. This could not be in greater contrast to the case in rural areas, where the estimated MPS out of transitory income substantially exceeds 1! This result may reflect failure to take province-specific fixed effects into consideration. If individual effects are relatively high in higher income provinces, the OLS slope coefficient will be biased upward. However, it does at least suggest that urban-rural differences in saving behavior reflect mostly differences in saving out of transitory income.

**Table 3. Empirical results in the study of Yingyi Qian (1988)**

| Region | Time period | MPS out of: Current income (AIM model) | Permanent income (PIM model) | Transitory income (PIM model) |
|---|---|---|---|---|
| **Urban** | 1995-78 | 0.04 | | |
| | | | 0.02 | 0.02 |
| | 1979-85 | 0.26 | | |
| | | | 0.25 | 0.27 |
| **Rural** | 1982-84 | 0.53 | | |
| | 1983-84 | | 0.34 | 1.31 |
| | 1982 | 0.41 | | |
| | 1983 | 0.53 | | |
| | | | 0.34 | 1.34 |
| | 1984 | 0.58 | | |
| | | | 0.36 | 1.23 |

Notes:
1) Income data exclude income in kind and savings exclude purchase of durable goods.
2) Household income and savings are expressed in real per capita terms using data on general retail price index and population.
3) Permanent income is estimated as the past three years' average income and transitory income is calculated by subtracting permanent income from current income.

## Model specification and data

We adopt the two model specifications employed by Yingyi, but add demographic variables. The models estimated are:

$$S = \alpha + \left(\beta_1 + \beta_2 DepRate_e + \beta_3 DepRate_y\right) \cdot Y + u$$

$$S = \alpha + \left(\beta_{p1} + \beta_{p2} DepRate_e + \beta_{p3} DepRate_y\right) \cdot Y_p + \left(\beta_{t1} + \beta_{t2} DepRate_e + \beta_{t3} DepRate_y\right) \cdot Y_t + u$$

where the notation is as above.

Per capita household disposable income (net disposable income in the case of rural

households) and consumption were calculated at the provincial level for 1995, 1996, and 1997 (see note to Table 1). Both income and expenditure were deflated by provincial consumer price indices (*CPI*s). Permanent Income is calculated as a mean value of past three years current income by each province. Transitory Income is defined as current disposable income minus permanent income. All data are from the *China statistical yearbooks* for 1993-98 and are based on household sample surveys. Rural area data are available in 31 provinces and urban area data are available in 30 (excluding Tibet), so the rural sample size after pooling is 93 and the urban sample size is 90. Summary statistics calculated from the sample are presented in Annex Table 1. What is most notable is that the variance of rural saving rates is substantially higher than the variance of rural saving rates. Looking at the extremes of the sample, we observe that the three highest rural saving rates are 0.429 (Tibet 1996), 0.420 (Tianjin 1997) and 0.390 (Hebei 1997). With the exception of Tibet, these are rich agricultural regions. The three lowest rural saving rates are -0.0645 (Ningxia 1995), -0.0438 (Xinjiang 1996) and -0.0397 (Gansu 1995); all three of these rank among the poorest agricultural regions.

**Estimation Results**

Random-effects generalized least squares (GLS) estimation results are summarized in Table 4. The constant term is negative in all estimations, indicating that the MPS exceeds APS and that, as a result, the latter rises as income rises increases. Both the elderly and youth dependency ratios are estimated to have a negative impact on saving. Consistent with most of the results in Table 2, the absolute value of the coefficient on the elderly dependency ratio is larger than that on the youth dependency ratio. It is also usually statistically significant, as opposed to the youth dependency ratio coefficient, which is not statistically significant in any of the model specifications estimated. The impact of household demographic structure appears to be mediated through saving out of permanent income in rural areas but transitory income in urban areas.

The figures in Table 5 have two purposes: first, to allow us to compare our results directly with those obtained by Yingyi, and second, to present estimates of marginal propensities to save evaluated at the sample mean values of the dependency ratios. Looking at the top half of Table 5, we observe that the AIM specification without dependency ratios gives a MPS of 0.2076 for urban households and 0.3674 for rural households. Yingyi's estimation of the AIM resulted in an urban MPS of 0.26 (recall that this was based on time-series data) and a rural MPS (estimated using a cross-sectional approach similar to ours) in the range 0.41-0.58. In short, given the fact that they rely on different data for different time periods, the two sets of AIM estimation results are consistent.

In the top half of Table 5, we show the results of combining the parameter estimates in Table 4 with the assumption that demographic dependency ratios are at their sample mean levels. Continuing to look at the AIM specification, we estimate the urban MPS to be 0.2528 and the rural MPS to be 0.4538, as opposed to 0.2076 and 0.3674 when dependency ratios were omitted from the model specification. In other words, the naïve specification understates the strength of the relationship between income and savings because provinces characterized by income levels high above the mean also tend to have higher-than-average dependency ratios (and *vice versa*). When demography is made explicit, the relationship between income and savings is seen to be more significant. The reason, going back to Table 4, is to be found in the elderly dependency ratio, and

the effect is about three times greater in rural areas than in urban areas.

Why should rural provinces with high elderly dependency ratios be characterized by low marginal propensities to save? As we put it above, the economic theory of saving is evolving rapidly. Two interpretations come to mind, however. One is that the presence of elderly persons may raise the consumption requirements of the household without substantially increasing household income (including income in kind). The second is that, in provinces characterized by a high level of parent-child co-residence (and hence a high elderly dependency ratio), the inducement to save may be less. If adult children are reasonably certain of living with their grown children, the argument might run, the incentive for life-cycle retirement saving would be reduced.

Moving to the PIM specification, when demography is omitted from the specification, the urban marginal propensities to save out of permanent and transitory income are found to be 0.1919 and 0.2860, respectively. The corresponding estimates for rural areas are 0.3463 and 0.4550. Note that by controlling for provincial effects, we have reduced upward bias in the estimation of the rural MPS out of transitory income.

**Table 4. Estimation results**

**Absolute Income Model (AIM)**

| | **Urban** | | | **Rural** | | |
|---|---|---|---|---|---|---|
| R-Square: | | | within = 0.5843<br>between = 0.8418<br>overall = 0.8004 | | | within = 0.6866<br>between = 0.7673<br>overall = 0.7452 |
| Independent Variables | Estimated Coefficient | | Standard Error | Estimated Coefficient | | Standard Error |
| $Y$ | 0.3489 | ** | (0.0493) | 0.6662 | ** | (0.0898) |
| $DepRate_e \cdot Y$ | -0.0068 | ** | (0.0024) | -0.0190 | ** | (0.0050) |
| $DepRate_y \cdot Y$ | -0.000739 | | (0.00046) | -0.00066 | | (0.0015) |
| Constant | -254.75 | ** | (86.411) | -367.32 | ** | (68.473) |

**Permanent Income Model (PIM)**

| | **Urban** | | | **Rural** | | |
|---|---|---|---|---|---|---|
| R-Square: | | | within = 0.6189<br>between = 0.8621<br>overall = 0.8243 | | | within = 0.689<br>between = 0.7696<br>overall = 0.7471 |
| Independent Variables | Estimated Coefficient | | Standard Error | Estimated Coefficient | | Standard Error |
| $Y_p$ | 0.2259 | ** | (0.0634) | 0.6378 | ** | (0.1487) |
| $DepRate_e \cdot Y_p$ | -0.0007 | | (0.0030) | -0.0178 | * | (0.0083) |
| $DepRate_y \cdot Y_p$ | 0.00023 | | (0.00073) | 0.00012 | | (0.0023) |
| $Y_t$ | 1.3911 | ** | (0.3873) | 0.9006 | | (0.6419) |
| $DepRate_e \cdot Y_t$ | -0.0641 | ** | (0.0214) | -0.0278 | | (0.0418) |
| $DepRate_y \cdot Y_t$ | -0.0102 | | (0.0055) | -0.0050 | | (0.0096) |
| Constant | -208.77 | * | (82.452) | -380.81 | ** | (78.385) |

** significant at the 99% confidence level, *significant at the 95% confidence level.

**Table 5. Marginal propensity to save (MPS) out of various kinds of income**

**Current Income (AIM Model)**

| Region | Time period | MPS out of Current Income | |
|---|---|---|---|
| | | Including dependency ratios | Excluding dependency ratios |
| **Urban** | 1995-97 | 0.2528 | 0.2076 |
| **Rural** | 1995-97 | 0.4538 | 0.3674 |

**Permanent Income and Transitory Income (PIM model)**

| Region | Time period | MPS out of Permanent Income | | MPS out of Transitory Income | |
|---|---|---|---|---|---|
| | | Including dependency ratios | Excluding dependency ratios | Including dependency ratios | Excluding dependency ratios |
| **Urban** | 1995-97 | 0.2282 | 0.1919 | 0.3651 | 0.2860 |
| **Rural** | 1995-97 | 0.4675 | 0.3463 | 0.4320 | 0.4550 |

1. MPS including dependency ratios derived by using estimated parameters (see Table 4) and sample means of independent variables.
2. MPS excluding dependency ratios derived by deleting dependency ratios and re-estimating.

When demography is explicitly included in the specification, in rural areas, the MPS to save out of permanent income is raised from 0.3463 to 0.4675 and the MPS out of transitory income is reduced from 0.4550 to 0.4320 (an insignificant change). In urban areas, adding demographic structure and evaluating marginal propensities to save at the sample mean has the effect of raising the MPS out of permanent income from 0.1919 to 0.2282 (an insignificant increase) and out of transitory income from 0.2860 to 0.3651. The most important implication is that, when demography is statistically controlled for, the marginal propensities to save out of permanent and transitory income in rural areas are indistinguishable. The distinction continues to be a relevant one in urban areas, however.

## Implications for the future

Heller and Szymansky (1997) caused a stir when they projected that after 2025, demographic aging in what they called the "Asian Tigers" would reduce national saving rates and put downward pressure on *ex ante* global savings. In this section, we combine the parameter estimates obtained from estimating the AIM model with assumptions about economic growth to estimate the impact of China's changing demographic structure on the household saving rate. To anticipate, our results are fully consistent with and reinforce the conclusion of these researchers.

Table 6 shows the main assumptions used in the projection exercise. The economic growth path is taken from the World Bank's "China 2020" report. According to this report, the pace of GDP growth will slow down over time, from current 9-10% p.a. to

5% p.a. in 2020. We suppose that this slowdown process will continue after 2020 and the average annual growth rate from 2020 to 2050 will be 3%. Total disposable income is assumed to grow at the same rate as total GDP. Demographic assumptions are from the United Nations (See Figure 2). We assume that the proportion of the population which is urban will rise from its current 30% to 55% in 2050. The urban-rural ratio of per capital household income is assumed to narrow from its current 2.5 to 2.0 in 2050.

**Table 6 Main presuppositions for the prospect**

| | Actual | | Assumption | | | |
|---|---|---|---|---|---|---|
| | **90** | **97** | **00** | **10** | **20** | **50** |
| Population (10,000 persons) | 114,333 | 123,625 | 126,940 | 136,416 | 144,518 | 146,830 |
| Urban areas (%) | 36.4% | 29.9% | 31.1% | 34.9% | 38.3% | 44.9% |
| Rural areas (%) | 73.6% | 70.1% | 68.9% | 65.1% | 61.7% | 55.1% |
| Elderly dep. ratio (%) | 8.3 | 9.5 | 10.0 | 11.3 | 16.6 | 36.9 |
| Youth dep. ratio (%) | 41.5 | 38.3 | 36.3 | 28.4 | 27.5 | 26.7 |
| Per Capita Disposable Income (100 million yuan) | | | | | | |
| Urban areas | 1,510 | 5,160 | 6,413 | 11,679 | 18,882 | 45,129 |
| Rural areas | 686 | 2,090 | 2,614 | 4,866 | 8,851 | 22,565 |
| Urban/Rural ratio | 2.20 | 2.47 | 2.45 | 2.40 | 2.13 | 2.00 |

(annual increasing rate; %)

| | Actual | | Assumption | | |
|---|---|---|---|---|---|
| | **90-97** | **97-00** | **00-10** | **10-20** | **20-50** |
| GDP | 11.2 | 8.4 | 6.9 | 5.5 | 3.0 |
| GDP per capita | 9.9 | 7.5 | 6.2 | 4.9 | 2.9 |
| Population | 1.1 | 0.9 | 0.7 | 0.6 | 0.1 |
| Urban areas | 2.9 | 2.2 | 1.9 | 1.5 | 0.6 |
| Rural areas | 0.4 | 0.3 | 0.1 | 0.1 | -0.3 |
| Disposable Income | 21.5 | 8.4 | 6.9 | 5.5 | 3.0 |
| Urban areas | 23.5 | 9.2 | 7.6 | 5.6 | 3.3 |
| Rural areas | 19.8 | 7.6 | 6.1 | 5.4 | 2.6 |
| Per Capita Disposable Income | | | | | |
| Urban areas | 19.2 | 7.5 | 6.2 | 4.9 | 2.90 |
| Rural areas | 17.2 | 7.7 | 6.4 | 6.2 | 3.2 |

1. Actual data are obtained from China Statistical Yearbook.
2. GDP growth path up to 2020 is cited the World Bank “China 2020” report.
3. Population growth rate, elderly and youth dependency ratios are referred to UN prospects.

The top half of Figure 5 shows the future prospect of the average propensity to save (APS) in urban and rural households. The bottom half shows the level of projected savings. As can be seen, the rural saving rate is projected to continue to rise until approximately 2010-15, after which it is projected to decline rapidly. The urban saving rate is very slightly increasing until about 2010-15, after which it, too, begins to decline (albeit at a more moderate rate). The combined result is that household savings in China are projected to peak in 2025 and then decline. Another implication is that total savings will come to be dominated by urban savings. In Figure 5, the sources of change are illustrated. The solid black lines, positive until 2015 and negative afterward, show

annual change in the saving rates. The cross-hatched bars illustrate the impact of economic growth on the saving rate, this is positive but diminishing. The solid bars represent the impact of demographic change. As can be seen, after 2015 this is projected to become decidedly negative.

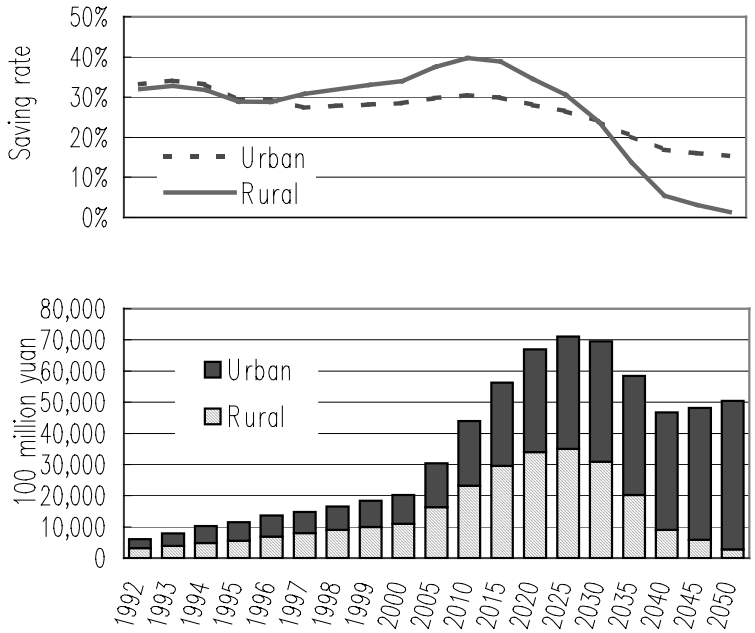



**Figure 4. Household saving rate and household savings in urban and rural areas**

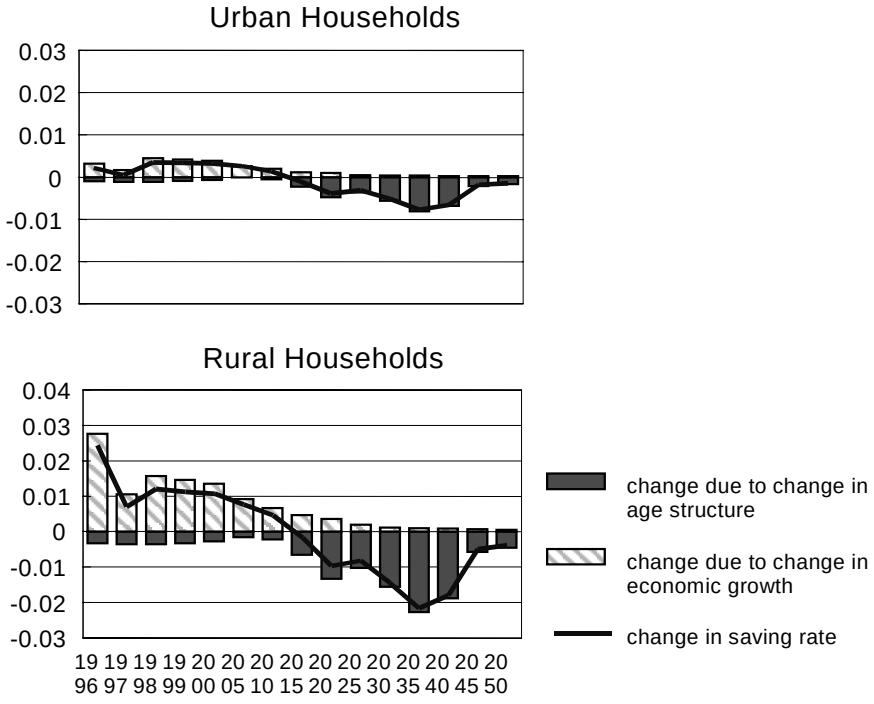



**Figure 5. Decomposition of changes in household saving rates**

## Concluding Remarks

One of the keys to rapid Chinese economic growth has been the abundant supply of household savings. Two trends suggest that this source of funds may be less generous in the future. One is the presumably inevitable deceleration in rate of income growth. Another is the rise in the elderly dependency ratio, which, according to our estimation results, is a significant determinant of household saving rates, especially in rural areas. While a reduced youth dependency ratio will favor household savings, this effect is weak. According to our projections, aggregate *ex ante* household savings will begin to decrease after around 2025. The emerging shortage aggregate household savings has the potential to influence China's development path and, as China turns increasingly to international sources of capital, global savings-investment balances, interest rates, and international capital flows. These results reinforce concerns recently expressed by Heller and Szymansky (1997) regarding the long-run prospect for savings in the East Asian region as a whole.

## References


Ahmad, Ehisham and Hussain, Arthar, 1991, “Social Security in China: A Historical Perspective”, in Research Studies in Development Economics, Ahman, Ehtisham et al., eds.

Chai, Joseph C. H., 1996, “Consumption and Living Standards in China” in: The Chinese Economy Under Deng Xiaoping, Ash Rovert F and Kueh Y. Y., eds.

Deaton, Angus S. and Paxson, Christina H., 1997, “The Effects of Economic and Population Growth on National Saving and Inequality”, The Demography of Aging Vol. 34, No. 1.

Heller, Peter S. and Symansky, Steve, 1997, “ Implications for Savings of Aging in the Asian Tigers”, IMF working paper.

Higgins, Matthew and Williamson, Jeffrey G., 1997, “Age Structure Dynamics in Asia and Dependence on Foreign Capital”, Population and Development Review Vol. 23, No. 2.

Horioka, Charles Yuji, 1991, “The determinants of Japan’s saving rate: the impact of the age structure of the population and other factors”, The Economic Studies Quarterly Vol. 42, No.3.

Lee, Ronald D., Mason, Andrew and Miller, Tim, 1999, ”Saving, Wealth and Population”, not published.

Mason, Andrew, 1988, “Saving, Economic Growth and Demographic Change”, Population and Development Review Vol. 14, No. 1.

Modigliani, F and A. Sterling, 1983, “Determinants of Private Saving with Special Reference to Social Security – Cross-Country Tests”, in The Determinants of National Saving and Wealth, F. Modigliani and R. Hemming, eds.

Schmidt-Hebbel, Klaus, Webb, Steven B., and Corsetti, Giancarlo, 1992, “Houshold Saving in Developing Countries: First Cross-Country Evidence”, The World Bank Economic Review Vol. 6, No. 3.

Weil, David N., 1994, “The Saving of the Elderly in Micro and Macro data”, Quarterly Journal of Economics Vol. 109.

World Bank, 1995, Averting the Old Age Crisis.

World Bank, 1997, China 2020.

Yingyi Qian, 1988, “ Urban and Rural Household Savings in China”, IMF working paper.

## Statistical Annex: Summary Statistics

**Observations**

| | Regions | | |
|---|---|---|---|
| **Year** | **Urban** | **Rural** | **Total** |
| 1995 | 30 | 31 | 61 |
| 1996 | 30 | 31 | 61 |
| 1997 | 30 | 31 | 61 |
| **Total** | 90 | 93 | 183 |

29 provinces and national total in urban areas
30 provinces and national total in rural areas
The data of households in Tibet are available only in rural area

**Nominal term**

| Variable | | | Mean | Std.Dev. | Min | Max |
|---|---|---|---|---|---|---|
| **Disposable income:** | **urban** | overall | 4,744 | 1,315 | 2,863 | 8,562 |
| **(per capita; yuan)** | | between | | 1,268 | 3,366 | 8,053 |
| | | within | | 398 | 3,838 | 5,613 |
| **Net income:** | **rural** | overall | 1.969 | 870 | 880 | 5,277 |
| **(per capita; yuan)** | | between | | 847 | 1,055 | 4,790 |
| | | within | | 236 | 1,425 | 2,457 |
| **Living expenditure:** | **urban** | overall | 3,875 | 1,070 | 2,482 | 6,853 |
| **(per capita; yuan)** | | between | | 1,038 | 2,761 | 6,614 |
| | | within | | 301 | 3,135 | 4,647 |
| | **rural** | overall | 1,559 | 638 | 773 | 4,228 |
| | | between | | 627 | 825 | 3,828 |
| | | within | | 150 | 1,118 | 1.959 |
| **Saving:** | **urban** | overall | 869 | 283 | 381 | 1,708 |
| **(per capita; yuan)** | | between | | 257 | 536 | 1,453 |
| | | within | | 124 | 548 | 1,146 |
| | **rural** | overall | 411 | 300 | -64 | 1,361 |
| | | between | | 279 | 36 | 1,087 |
| | | within | | 120 | 96 | 685 |
| **GDP:** | **urban** | overall | 4,461 | 11,86 | 165 | 74,77 |
| **(100 million yuan)** | | between | | 11,93 | 184 | 67,04 |
| | | within | | 1,269 | -4,106 | 12,18 |
| | **rural** | overall | 4,319 | 11,70 | 56 | 74,77 |
| | | between | | 11,76 | 66 | 67,04 |
| | | within | | 1,248 | -4,248 | 12,04 |
| **GDP per capita:** | **urban** | overall | 6,227 | 4,186 | 1,823 | 25,75 |
| **(yuan)** | | between | | 4,137 | 2,044 | 22,18 |
| | | within | | 891 | 2,574 | 9,791 |
| | **rural** | overall | 6,116 | 4,164 | 1,823 | 25,75 |
| | | between | | 4,115 | 2,044 | 22,18 |
| | | within | | 878 | 2,462 | 9,680 |
| **Elderly dep. ratio:** | **urban** | overall | 9.83 | 2.25 | 5.25 | 17.36 |
| **(%)** | | between | | 2.24 | 6.13 | 16.76 |
| | | within | | 0.37 | 8.95 | 10.71 |
| | **rural** | overall | 9.79 | 2.22 | 5.25 | 17.36 |
| | | between | | 2.21 | 6.13 | 16.76 |
| | | within | | 0.38 | 8.92 | 10.68 |
| **Youth dep. ratio:** | **urban** | overall | 38.69 | 7.64 | 21.59 | 52.70 |
| **(%)** | | between | | 7.51 | 22.73 | 51.16 |
| | | within | | 1.79 | 34.31 | 42.92 |
| | **rural** | overall | 39.23 | 8.11 | 21.59 | 59.26 |
| | | between | | 7.99 | 22.73 | 55.59 |
| | | within | | 1.82 | 34.85 | 43.46 |

**Real term**

| Variable | | | Mean | Std.Dev. | Min | Max |
|---|---|---|---|---|---|---|
| **Disposable income:** | **urban** | overall | 3,787 | 1,034 | 2,445 | 6,916 |
| **(per capita; yuan)** | | between | | 1,034 | 2,610 | 6,741 |
| | | within | | 155 | 3,373 | 4,322 |
| | **rural** | overall | 1,576 | 688 | 732 | 3,973 |
| | | between | | 684 | 827 | 3,759 |
| | | within | | 126 | 1,313 | 1,810 |
| **Permanent income:** | **urban** | overall | 3,447 | 934 | 2,328 | 6,558 |
| **(per capita; yuan)** | | between | | 924 | 2,439 | 6,147 |
| | | within | | 190 | 2,998 | 3,860 |
| | **rural** | overall | 1,344 | 606 | 701 | 3,580 |
| | | between | | 606 | 725 | 3,463 |
| | | within | | 96 | 1,106 | 1,615 |
| **Transitory income:** | **urban** | overall | 340 | 219 | -95 | 916 |
| **(per capita; yuan)** | | between | | 174 | 16 | 755 |
| | | within | | 136 | 45 | 680 |
| | **rural** | overall | 231 | 147 | -135 | 618 |
| | | between | | 130 | -52 | 526 |
| | | within | | 72 | 54 | 401 |
| **Living expenditure:** | **urban** | overall | 3,094 | 842 | 2,120 | 5,556 |
| **(per capita; yuan)** | | between | | 845 | 2,172 | 5,541 |
| | | within | | 109 | 2,841 | 3,434 |
| | **rural** | overall | 1,247 | 505 | 598 | 3,183 |
| | | between | | 505 | 657 | 3,004 |
| | | within | | 72 | 1,058 | 1,426 |
| **Saving:** | **urban** | overall | 693 | 221 | 325 | 1,380 |
| **(per capita; yuan)** | | between | | 210 | 417 | 1,200 |
| | | within | | 77 | 494 | 888 |
| | **rural** | overall | 329 | 238 | -55 | 1,054 |
| | | between | | 224 | 28 | 875 |
| | | within | | 87 | 80 | 526 |
| **Saving rate:** | **urban** | overall | 18.22 | 2.727 | 12,87 | 25.65 |
| **(%)** | | between | | 2.271 | 14.07 | 22.96 |
| | | within | | 1.547 | 12.93 | 22.75 |
| | **rural** | overall | 19.03 | 10.204 | -6.45 | 42.88 |
| | | between | | 9.089 | 2.92 | 37.46 |
| | | within | | 4.827 | 5.07 | 29.50 |
| **GDP:** | **urban** | overall | 3,560 | 9,439 | 138 | 57,070 |
| **(100 million yuan)** | | between | | 9,530 | 143 | 53,519 |
| | | within | | 553 | 108 | 7,111 |
| | **rural** | overall | 3,460 | 9,325 | 48 | 57,538 |
| | | between | | 9,409 | 52 | 53,617 |
| | | within | | 602 | -388 | 7,382 |
| **GDP per capita:** | **urban** | overall | 4,959 | 3,241 | 1,526 | 19,229 |
| **(yuan)** | | between | | 3,250 | 1,585 | 17,344 |
| | | within | | 421 | 3,269 | 6,845 |
| | **rural** | overall | 4,888 | 3,251 | 1,462 | 19,387 |
| | | between | | 3,255 | 1,545 | 17,379 |
| | | within | | 456 | 3,070 | 6,896 |