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Determinants of Household Saving in China

Marcos Chamon and Eswar Prasad[1]

Research Department, IMF
Washington, DC 20431

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Abstract

This paper analyzes the patterns and determinants of saving behavior among Chinese households using a subset of the Urban Household Survey from 1986-97. Estimates of age and cohort profiles of savings show that young households tend to have relatively high saving rates, possibly in order to self-finance purchases of major durables and housing since there are severe constraints (or were, until recently) on borrowing for these purchases. Saving rates then decline with the age of the household head until around age 45, when they begin to bounce back sharply, presumably as retirement approaches. Cohorts with household heads that were in their 40s during the 1980s tend to save the most. These cohorts may constitute the group most vulnerable to the market-oriented reforms that began in the early 1980s, which may have increased uncertainty about their future incomes while not yielding them as much of a benefit in terms of rising incomes compared to younger cohorts. We combine these results with an analysis of demographic projections to show that demographic shifts may actually contribute to higher household saving rates over the next decade or two. But our data also indicate that past savings constitute the dominant source of financing for durables good purchases. This suggests that, as the demand for durables rises with rising income levels and as consumer credit develops, the saving rate, especially for younger households, could decline.

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[1] mchamon@imf.org; eprasad@imf.org. Some of the aggregate data presented in this paper are drawn from work done by the IMF's China team. The views expressed in this paper are those of the authors and do not necessarily represent those of the IMF or IMF policy.

I. Introduction

The Chinese save a lot. Figure 1 shows that gross domestic saving in China has amounted to about 40 percent of GDP on average over the last two decades. National savings has surged since 2000, reaching 50 percent of GDP in 2004. Enterprise saving, which has typically been on the order of about 15 percent of GDP, has risen sharply in recent years and amounted to almost 23 percent of GDP in 2004. Such high rates of enterprise savings may be related to the attractiveness of investing in a fast-growing economy like China and by the fact that retained earnings are typically one of the main sources of financing for enterprise investment.[2] While enterprises may enjoy attractive rates of return on their savings, the same is not true for households. In fact, common forms of household savings such as bank deposits have generally had low (and, in some years, negative) real rates of return.

Household saving has traditionally been the most important contributor to overall saving (with the exception of the 2002-04 period when enterprise saving became larger). This component of saving is the focus of our paper. Indeed, with household saving amounting to one quarter to one third of disposable income by some estimates, an analysis of the determinants of household saving behavior is of considerable interest just in terms of trying to explain its sheer magnitude in the context of standard economic models.

Understanding household saving behavior in China has broader implications as well. The motives that drive saving could help determine how effective monetary policy actions such as changes in interest rates are likely to be in affecting aggregate demand (see Din, 2003, for a discussion of this issue in the context of China). Although history may not be a perfect guide to the future, such an analysis may also be relevant for understanding how financial sector reforms—including banking sector restructuring and the development of new financial instruments that allow individuals to borrow against their future income—could affect aggregate saving and, possibly, the saving-investment balance (see, e.g., Prasad and Rajan, 2005).

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[2] The recent increase in saving by enterprises may be related to their rising profits and tightening credit conditions. State enterprises traditionally do not pay dividends to their shareholders or to the government.

A basic question to be addressed is why Chinese households save so much of their income. A facile explanation is that this is just part of the typical East Asian ethic of frugality. Or, in more esoteric terms, that Chinese households have congenitally low discount rates. But this "cultural" explanation is hardly satisfactory from an analytical standpoint. Chinese household saving rates were actually quite low prior to the reforms of the1980s.[3] Moreover, there is little evidence that cultural effects could explain the high rates of saving in China and other east Asian economies during the last two decades (Carroll, Rhee and Rhee, 1994). More promising explanations of this phenomenon include patterns of economic growth, demographic factors (a rapidly aging population), uncertainty engendered by the move towards a market-oriented economy, and the absence of financial instruments to borrow against future income. Another factor is that many social benefits--pension, housing and health--were historically provided through state-owned enterprises. Those benefits cover many of the important reasons why households usually save. The market-oriented reforms and gradual hardening of state enterprises' budget constraints have resulted in reductions in these benefits and made their future provision more uncertain. As a result, households may have increased their saving in order to prepare for future expenditure needs on those fronts.

A widely-used benchmark model for explaining household saving behavior is the life cycle hypothesis, which predicts that higher economic growth should increase the total savings of the young and richer cohorts vis-à-vis the dissaving of the older and poorer cohorts, thereby raising the average saving rate. That process can be amplified by demographic changes that increase the share of the population that is of prime saving age. A recent paper by Modigliani and Cao (2004) uses aggregate data from China during the period 1953-2000 and finds support for those effects.

But studies based on micro data for other countries have found the effect of growth on savings through life cycle channels to be limited. For instance, Paxson (1996) uses household survey data to estimate age and cohort profiles for the saving rate. Her analysis incorporates data from the U.S., the U.K., Thailand and Taiwan Province of China. The last

[3] Although one could argue that, prior to the 1980s, Chinese incomes were close to subsistence levels, making saving more difficult.

of these economies provides a setting of high income growth and declining fertility that is somewhat analogous to the current conditions prevailing in Mainland China. In all cases, Paxson finds that the aggregation effect of growth on the savings of the young vis-à-vis the dissavings of the old alone does not translate into substantial increases in the aggregate saving rate (taking the estimated age-profiles as given and focusing only on their aggregation). Growth may also affect savings through habit formation considerations (Carroll and Weil, 1994). However, Paxson's (1996) estimates of the effect of past earnings growth on savings suggests a limited quantitative effect for that channel as well.

Borrowing constraints due to underdeveloped financial markets could also affect the relationship between growth and saving rates. Since this phenomenon is likely to be particularly relevant for China, we develop a simple model where borrowing constraints play an important role in determining how growth affects savings. The basic idea is as follows. If younger households in a fast growing economy could borrow against their higher future income, they would wish to do so. But if there are constraints to such borrowing, including inadequately developed financial markets, the most they can do to smooth their consumption is to save less, postponing their retirement savings towards later stages of their life. For sufficiently high growth rates, the bulk of one's lifetime income would be concentrated in the later stages of the life cycle. That income can only be spread over the remaining part of the life cycle (since the borrowing constraints prevent it from being spread to the earlier parts). As a result, we may end up with a situation where sufficiently high income growth leads to a higher proportion of lifetime income being saved for retirement. Thus, growth may increase savings through life cycle effects not only as a result of aggregation considerations, but also by changing the age-profile of savings in a way that raises aggregate savings.

How relevant are these competing explanations for households' saving behavior in a rapidly growing developing economy that has an underdeveloped financial sector? As one might anticipate, it is not feasible to empirically disentangle all of these different hypotheses. Nevertheless, our objective is to make a modest attempt to at least shed some light on the empirical relevance of different hypotheses.

In this paper, we use micro data to characterize household saving behavior in China. Our primary data source is the Urban Household Survey conducted annually by China's

National Bureau of Statistics. These data are currently available for the period 1986-97 (we are in the process of negotiating the procurement of more recent data).

In our empirical analysis, we estimate the age and cohort profiles of saving by Chinese urban households. We find that there are strong cohort effects in the data, with middle-aged cohorts tending to save more than younger or older cohorts. A possible explanation for this result is that middle-aged cohorts (with household head ages between 40 and 50 in 1986) are likely to be the most vulnerable to market-oriented reforms, which could increase uncertainty about their future incomes and not yield them as much of a benefit in terms of rising incomes compared to younger cohorts.

We also find that households tend to have relatively high saving rates in the early stages of the life cycle. This finding could be attributable to the fact that, in the absence of well-developed financial markets that allow for borrowing against future income streams, acquisition of major durable goods (and housing) could require higher saving than would otherwise be the case. Age effects tend to drop until the age of 40—probably related to costs associated with children—at which point they begin to rebound sharply, presumably as those households prepare for retirement. This sharp increase is consistent with the predictions of our stylized model.

Finally, we use the survey data to explore the potential effects that the availability of consumer finance could have on household saving behavior. Our data suggest that, based on the important role played by past savings in financing large durables purchases, average household savings could decline significantly as rising income levels stimulate durables purchases which will increasingly be financed by consumer credit.

In the final section of the paper, we bring together the empirical results with some macroeconomic data to discuss implications for the possible evolution of household saving patterns in China. It turns out that, over the next two decades, projected demographic shifts within the working–age population are likely to be more important than the rise in the elderly dependency ratio in influencing the aggregate household saving rate. Overall, we do not anticipate substantial changes in saving behavior stemming from demographic factors over the short- to medium-term.

II. Literature Review

There is a large literature on the determinants of savings, both at the aggregate (national) and household levels. This section begins by discussing some of the papers mentioned above in more detail, and also reviews some papers that are more specific to China and the East Asian region. The most relevant aspects for the recent Chinese experience are the ones related to high income growth, demographic transition and financial development. The life cycle hypothesis predicts that higher economic growth should increase the total savings of the young and richer cohorts vis-à-vis the dissaving of the older and poorer cohorts, thereby raising the average saving rate. That process can be amplified by demographic changes that increase the share of the population in their prime saving age.

A recent paper by Modigliani and Cao (2004) uses aggregate data from China during the period 1953-2000 to test the life cycle hypothesis predictions on aggregate savings. The estimated effects of long-term growth and the employed/minors dependency ratio on savings are both positive. Deaton and Paxson (1993) study life cycle savings using household-level data on income and expenditures from Taiwan Province of China over 1976-90, which provides a useful benchmark for comparisons with the current situation in Mainland China. The observed patterns across households of different ages and cohorts are broadly consistent with a life cycle explanation. However, there is also strong evidence of a link between income growth and saving at the individual level, something that cannot be explained by life cycle theory.

Paxson (1996) shows that the effect of growth on the savings of the young vis-à-vis the dissavings of the old alone does not translate into substantial increases in the saving rate. Carroll and Weil (1993) study growth and savings in a cross-section of countries. They show that growth Granger-causes saving, but that saving does not Granger-cause growth. In his comment on Carroll and Weil's work, Kremer (1994) argues that changes in the prospects of capital being expropriated can have very large implications for the optimal steady-state capital stock. In particular, a reduction in expropriation risks can promote a surge in savings. That point seems particularly relevant for an economy that has undertaken a reform process such as the one in China.

Differences in preferences can also help explain saving behavior. Carroll and Weil (1993) also use household-level data from the U.S. to show that households with predictably higher income growth save more than households with predictably low income growth. They present a simple model where that is the result of smoothing housing consumption in the presence of credit constraints, but favor habit formation considerations when explaining this correlation of savings and income growth at the individual level. Habit formation considerations can help explain high savings in fast growing economies, such as the ones in East Asia. Bequest motives have been proposed as an explanation for high saving rates in Japan (Hayashi, 1997). Carroll, Rhee and Rhee (1994) test the hypothesis that cultural differences can explain saving behavior by comparing the savings pattern of different immigrant groups in Canada. They find no evidence of cultural effects on saving. However, it is possible that selection bias among immigrants dominates cultural differences.

Credit constraints may also affect saving decisions. Hayashi, Ito and Slemrod (1987) study whether differences in availability of financing for housing in Japan can account for the higher household saving rate vis-à-vis the U.S. Their calibrated model indicates that the effect of the larger down payment Japanese households must meet is too small to explain the difference between the saving rate in Japan and in the U.S. There is a vast literature on occupational choice, where credit constraints often play a role in one's decision to become a worker or an entrepreneur. It is possible that very high savings may be part of an effort to accumulate enough capital to overcome a credit constraint (for example, Parker, 2000, and Townsend and Ueda, 2003).

There are a number of papers looking at Chinese saving behavior. Many of these are based on data aggregated at different levels. Qian (1988) estimates saving equations for urban and rural areas using aggregate data. He reports higher saving propensities in rural areas compared to urban areas and, based on his econometric analysis, concludes that Chinese households' saving behavior in the 1980s is an equilibrium phenomenon rather than a sign of forced saving (that could be caused by a monetary overhang and shortage of consumer goods). Kraay (2000) uses household data aggregated at the province level to show that expected future income growth is negatively associated with savings in rural provinces, but not in urban provinces. The availability of household-level data for China is rather

limited. Dessi (1991) and Wang (1995) use data from a survey done in 1987 to estimate income and wealth functions for Chinese households. Since their data covers only one year, they are not able to separate out age effects from those of belonging to a particular cohort as we do in this paper. In another paper based on a single-year survey, Meng (2003) uses data from the 1999 Urban Household Income, Expenditure and Employment Survey and concludes that Chinese urban households have a strong motive for precautionary saving. Jalan and Ravallion (1999, 2001) use data from rural household surveys to investigate the effects of income shocks and future income uncertainty on saving behavior.

III. A Simple Model of How Growth Can Affect Savings

This section provides a simple illustration of how rapid income growth can affect saving behavior in an economy with limited financial development. For an infinitely-lived agent, higher income growth should decrease savings. But, once life cycle considerations are taken into account, an agent must eventually start saving for retirement. Higher income growth can cause agents to postpone their savings. As shown in the simple model below, however, they may end up saving more of their lifetime income even though they have postponed their savings. The key point we emphasize is that, given credit constraints, it is easier to smooth consumption going forward than to anticipate future income. That asymmetry can cause growth to raise savings in a rapidly growing economy. Households in such an economy would wish they could borrow against their higher expected future income. But if they cannot, they will end up consuming relatively little of their income in the early stages of their life cycle. As a result, the bulk of their consumption will be concentrated in the later stages, and its smoothing will imply higher life cycle savings.

Suppose an economy consists of overlapping generations of agents that live for 3 periods. There is no population growth and the proportion of each cohort in the population is the same. Agents earn a wage income in the first two periods of their life, while in the final period they earn nothing. The only source of consumption in the final period is the amount saved in the first two periods. For simplicity, let the utility function be time separable with the instantaneous utility function being concave (and defined only over consumption); also assume that there is no discounting of future consumption and that there are no bequest

motives. We also assume that the interest rate is zero. Wages in this economy grow at a geometric rate γ each period. That is, the wage at t_1 is γ, at t_2 is γ^2, and so on.

If $\gamma \leq 2$, then an agent born in period t can perfectly smooth her income by saving $\gamma^t - (\gamma^t + \gamma^{t+1})/3$ in the first period of her life and saving $\gamma^{t+1} - (\gamma^t + \gamma^{t+1})/3$ in the second period. That would allow her to consume one third of her lifetime income $(\gamma^t + \gamma^{t+1})$ in each period, saving one third for her "retirement." But if $\gamma > 2$, the representative agent would like to borrow in the first period of her life against her income in the second period. If that is not possible, the most the agent can do is not to save in the first period and to smooth her second period income between that period and her retirement period. Thus, the agent would save nothing in the first period of her life, and save half of her second period income for retirement. That implies a share $\frac{\gamma}{2(1+\gamma)}$ of her lifetime income being saved for retirement, which is higher than 1/3 since $\gamma > 2$. Thus, a higher income growth path can cause agents to postpone their savings but to end up saving more of their lifetime income for the retirement period:

$$Share\ of\ human\ wealth\ saved\ for\ retirement = \begin{cases} 1/3\ if\ \gamma \leq 2 \\ \dfrac{\gamma}{2(1+\gamma)}\ if\ \gamma > 2 \end{cases}$$

Income growth will affect aggregate savings in that economy through its effect on the net savings of each cohort. The higher is γ, the larger the income of the wage-earning cohorts vis-à-vis the dissaving of the older cohorts (one of the key implications of the life cycle theory for growth). The higher is γ, the less the youngest cohort will save, and the more the intermediary cohort will. Those competing effects lead to non-monotonicity for small values of γ (see Figure 2). But once $\gamma > 2$, the young cohort will not be saving at all, and an increase in γ will unambiguously increase the aggregate saving rate in the economy (again, since consumption can only be smoothed going forward).

$$Aggregate\ saving\ rate = \begin{cases} \frac{2}{3} - \frac{\gamma^3 + 2\gamma + 1}{6\gamma^2}\ if\ \gamma \le 2 \\ \frac{1}{4} - \frac{1}{4\gamma}\ if\ \gamma > 2 \end{cases}$$

The expression above implies that there is a local peak for the aggregate saving rate in the region where $\gamma \le 2$, as can be seen in Figure 2.

We can generalize this result to a scenario where agents are able to borrow up to a share β of their second-period income in the first-period of their life. This borrowing would not affect consumption behavior if $\gamma \le 2$, since agents can then smooth their consumption simply by saving less in the first period. But it will lower savings for $\gamma > 2$. We assume that β is sufficiently small so that $\beta \le \frac{\gamma + 1}{3\gamma^2}$ and $\beta \le \frac{1}{2\gamma + 1}$. This ensures that the amount the youngest cohort can borrow against its second-period income is lower than the amount the middle-aged cohort wants to save (the first condition corresponds to the case where this limited borrowing allows for full consumption smoothing, while the second corresponds to the case where full smoothing does not take place). If that was not the case, then the young cohort would bid-up the interest rate (since it has a higher level of lifetime income than the middle-aged cohort). The resulting saving rates (assuming $\gamma > 2$) are:[4]

$$Share\ of\ wealth\ saved\ for\ retirement = \max\left(\frac{(1-\beta)\gamma}{2(1+\gamma)}, \frac{1}{3}\right)$$

$$Aggregate\ saving\ rate = \begin{cases} \frac{2}{3} - \frac{\gamma^3 + 2\gamma + 1}{6\gamma^2}\ if\ 2 \le \gamma \le \frac{2}{1-3\beta} \\ (1-\beta)\left(\frac{1}{4} - \frac{1}{4\gamma}\right) - \frac{\beta}{2}(\gamma - 1)\ if\ \gamma > \frac{2}{1-3\beta} \end{cases}$$

[4] When defining aggregate savings, each cohort's savings is equal to its income minus its consumption.

Note that the first expression for the aggregate saving rate is identical to the one for the range where $\gamma \leq 2$ (so the constrained borrowing is just expanding the range over which that expression determines the aggregate saving rate). As one would expect, relaxing the borrowing constraint leads to a decline in the aggregate savings in the economy. The effect is potentially quite strong, as shown in Figure 3.

This is admittedly a very stylized model, but still helps to illustrate how, in a growing economy, borrowing constraints arising from lack of financial development could affect aggregate saving through its interaction with income growth.

IV. Data

The availability of household-level data from China is limited. A subset of the Urban Household Survey (UHS) conducted by the National Bureau of Statistics (NBS) is available through the Databank for China Studies at the Chinese University of Hong Kong. Those subsets are available for the surveys from 1986 to 1997, covering a time when large transformations were taking place in the Chinese economy.[5] Unfortunately, no similar arrangement is available for the NBS Rural Household Survey.

The Urban Household Survey subsets provide household-level information for a number of variables. It provides detailed information on income and consumption expenditures. It also provides demographic and employment information of household members, living conditions and a number of other household characteristics. Table 1 provides summary statistics for household income, consumption and the resulting saving rate for households whose head's age was between 25 and 70 years. Note the large variations in sample size across years (notably the lower sample size from 1993 to 1997). The income variable we focus on includes labor income, property income, transfers, and income from household sideline productions. The consumption expenditure variable covers a broad range

[5] As noted earlier, we are currently negotiating with the NBS to obtain more recent data.

of categories.[6] Neither income nor consumption measures capture the consumption value of owner-occupied housing (which should bias the saving rates reported in this paper upwards).

Another source of household-level data is the Household Income Survey collected by the Institute of Economic Studies, Chinese Academy of Social Sciences. It was collected in 1988 and 1995, with 9009 and 6931 households, respectively, in the urban sample, and 10258 and 7998 households, respectively, in the rural sample. That data set has detailed information on household income and expenditures, as well as subsidies received. While the subset of the NBS Urban Household Survey that we use in this version of the paper is better suited for the estimation of the age profile of savings and of how that profile changes over time, due to its larger coverage, we plan to use the Household Income Survey as a complement in future versions of this paper.

V. Basic Empirical Results

V.1 An alternative approach to the life cycle hypothesis

We begin by providing a simple characterization of the relevance of the life cycle hypothesis in China along the lines of the work by Attanasio and Browning (1995). These authors show, using micro data for the U.K., that age profiles for income and consumption tend to be highly correlated. Similar findings have been interpreted as strong evidence against simple forms of the life cycle model. These authors then show that the strong correlation between consumption and income largely disappears when they control for changes in family composition, indicating that the purported excess sensitivity of consumption growth to labor income growth is an artifact of the data.

We conduct a similar exercise using our dataset. Figure 4 shows the life cycle paths of income and consumption by tracing the evolution of these variables for each cohort. Each line traces a particular cohort over time, plotted against the age of the household head (for

[6] The categories covered include: food; clothing and footwear; household appliances, goods and services; medical care and health; transportation and communications; recreational educational and cultural services; housing; and sundries.

example, the first line traces the income and consumption paths over time for those households whose heads were 25 years old in 1986). Figure 4a plots average log income and consumption. Both income and consumption profiles follow the characteristic inverted-U pattern, with consumption tracking income quite closely. As noted above, this appears to violate one of the central predictions of the basic life cycle hypothesis. Figure 4b plots the log of income and of a measure of consumption that controls for demographic characteristics of the households. That adjusted measure is computed by regressing the average log consumption on the average number of adults, children and elderly household members for that cohort in that year, and removing the component explained by those demographic characteristics.[7]

The adjusted consumption profiles flatten more across cohorts and it is now clearer that, over the life cycle, consumption tracks income less closely than in the unadjusted plots.[8] But, in contrast to the Attanasio-Browning plots for the U.K., there isn't a complete disconnect between the income and adjusted consumption profiles. Nevertheless, this descriptive analysis suggests that, like in other western economies for which detailed analysis has been conducted using micro data, controlling for demographic factors can bring the data more in line with the predictions of simple versions of the life cycle hypothesis.

V.2 Demographic determinants of household saving behavior

Next, we compute the age and cohort profile of savings following the approach used in Deaton and Paxson (1994). Instead of directly estimating those effects on the observed household saving rates, we estimate their effects on income and consumption and, based on those estimates, we then compute the implied effect on savings. This method produces more

[7] This procedure is similar to that of Attanasio and Browning (1995). They also control for the log of family size and include a dummy for whether the household has children. Adding those controls further flattens the envelope of the adjusted consumption lines.

[8] When we include additional demographic controls in the regressions to replicate the Attanasio-Browning regression, the consumption profiles flatten out a little more, but the differences relative to the results presented here are very small.

reliable estimates, as household saving rates can be very noisy (for example, a household with zero income that consumes out of its assets would have a saving rate of minus infinity).

If there are no shocks to income and the real interest rate is constant, then the life cycle hypothesis predicts that consumption at any given age should be proportional to lifetime resources, with the constant of proportionality depending on the age and the real interest rate.

$$c_{ha} = f_h(a)W_h$$

where c_{ha} denotes the consumption of household *h* headed by an individual of age *a* and with lifetime resources W_h. Taking logs of the expression above and averaging it based on age and year of birth *b* yields:

$$\overline{\ln c_{ab}} = \overline{\ln f(a)} + \overline{\ln W_b}$$

In our estimation, the age effects $\overline{\ln f(a)}$ are captured by a vector of age dummies, and the lifetime resources $\overline{\ln W_b}$ by a vector of cohort dummies. The estimated consumption equation is:

$$\overline{\ln c_{ab}} = D^a\boldsymbol{\alpha}_c + D^b\boldsymbol{\gamma}_c + D^t\boldsymbol{\theta}_c + \varepsilon_c$$

where D^a, D^b and D^t are matrices of age, year of birth and year dummies, $\boldsymbol{\alpha}_c$,$\boldsymbol{\gamma}_c$ and $\boldsymbol{\theta}_c$ are the corresponding age, cohort and year effects on consumption and ε_c is the error term. The year fixed effects should help capture differences in consumption resulting from aggregate shocks.[9] When estimating this equation, we impose the constraint that the sum of the year

[9] The year dummies may also help pick up differences associated with slight variations in samples across years.

effects must add up to zero. Since age minus cohort equals year plus a constant, in the absence of that constraint any trend could be the result of different combinations of year, age and cohort effects. When the year effects are normalized to zero, that is no longer the case.

If the age profile of income is invariant to economic growth—i.e., if economic growth raises the lifetime resources of younger cohorts but does not alter how the income is distributed over their life cycle--then income can also be expressed as a function of age and lifetime resources.[10] We estimate an equation for income that is analogous to the one for consumption:

$$\overline{\ln y_{ab}} = D^a \boldsymbol{\alpha}_y + D^b \boldsymbol{\gamma}_y + D^t \boldsymbol{\theta}_y + \varepsilon_y$$

where $\boldsymbol{\alpha}_y$,$\boldsymbol{\gamma}_y$ and $\boldsymbol{\theta}_y$ correspond to the age, cohort and year effects on income, and ε_y is the error term. Once the effect of a variable is estimated for consumption and income, we can compute the corresponding effect on the household saving rate. Note that, in our analysis, we assume that a household headed by an individual with age *a* will have a similar income and consumption behavior that an individual with age *a* would.[11]

We restrict our sample to households whose head's age was at least 25 and at most 70.[12] We drop the age and cohort dummies corresponding to a household that was 25 years of age in 1986. Thus, our estimated age effects correspond to the average difference between the saving rate of a household headed by someone with *a* years of age vis-à-vis one headed by a 25-year old, while the cohort effects correspond to the difference between a household whose head was *a* years old in 1988 vis-à-vis one that was 25.

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[10] Note that this assumption is also made in the model sketched in Section III.

[11] For a discussion of the limitations of the assumption that age-saving profiles of households are similar to age-saving profiles of individuals in those households, and for alternative approaches, see Deaton and Paxson (2000).

[12] This is to reduce any noise in the estimates resulting from the small number of households at the tails of the age distribution.

The estimated age and cohort profile of saving rates are presented in Figure 5. The age effects are stronger for younger and older households. That profile would fit a description whereby households tend to save more at the beginning of their life cycle (for example, as they save to purchase durable goods or start a family). The saving rate then gradually declines by almost 5 percentage points, probably as a result of expenditures on raising children. Saving rates begin to recover when the household heads' age is around the early 40s, presumably as households start saving for retirement. From the early 40s to age 65, the age effect leads to an increase in the savings rate of about 8 percentage points. This sharp increase in the saving rate in the latter working years of the life cycle matches the stylized predictions of the model presented in Section III.

The cohort effects show an inverse U-shaped pattern, whereby middle-aged cohorts tend to save more than younger or older cohorts. That effect is quite strong, with the peak corresponding to cohorts that were in their 40s in 1988 and implying saving rates about 5 percentage points higher than the baseline cohort (aged 25 in 1986) and almost 10 points higher than those of some of the older cohorts. This pattern may be capturing a "making up for past savings" effect among the middle-aged cohorts. Prior to the SOE reforms, workers received a number of housing, health, education and pension benefits through their employer. As some benefits were lost or their future became more uncertain, households that have counted on those benefits may have found themselves in a situation where they needed to make up for past savings that did not take place because their need was not anticipated. Younger cohorts would not be affected as much, first because they have not had those benefits for long and second because they have many working years ahead in a fast-growing economy. Older cohorts would not be affected as much by future uncertainty (since their horizon is shorter) and may have been protected by the reform process. Thus, it is precisely among middle-aged cohorts that this effect would be stronger, which may help explain the pattern in Figure 5.

The estimations were also performed with the inclusion of controls for demographic characteristics of the households. For each age-cohort group, the average number of adults,

children and elderly were included in the regressions.[13] The results are presented in Figure 6 and are similar to those in Figure 5. There is a correlation between cohort and demographic characteristics of the household, notably with the number of children. Older cohorts were not as affected by the one-child policy implemented in the early 1980s as the younger ones were (see Figure 7 which shows the evolution of demographic characteristics in our sample). The estimated coefficients imply that, on average, an additional child increases the saving rate by about two and a half percentage points.[14] Overall, both sets of estimations yielded age and cohort profiles that seem reasonable and a plausible description of the saving behavior of urban Chinese households.[15]

V.3 Durables purchases and savings

This subsection estimates the potential effects of a lack of consumer financing on household saving behavior. Even at present, consumer financing remains very limited in China and it was virtually nonexistent in the years for which the survey data we use is available.[16] As a result, instead of borrowing against future income to purchase durable goods, Chinese households are more likely to rely on their past savings. This would cause households to postpone some of those desired purchases and to save more in the process.

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[13] We define children as those under 18 years of age, elderly as those over 65 and the remaining people are considered adults. The head of the household and the spouse are always classified as adults regardless of their age.

[14] This may partly reflect the need to finance education expenditures. Although education is subsidized by the state, more schools are charging fees and "compulsory donations." These tend to become more of a burden at higher levels of education. Meng (2003) reports strong evidence of the inability of urban households to finance education expenditures..

[15] Both sets of profiles are relatively "well behaved" compared to those estimated for other countries, such as the ones presented in Deaton and Paxson (2000).

[16] Total consumer loans issued by all financial institutions in China increased from essentially zero in 1997 to about 2 trillion yuan in 2004. Real estate loans account for about three-fourths of total consumer loans outstanding, with auto loans and consumer loans accounting for about 10 percent each.

The Urban Household Survey provides detailed information on consumption expenditures, from which we construct a measure of durables consumption.[17] We focus on the last 5 years of our data coverage (1993-97) and continue to limit our sample to households whose head is between 25 and 70 years of age. In these data, purchases of durables correspond, on average, to 6.2% of income.[18] Moreover, purchases of durables exceed income minus other expenditures for 23.1% of the households. This suggests that a number of households were unable to finance lumpy durables purchases just by saving less in that period.

Table 2 presents a breakdown of the sources of financing for durables consumption for groups of households differentiated by various thresholds for the share of durables in total consumption. The breakdown is based on the following identity:

Durable consumption=(i) Income - Nondurable consumption - Nonconsumption expenditures +
(ii) Net financial dissavings +
(iii) Credit

A substantial amount of durables consumption is financed through net financial dissavings. For example, there is a 16.4% difference in net financial dissavings as a share of income between households for which durable consumption is above 10% of total consumption and households for which it is below that threshold. The difference in credit borrowing is only 2.3% of income.[19] The relative importance of net financial dissavings tends to increase with the share of durable goods in total consumption. It is worth noting that,

[17] Defined as the durable goods components of two broad categories of consumption: household appliances, goods and services; and recreational, educational and cultural services.

[18] All average figures presented in this subsection are weighted by income unless otherwise noted.

[19] For the full sample, credit financing (including purchases on credit, which are very small, and various types of bank loans) corresponds to 3.4% of income. Among the households for which durable purchases exceeded income minus other expenditures, total credit corresponds to 7.9% of their income (purchases on credit remain negligible).

while income is higher for households that consume more durable goods, the mean income figures change only moderately as the share of durables consumption in total consumption rises.[20] That suggests that much of the variation in durables consumption may be related to its inherent lumpiness. The table also strongly suggests that high levels of durables purchases appear to be financed in large part by relying on past savings rather than on credit. This pattern, which is attributable to the absence of well-developed financial markets and instruments for borrowing against future income, may generate higher savings. We plan to investigate this hypothesis more formally in future versions of the paper.

Durables consumption tends to increase as income grows (at least over some range), which can potentially amplify the effect on savings of the development of consumer credit in China. Table 3 presents estimates of how income affects the share of consumption spent on durable goods as well as on food items. As expected, the level of per capita household income is positively associated with the share of consumption spent on durable goods. The estimated coefficient suggests that a doubling of real income would be associated with an increase in that share of about 3.6 percentage points. Rising incomes tend to lower the share of consumption spent on food (which is on average 49 percent for the households in our sample). A doubling of real income should lower that share by 8.3 percentage points. The estimated relationships could of course change over time (e.g., food consumption will never be negative even if income increases ten-fold). However, they provide an indication of how consumption patterns—especially the relative consumption shares of food, nondurables and durables—should evolve over the short to medium term. Indeed, there is evidence that Chinese households have substantially expanded their consumption of durables as their income grows—abundant observational evidence of this can be found in any major Chinese city. For example, the number of automobiles per 100 urban households was less than 1 in 2002 and is currently over 3.

[20] There does, however, appear to be a discrete jump in average income levels between households that have a very small share of durables purchases in total consumption (less than 5 percent) versus those that have shares above the thresholds that we look at.

VI. Discussion and Implications for Aggregate Saving Patterns

We now review our key findings thus far and discuss their implications in light of other macroeconomic data.

Our preliminary analysis of Chinese households' saving behavior has identified two striking patterns in the data. One, based on the age effects that we estimated, indicates that households with younger household heads tend to save a large proportion of their income. This could be the result of underdeveloped financial markets that lead to saving for purchases of major durable goods, housing and so on. But saving rates do increase sharply towards the final working years of the life cycle, as would be predicted by our stylized theoretical model for a fast-growing economy. The second result, based on the estimated cohort effects, suggests that households with heads that were in their forties towards the end of the 1980s, and who are now nearing retirement age, are among the highest-saving cohorts in our sample.

What are the implications of these findings in light of anticipated demographic shifts? The top panel of Figure 8 shows China's demographic profile as of 2005 (estimate) and projections for 2015, 2025 and 2050. The increasing mass in the right tail of the distribution for later years conforms to conventional wisdom about the ageing of the population and potentially higher dependency ratios. But the picture is not quite so simple. As highlighted in the lower panel of Figure 8, the share of the working-age population between the ages of 40 and 64 is actually projected to increase sharply by 2015, before stabilizing and then starting to decline.

This implies that the effects of demographic shifts on saving rates over the next decade are far from straightforward—the possible decline in saving resulting from the aging of the population and the rise in the population share of the elderly is likely to be more than offset by the increase in the share of the high-saving group of workers (who are in the latter half of their working life). Thus, the demographic factors by themselves could portend an increase in the saving rate over the next decade. These effects could switch and become less ambiguous after two decades or more, as the elder dependency ratio continues to rise and low-saving younger cohorts become more dominant in the working-age population.

On the other hand, development of financial markets could decrease household saving rates by allowing households to finance consumption—especially of durables—by borrowing

against future income. This force could play an increasingly important role as the share of younger cohorts in the population increases. A different set of forces—which we have not examined in this paper—is related to the fact that, as market-oriented reforms proceed and employment uncertainty increases, precautionary saving could increase, especially if there isn't much progress towards the establishment of a more comprehensive social safety net.

Furthermore, the interest rate could drive short- to medium-term fluctuations.[21] Figure 9 shows that the modest gradual decline in household saving rates since the late-1990s may be partly attributable to the decline in both real and nominal interest rates. Interestingly, the sharp fall in the real interest rate during the early 1990s appears not to have had much of an effect on household saving rates. As financial markets develop and households have access to a broader range of financial instruments rather than just bank deposits, they could become more sensitive to changes in real interest rates. The direction of that effect is ambiguous. On the one hand, a higher interest rate can lead to an increase in savings through a substitution effect. But on the other hand, a higher return on savings allows households to achieve the same target level of future consumption by saving less.

In future versions of this paper, we intend to more formally explore the relative quantitative magnitude of these various effects on household savings, both in the data and in stylized models calibrated to these data.

[21] All of our estimates reported in earlier sections include controls for time effects, which would encompass the effects of year-to-year interest rate changes.

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Table 1. Summary Statistics

Year	Observations	Income Per Capita (in 1997 RMB)	Consumption per Capita (in 1997 RMB)	Average Saving Rate
1986	11877	3267	2861	12.4%
1987	12700	3362	2914	13.3%
1988	13364	3295	3041	7.7%
1989	12806	3266	2837	13.1%
1990	13380	3560	2984	16.2%
1991	13508	3774	3201	15.2%
1992	16561	4166	3459	17.0%
1993	5992	4892	4129	15.6%
1994	6151	5310	4458	16.1%
1995	6159	5451	4617	15.3%
1996	6157	5644	4695	16.8%
1997	6144	5876	4863	17.2%

Notes: Data are from the subset of the Urban Household Survey available through the Databank for China Studies of the Chinese University of Hong Kong. The reported summary statistics are for households whose head is between 25 and 70 years of age. Income and consumption are converted to constant 1997 prices based on the Urban CPI. Saving rate defined as 1-consumption/income.

Table 2: Sources of Finance for Purchases of Durables
(all variables expressed as a share of income unless otherwise noted)

	Durable Consumption/Total Consumption					
	≥ 5%	<5%	≥ 10%	<10%	≥ 25%	<25%
Durable consumption	18.4%	0.6%	24.6%	1.2%	40.6%	2.7%
Income - other expenditures	9.9%	5.4%	10.6%	5.7%	12.9%	6.1%
Net financial dissavings	3.5%	-8.2%	8.4%	-8.0%	20.4%	-7.0%
Credit	5.0%	3.4%	5.7%	3.5%	7.3%	3.6%
Per capita income (in 1997 RMB)	7114	4912	7448	5058	7559	5307
Number of households	7304	23298	4860	25742	1765	28837

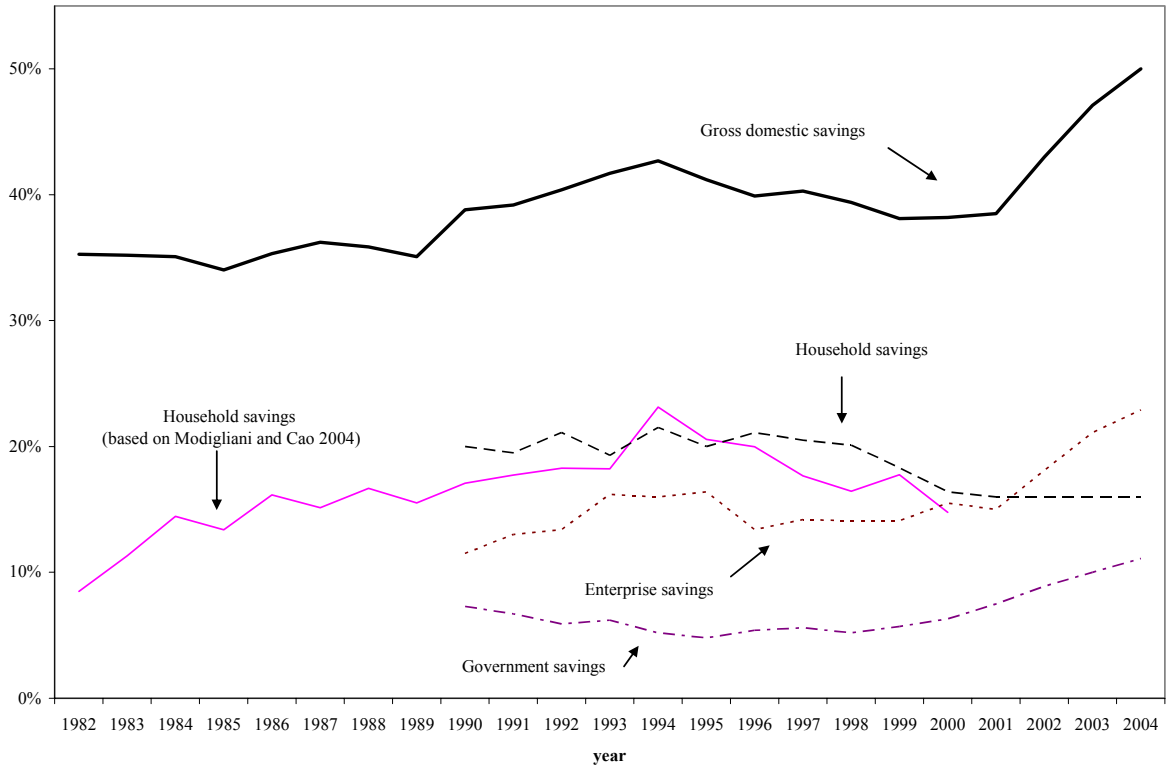
Notes: Negative values for net financial dissavings indicates that the households are on average net financial savers. Figures correspond to simple (i.e. unweighted) averages.

Table 3: Effect of Income on the Shares of Durables and Food in Total Consumption.

Dependent variable:	Ratio of durables consumption to total consumption	Ratio of food consumption to total consumption
Log (Income)	0.052 (0.001)***	-0.120 (0.002)***
Number of adults	0.007 (0.001)***	-0.012 (0.001)***
Number of children	0.008 (0.001)***	-0.068 (0.002)***
Year fixed effects	Yes	Yes
Rsquared	0.084	0.178
Number of observations	30602	30602

Notes: Standard errors are in parentheses. *** denotes statistical significance at the 1% level. The estimated coefficients imply that a doubling of real household income raises the share of durables in consumption by 3.6 percentage points and lowers the share of food by 8.4 percentage points.

Figure 1. Savings as a Percentage of GDP.



Source: IMF staff calculations, unless otherwise noted.

Figure 2. Aggregate Saving Rate as a Function of Geometric Growth Rate of Wages

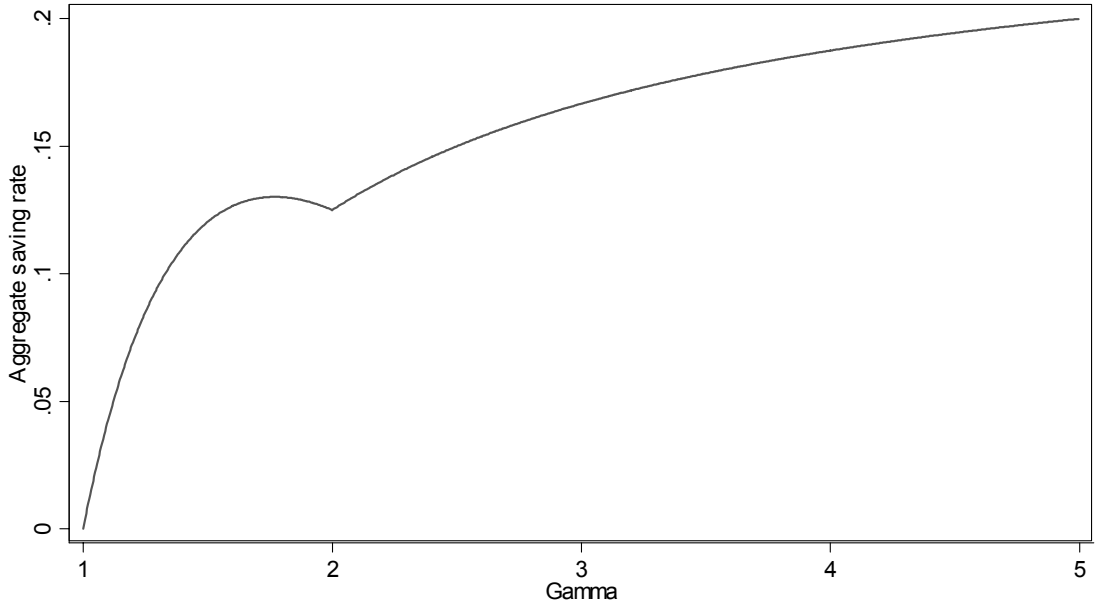


Figure 3. Aggregate Saving Rate as a Function of the Geometric Growth Rate of Wages and the Credit Constraint

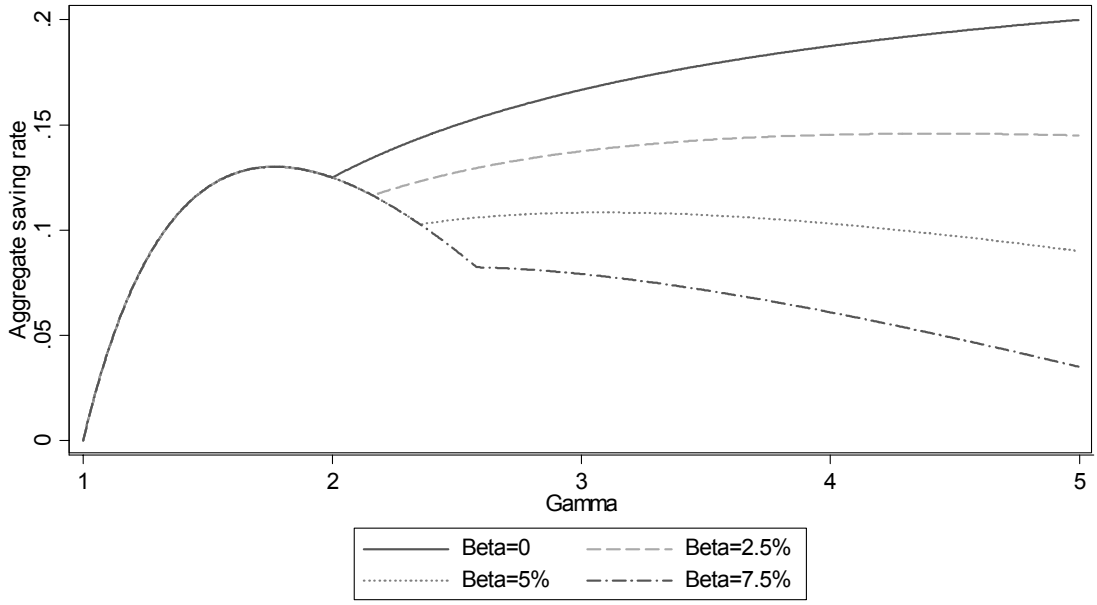


Figure 4a. Income and Consumption over the Life Cycle

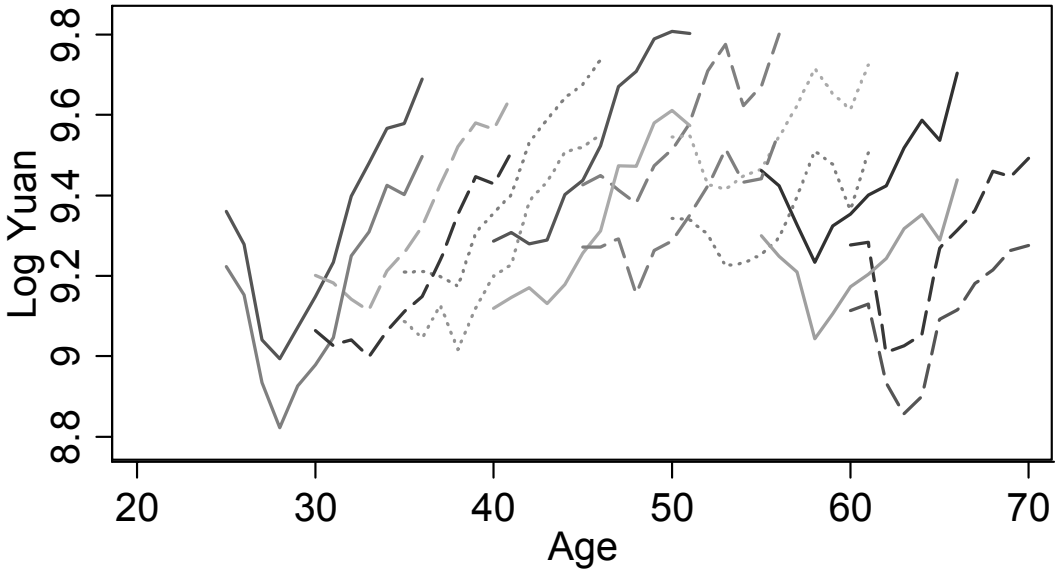
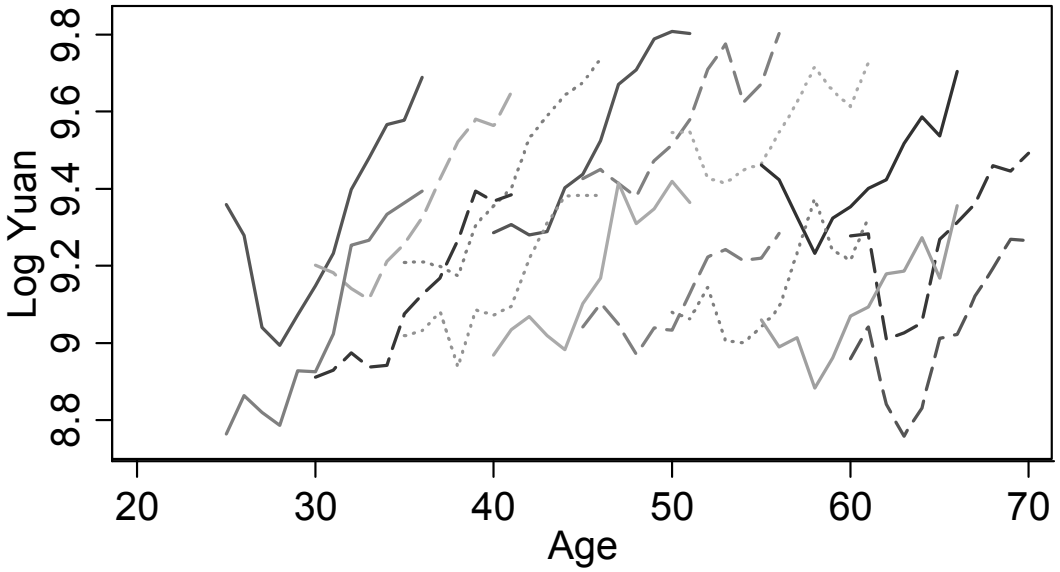


Figure 4b. Income and "Adjusted" Consumption over the Life Cycle



Notes: Each line traces a cohort over time (for example, the first line corresponds to households whose head was 25 years old in 1986). For illustration clarity, only every fifth cohort is shown.
"Adjusted" consumption corresponds to the residuals of regressions of consumption on the average number of adults, children and elderly in the household, plus the regression's constant.

Figure 5. Age and Cohort effects on the Saving Rate

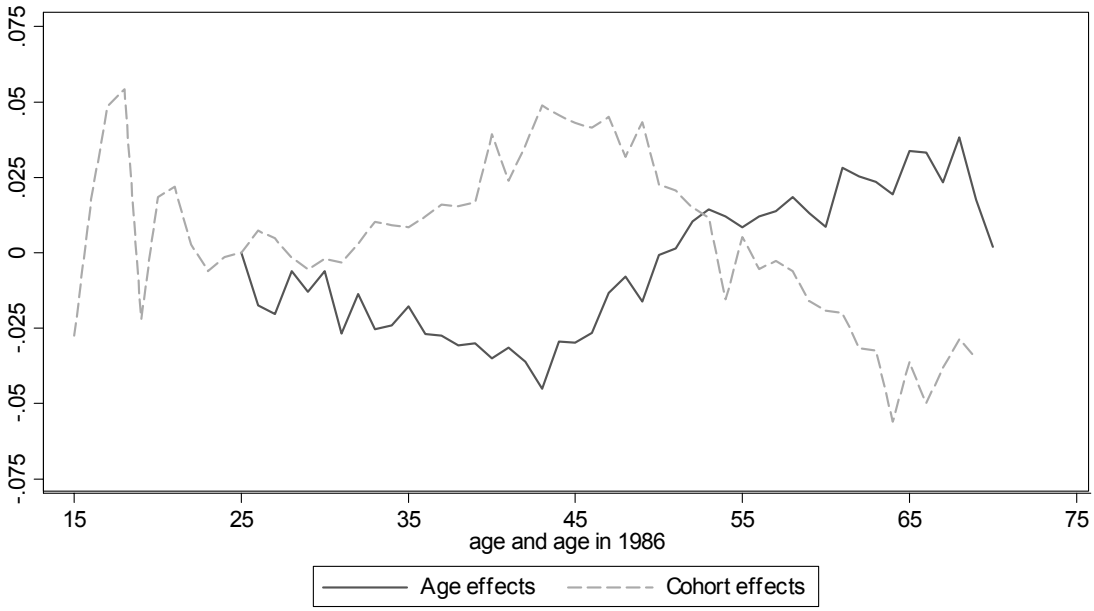


Figure 6. Age and Cohort Effects on the Saving Rate, Controlling for Number of Adults, Children and Elderly

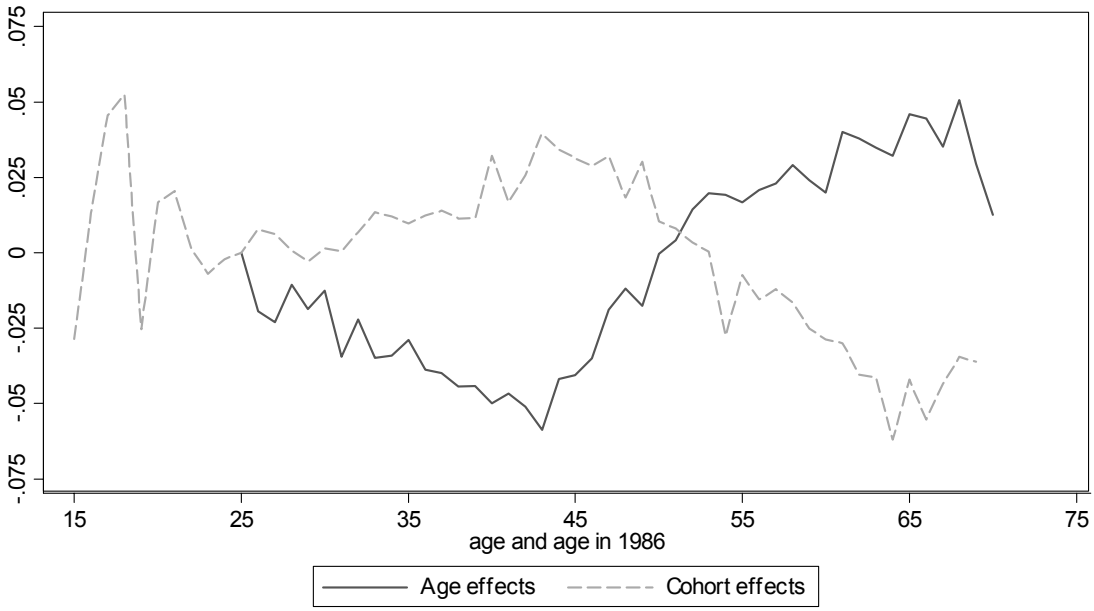
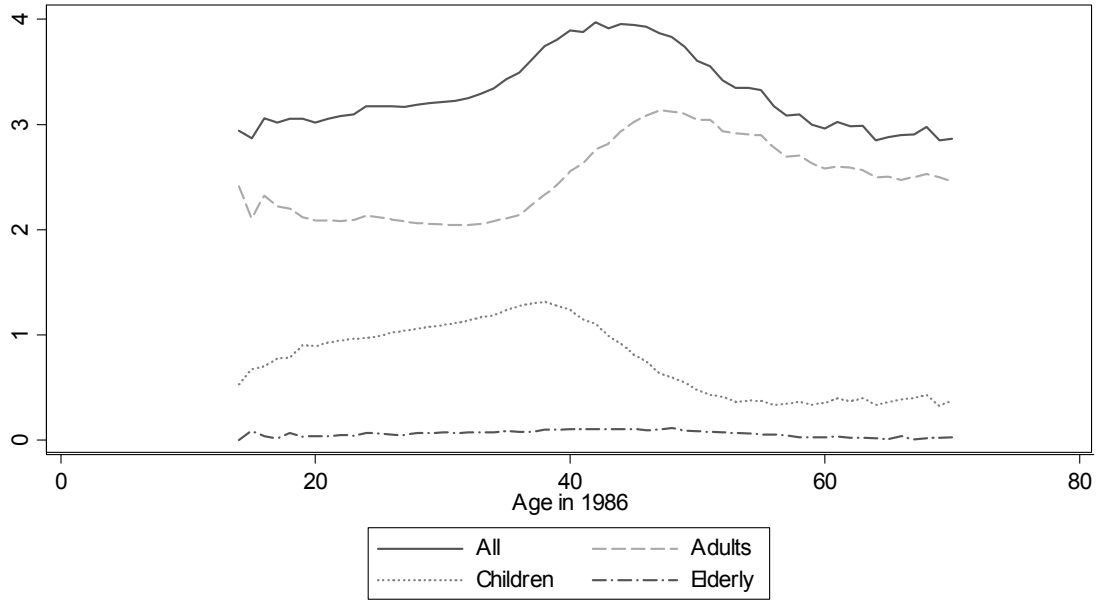


Figure 7. Average Number of Household Members in Demographic Group, by Cohort and Year



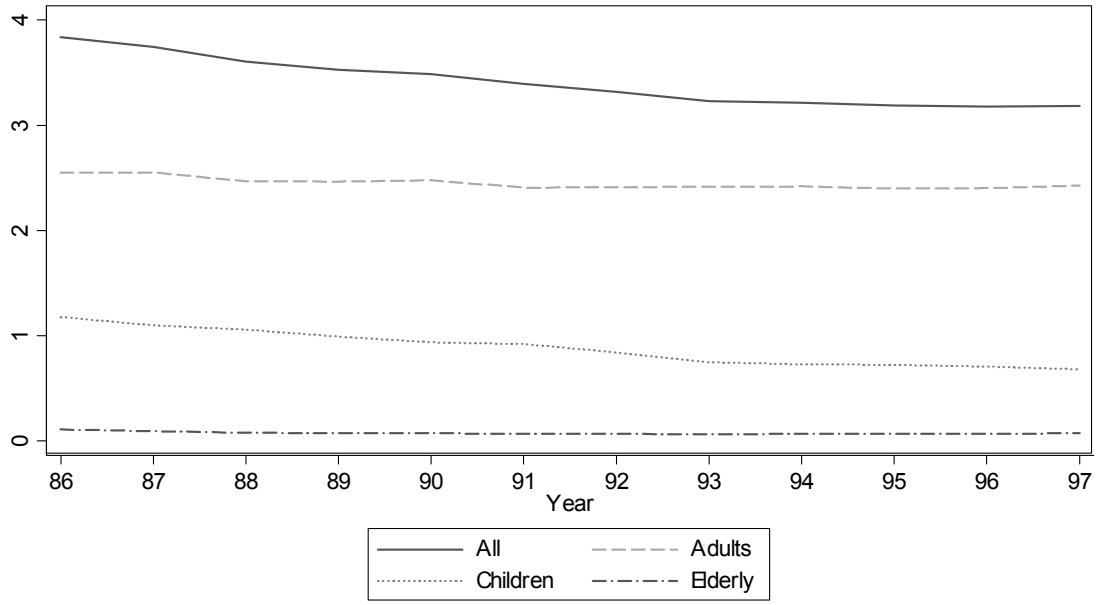
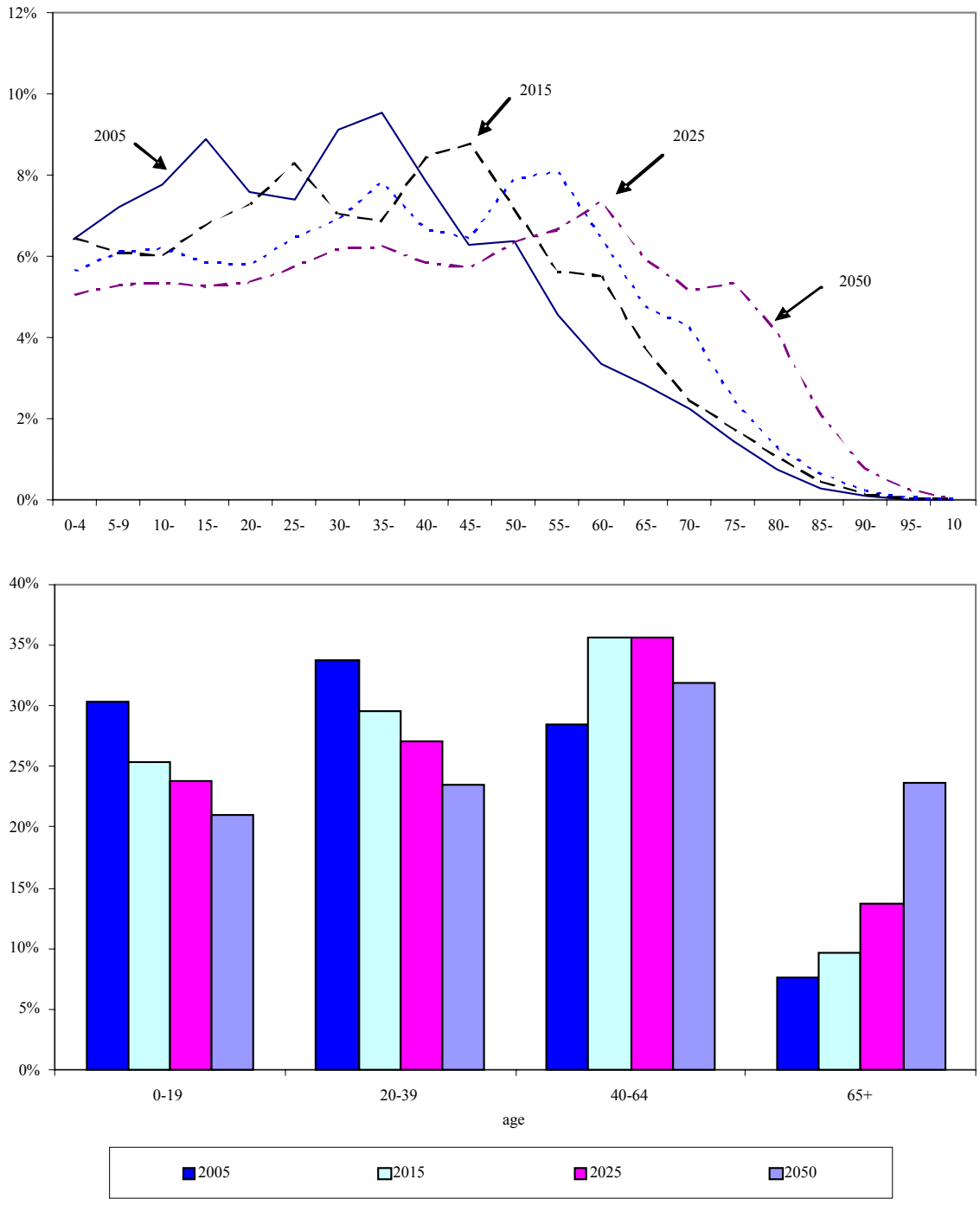
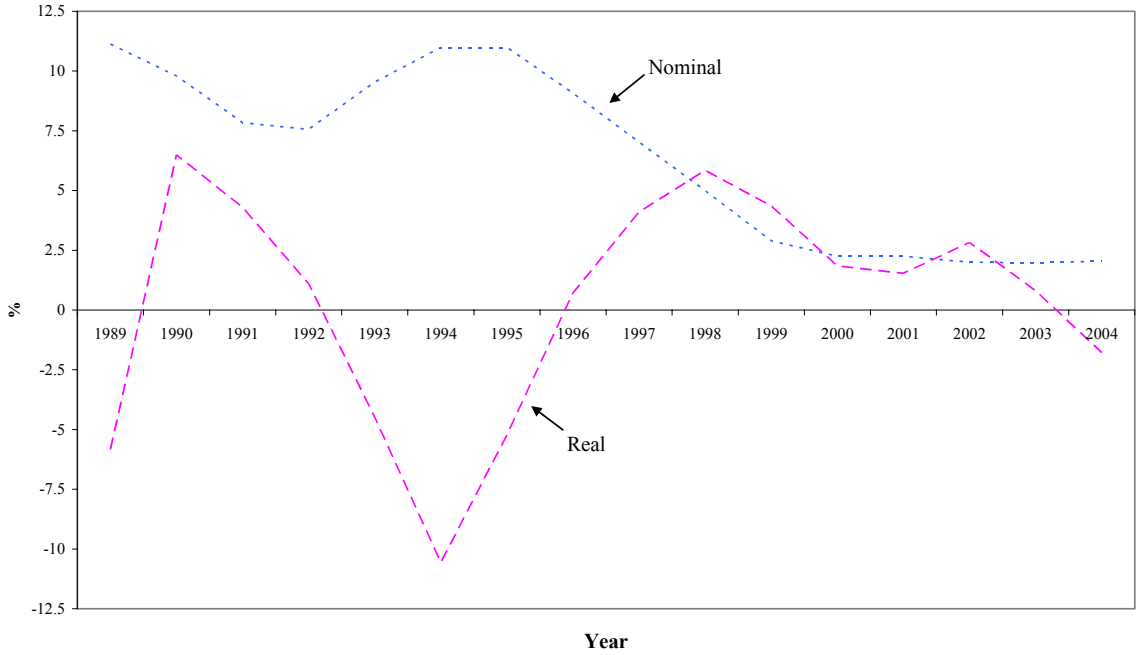


Figure 8. Share of Chinese Population by Age Group



Source: United Nations estimates and projections

Figure 9. Nominal and Real Interest Rates - 1 Year Deposit



Source: CEIC

Notes: Nominal one-year deposit rates (annual average) deflated by annual change in CPI (one year ahead)