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ABSTRACT

Why Are Saving Rates of Urban Households in China Rising?*

From 1995 to 2005, the average urban household saving rate in China rose by 8 percentage points, to about one quarter of disposable income. We use household-level data to explain why households are postponing consumption despite rapid income growth. Tracing cohorts over time indicates a virtual absence of consumption smoothing over the life cycle. The age profile of savings has an unusual U-shaped pattern, with saving rates being the highest among the youngest and oldest households. We find that financial underdevelopment, as reflected in constraints on borrowing and low returns on financial assets, partially accounts for this pattern. Moreover, overall saving rates have increased across all demographic groups. We argue that this can be explained by the rising private burden of expenditures on housing, education, and health care.

JEL Classification: D12, E21, O16

Keywords: household savings, age and cohort profiles of savings, borrowing constraints, precautionary savings, financial development, demographics

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I. Introduction

The Chinese save a lot. Figure 1 shows that gross domestic savings in China have surged since 2000, climbing to over 50 percent of GDP in 2005. Enterprise savings have risen sharply and displaced household savings as the main contributor to national savings. However, while household savings have declined as a percentage of GDP, this is mainly because of a huge increase in the share of enterprise income in national income. The aggregate (urban and rural) household saving rate has in fact risen by six percentage points over the last decade.

Similarly, after remaining relatively flat during the early 1990s, the average saving rate of urban households rose from 17 percent in 1995 to 24 percent in 2005. This increase took place despite rapid income growth and a real interest rate on bank deposits that has been low over this period (and even negative in some years, as nominal deposit rates are capped by the government). In this paper, we attempt to understand the reasons behind this phenomenon. We use data from the annual Urban Household Surveys conducted by China's National Bureau of Statistics to analyze the evolution of the urban household saving rate over the period 1990-2005. To our knowledge, this is the first detailed examination of Chinese household saving behavior using micro data over a long span.[2]

It is difficult to reconcile the phenomenon of a rising saving rate with conventional intertemporal models of consumption. When trend income growth is high, households seeking to smooth their consumption should borrow against future income, especially if real interest rates are low. If that is not possible, households (particularly younger ones) should at least postpone their savings. But, as we show in this paper, saving rates are high and have increased across all demographic groups, including those that can expect rapid income growth in the future. As with most other studies using household data (e.g., Paxson, 1996), we find very limited consumption smoothing over the life cycle.[3] Instead, consumption tends to parallel income, consistent with the buffer-stock model of savings (see Carroll, 1997).

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[2] Most previous studies have relied on aggregate data (e.g., Kuijs, 2006) or provincial-level data (e.g., Qian, 1998; Kraay, 2000)

[3] Horioka and Wan (2007) use provincial-level data and also find a limited role for variables related to the age structure in explaining saving behavior. Modigliani and Cao (2004) find evidence in favor of the life cycle hypothesis using aggregate (national level) data.

We estimate how saving rates vary with time, age, and cohort (year of birth) of the household head, using a variant of the decomposition in Deaton and Paxson (1994). Since incomes are rising across all age groups, we modify their original decomposition in order to attribute that increase to time effects rather than the demographic variables (i.e., age and cohort effects).The most interesting result is that, instead of the traditional "hump-shaped" profile of savings over the life cycle, we find the opposite: a U-shaped pattern, where the younger and older households have the highest saving rates. High saving rates among the young could reflect the need to build up an adequate buffer stock of savings and to finance purchases of major durable goods and housing. Saving rates then decline with age, but increase as retirement approaches and remain high even among the older households. This could be driven by the increasing burden of lumpy and uncertain health expenditures. The cohorts that were in their 40s and 50s in 1990 tend to save more, perhaps because they are subject to the uncertainties generated by the market-oriented reforms and do not have many working years ahead to benefit from those reforms.

Another interesting result from this decomposition is that there remains a substantial time trend in household saving rates even after we control for demographic characteristics. This pattern favors explanations based on economy-wide changes affecting all households.

The declining public provision of education, health, and housing services (the breaking of the "iron rice bowl") has created new motives for saving. While health and education expenditures together accounted for only 2 percent of consumption expenditures among the households in our sample in 1995, this share had risen to 14 percent by 2005.[4] This can contribute to rising savings, as younger households accumulate assets to prepare for future education expenditures, and older households prepare for uncertain (and lumpy) health expenditures.[5] Moreover, there has been an extensive privatization of the housing stock. Only

[4] These expenditures are superior goods, with an income elasticity greater than one. So, rapid income growth has amplified the trend towards direct private expenditures on those services.

[5] In the absence of natural experiments, it is difficult to quantify the precautionary saving motives stemming from limited public health insurance. But the past experience of other high saving economies can provide some information on its potential effects. Chou, Liu and Hammitt (2003) estimate that the universalization of health insurance in Taiwan lowered the household savings rate by about 2.5 percentage points Assuming that the effects are symmetric and of similar size, the decline in public provision of health could be important for explaining the rising saving rates in China.

17 percent of households owned their homes in 1990; by 2005, that figure had risen to 86 percent. Most of those purchases were financed by the withdrawal of past savings, suggesting that a lot of the savings done during that period was motivated by a planned house purchase. Our estimates indicate that housing privatization alone could explain a 5 percentage point increase in the urban household saving rate. Of course, these channels can only help explain an increase in the saving rate during an adjustment period; they cannot by themselves sustain high saving rates in the long run.

We also investigate the target saving hypothesis, according to which households have a target level of saving and, since bank deposits are the primary financial asset for Chinese households, their saving rates are then negatively correlated with real returns on bank deposits. We find some indirect support for this hypothesis using the cross-sectional variation in provincial inflation rates. Saving rates are higher in provinces with higher inflation (and, thus, lower real returns), although this evidence is only suggestive and, even if taken at face value, points to a quantitatively small effect.

These various strands of evidence suggest that rising macroeconomic uncertainty, coupled with financial repression--which has resulted in the lack of instruments for borrowing against future income, limited opportunities for portfolio diversification, and low real returns on bank deposits—has driven the increase in household saving rates. The appendix provides a simple stylized model (drawing on Jappelli and Pagano, 1994) to illustrate how the interaction of rapid income growth and borrowing constraints due to financial underdevelopment can drive up saving rates.

There are other factors that may be relevant as well. The overall macroeconomic uncertainty associated with the transition to a market economy has contributed to precautionary saving motives, although we do not find strong evidence that this effect has been quantitatively important. Economic growth may affect savings through habit formation considerations (Carroll and Weil, 1994); our results, however, suggest a limited role for that channel in urban China. Finally, cultural factors are often considered an explanation for the

high saving rates in many East Asian countries, including China.[6] But they cannot account for the trend in saving rates, which is the primary focus of this paper.

In the final section of the paper, we combine the empirical results with some macroeconomic data to discuss possible implications for the evolution of household saving in China. Our estimates suggest a modest role for projected demographic changes on household savings. Since our preferred explanations for the high and rising saving rates are related to China's transition to a market economy and the underdeveloped financial system, it is possible that saving rates will decline as new financial instruments (for borrowing and for portfolio diversification) become prevalent and once households have accumulated a sufficiently large stock of assets to cope with the new economic environment. The shift from public to private provision of education, health, and housing can help explain rising saving rates during an adjustment period. Government policy towards social expenditures will be relevant for determining the longer-term trajectory of saving based on this motive (Blanchard and Giavazzi, 2006, emphasize this point). Thus, the insights obtained by moving from aggregate to household-level data and the analysis in this paper can inform the debate on how to "rebalance" growth in China by stoking private consumption growth.

II. Data

We begin by discussing our dataset. The availability of household-level data from China is limited. A subset of the annual Urban Household Surveys (UHS) conducted by the National Bureau of Statistics (NBS) is available through the Databank for China Studies at the Chinese University of Hong Kong. The data cover the entire UHS for 1986-1992 and a subset of 10 provinces/municipalities for 1993-1997.[7] We have extended the coverage of that subset until 2005 through a collaboration agreement with the NBS. Unfortunately, no similar arrangement is available for the NBS Rural Household Survey. Appendix Table A1 provides a detailed comparison of income levels and saving rates in the Urban and Rural Household Surveys as well as in the Flow of Funds Accounts of the National Accounts.

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[6] Carroll, Rhee, and Rhee (1994) compare the saving behavior of different immigrant groups in Canada and find no evidence of cultural effects on savings.

[7] Those provinces/municipalities are: Anhui, Beijing, Chongqin, Ganshu, Guangdong, Hubei, Jiangsu, Liaoning, Shanxi, and Sichuan.

The UHS is based on a probabilistic sample and stratified design. It provides household-level information for a number of variables, including detailed information on income and consumption expenditures. It also provides demographic and employment information about household members, living conditions, and a number of other household characteristics. The data are collected over the course of the year. Households are asked to keep a record of their income and expenditures, which is collected every month by a surveyor. Table 1 reports summary statistics for household income, consumption and the resulting saving rates. The sample size increased in 2002; in that year, the survey instrument was also refined to obtain more detailed responses to some questions.

The measure of disposable income that we focus on includes labor income, property income, transfers (both social and private, including gifts), and income from household sideline production. The consumption expenditure variable covers a broad range of categories.[8] Appendix Table A2 describes the changes in the distribution of consumption across different groups of goods. Neither income nor consumption measures capture the consumption value of owner-occupied housing.[9] All flow variables are expressed on an annual basis and, where relevant, nominal variables are deflated using the provincial CPI. We measure savings as the difference between disposable income and consumption expenditures.[10]

A potential concern at this juncture is that the micro data indicate household saving rates lower than those suggested by the aggregate data taken from the Flow of Funds Accounts. The Flow of Funds data indicate a household saving rate of 32 percent in 2004, the last year for which those data are available. This is about 7 percentage points higher than the household-survey based estimate of the saving rate. The discrepancies between micro and

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

[9] Households report their estimate for the rental value of owner-occupied housing from 2002 onwards. It is very rare in our sample for households to live in a rented private house, so we cannot meaningfully estimate the rental value of owner-occupied houses at market prices in previous years.

[10] This residual measure of savings includes transfer expenditures. To the extent that these expenditures reflect implicit risk sharing and informal consumption smoothing contracts among households, their inclusion in the measure of savings is appropriate. These transfer expenditures are fairly well spread across household demographic groups and different income levels, so our results are robust to their exclusion from savings (although the level of saving rates would decline).

macro data on saving ratios are an issue in virtually every country where both types of data are available. Deaton (2005) documents systematic discrepancies whereby survey-based measures of income and consumption are different than those from the national accounts in most countries. Some of these differences can be traced to definitional issues.

Perhaps more importantly, it is usually difficult to get adequate survey response rates from high-income households. These households tend to have high saving propensities—Figure 2 (left panel) shows that saving rates are higher for the top deciles of the household income distribution covered in our sample. The shares of total saving accounted for by each income decile (Figure 2, right panel) show that the top two deciles alone account for over half of total savings.[11] The increase in saving rates was also more pronounced among the richer households. Thus, an under-sampling of rich households would understate average savings.[12] But we do not see the discrepancy between the mean saving rates derived from micro and macro data as indicative of a problem with the micro data.[13]

One other issue is whether our 10-province sample is a representative subset of the full UHS sample. Table 2 compares the saving rates in our sample with those from available tabulations of the entire UHS sample. The figures are quite comparable. By arrangement with the NBS, we also checked many of our results reported in subsequent sections with data for the full sample for selected years. There were no major discrepancies in the results.[14]

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[11] If we sort households by a measure of permanent income rather than current income, the results are similar to those in Figure 2. That measure is estimated by regressing household income on dummies for education, occupation, and type of employment of the household head, as well as the household head's age and its square.

[12] In our sample, the ratio of income at the 99th percentile of the distribution to median income was about 4.6 in 2005 and annual income at the 99th percentile was about 120,000 yuan (about $14,560). It is possible that the UHS sample coverage of very high-income households is quite limited. This is not a major concern for our analysis but could be important for reconciling micro and macro data.

[13] A possible additional source of the discrepancy is related to anecdotal evidence suggesting that some bank deposits under household accounts, which are counted as part of household savings in the aggregate data, are in fact enterprise deposits; this is apparently due to tax and other issues related to incomes of small-scale entrepreneurs.

[14] Our analysis sample covers about 45 percent of the total number of observations (using sampling weights) in the full UHS sample.

III. Basic Empirical Results

III.1 Stylized Facts

We now provide a more detailed characterization of saving patterns based on the micro data. Figure 3 shows, for selected years from 1990 to 2005, cross-sectional averages of disposable income and consumption (all in 2005 constant prices) as a function of the age of the household head. There has been an enormous increase in average income over this period, with consumption closely following both measures of income. These figures indicate that Chinese households did not borrow against expected future income growth in order to smooth their lifetime consumption. These plots are more consistent with the predictions of buffer-stock saving models in which consumption parallels income (Carroll, 1997), rather than the predictions of the traditional version of the life cycle/permanent income hypothesis.

The lack of consumption smoothing over the life cycle is also illustrated in Figure 4, which tracks the consumption of each (synthetic) cohort, based on year of birth, over time. Figure 4A plots income and consumption against the age of the household head, with each line corresponding to a different cohort (for example, the first line traces the income and consumption paths over time for those households whose heads were 25 years old in 1990). Controlling for the demographic characteristics of households, using the approach of Attanasio and Browning (1995), does not make much of a difference to the consumption profiles, which still increase substantially over time (Figure 4B).[15] This is not surprising, since the trend growth in consumption in China is so strong that it could not possibly be smoothed even with well-developed credit markets.

The age profiles of income (Figure 3) exhibit a familiar hump-shaped pattern in 1990 and 1995. That is, income initially increases with age but, after peaking in the mid- to late-50s, begins to decline. Interestingly, that pattern changes over time and by 2005, the profile has two peaks, with younger households enjoying a relatively high level of income. Based on related work using the same dataset where we analyze in detail the determinants of labor earnings inequality in China, we conjecture that improvements in educational attainment are able to

[15] Attanasio and Browning (1995) show that demographic controls can account for much of the variation in consumption over the life cycle in the U.K.

explain much of the increase in income for younger households.[16] This phenomenon of rising returns to human capital is quite typical for transition economies (see, e.g., Keane and Prasad, 2006, for the case of Poland).

Figure 5 plots the saving rate as a function of the age of the head of household in the cross-section of households for 1990, 1995, 2000 and 2005. In 1990, the age-saving profile exhibits a hump-shaped pattern, with the saving rate increasing with age, peaking at around age 50, and then declining with age. Such behavior is close to what life-cycle theory would predict, given borrowing constraints and rising labor earnings over some range of the working life. However, that profile has changed over time. The age-saving profile started to shift to a U-shaped pattern in the mid-1990s, and this pattern has become more pronounced in the 2000s. That is, young households save a lot more of their income than was the case a decade ago. Saving rates then decline with age with a trough around the 40s, before rising as the household head approaches retirement age. This type of saving behavior—the relatively high saving rates at the early and late stages of the life cycle—is puzzling as it does not conform to the standard life cycle model, especially in the context of a fast-growing economy. In the next section, we decompose saving behavior into age, cohort, and time effects in order to understand what is driving such behavior.

III.2 Demographic Determinants of Household Saving Behavior

One problem with cross-sectional age profiles of household saving is that they confound age, cohort, and time effects. Different age and cohort groups are likely to have very different savings behavior and these are likely to change over time. We decompose the contribution of these effects to savings by using the approach of Deaton and Paxson (1994).

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

[16] In our sample, as of 1995, 24.0% of the household heads in their 30s had attended college or junior college, while 20.0% of those in their 40s, 50s and 60s had. By 2005, those figures had risen to 45.6% and 25.3%, respectively. The increase in education levels may reflect rising skill premia and also the fact that incomes have risen (education is a normal good). Also, the disruptions in schools and universities in the 1960s and 70s may have affected the educational attainment of older cohorts.

resources, with the constant of proportionality depending on the age of the household head and the real interest rate. That is,

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

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 (year of birth) and time dummies. The estimated consumption equation is:

$$\overline{\ln c_{ab}} = D^a \boldsymbol{\alpha}_c + D^b \boldsymbol{\gamma}_c + D^t \boldsymbol{\theta}_c + \varepsilon_c \qquad (1)$$

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 capture differences in consumption resulting from aggregate shocks, and from China's steady income growth.

Since age minus cohort equals year plus a constant, in the absence of constraints on these dummies, any trend could be the result of different combinations of year, age, and cohort effects. Deaton and Paxson (1994) identify age and cohort effects by imposing the constraint that the year effects must add up to zero and be orthogonal to a time trend. This constraint on the year dummies forces the decomposition to attribute the rising income and consumption over time to age and cohort effects (e.g., younger cohorts being much richer than older ones and, for a given cohort, income and consumption rising rapidly with age), overwhelming most of the other variation in consumption and savings behavior. For the purposes of this paper, it

would be preferable to disentangle differences in saving behavior across age and cohort groups, controlling for the rising economy-wide income level. Thus, we chose not to impose any constraint on the year effects. Instead, we constraint the cohort effects to add up to zero and be orthogonal to a trend.[17] That is, we impose the constraints:

$$\sum_b \tilde{\mathbf{a}}_c = 0, \text{ and } \sum_b \tilde{\mathbf{a}}_c b = 0$$

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 the manner in which income is distributed over their life cycle—then income can also be expressed as a function of age and lifetime resources. We estimate an equation for disposable income that is analogous to the one for consumption:

$$\overline{\ln y_{ab}} = D^a \acute{\mathbf{a}}_y + D^b \tilde{\mathbf{a}}_y + D^t \grave{\mathbf{e}}_y + \varepsilon_y \qquad (2)$$

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 we have estimated the effects of a variable on consumption and income, we can then compute its resulting effect on the household saving rate. When estimating these equations, we also include the following demographic controls: log(family size) and the share of individuals in the household aged: 0-4, 5-9, 10-14, 15-19 and 20 or above.

In our analysis, we assume that a household headed by an individual with age *a* will have income and consumption patterns similar to those of an individual with age *a*. Deaton and Paxson (2000) note that there is no reason to suppose that household behavior varies with the age of the household head in the same way that individual behavior varies with the age of the individual. To examine how much of a potential problem this may pose in our dataset, we plot the average age of the household head as a function of an individual's age in 1990 and

[17] The life cycle hypothesis predicts how consumption should vary with age but does not have implications for how it should vary with the year of birth (after controlling for age and rising incomes over time). Thus, the orthogonalization of cohort effects does provide a useful test of the predictions of the life cycle model.

2005 (the end-points for our sample). Figure 6 shows that the two variables are in fact closely related, except at the tails of the age distribution. This suggests that, in the case of China, the consumption behavior of a household headed by an individual of age *a* is a reasonable approximation to the saving behavior of an individual of that age.

Figure 7 shows the estimated age and cohort profiles of income, consumption and saving rates. The profile for one type of effect assumes that the others are kept constant. We take as our baseline household one whose head was 25 years old in 1990. For example, the age profile shows how income and consumption would vary with age holding the cohort effect constant at the level for the cohort born in 1965 and the year effect at its 1990 level (as if it was possible to change the age while holding the year and year of birth constant). Similarly, the cohort profile shows how income and consumption would vary with year of birth holding constant the age effect at its level for 25 year olds and the year effect at its 1990 level. Finally, the year profile shows the variation over time holding constant the age effect at its level for 25 year olds and the cohort effect at the level of those born in 1965.

The results confirm that consumption (dashed line) tends to track income (solid line). The age effects show that income and consumption initially increase with age before steadily declining. The implied effect on the saving rate, approximated as log (Y) – log (C), is similar to the saving rate profile as a function of age observed in the cross-section for the recent years (although the amplitude of the movements is smaller).[18] It indicates that young households save substantially, but then saving rates gradually decline (by about 10 percentage points), reaching a trough around age 45. The high saving rates among young households may be driven by the need to build an adequate buffer stock of savings to smooth adverse shocks to their income, and possibly to finance purchases of major consumer durables or housing (those expenditures tend to be larger for younger households). The decline in saving rates through the early to mid-40s appears to be related to the costs of rearing children, particularly education costs. Indeed, as shown in Figure 8, the share of education expenditures in total expenditures peaks on average at around age 45; also note that this share has been rising over time.

[18] This approximation allows us to linearly separate the different effects in the estimated regressions. It yields saving rates slightly higher than we would get using 1 – C/Y.

Saving rates increase rapidly after the age of the household head crosses the mid-40s and remain high even among much older households.[19] The increase from age 45 to age 65 is about 6 percentage points. The high saving rates among older households are somewhat puzzling, but could be a reflection of the rising burden of health expenditures. Figure 8 shows that these expenditures, which are increasingly being shifted on to households from the state, account for a rising share of consumption expenditures, particularly among older households. The uncertainty and lumpiness of those expenditures may be driving much of the elderly savings (which may also be affected by a selection bias, whereby elders who remain heads of households are on average better off). Finally, the sharp increase in the saving rate in the later working years is consistent with postponing retirement savings until retirement is near, which is the optimal response to rapid expected income growth.

The cohort profiles of income, consumption and savings suggest that younger and older cohorts had relatively higher income than those that were in their 20s and 30s in 1990 (Figure 7). The resulting effect on savings suggests that the higher saving cohorts are those that were in their 40s and 50s in 1990 (saving about 7.5 percentage points more than later cohorts). This is an interesting result, and may be capturing the fact that those cohorts may have been particularly hard hit by the reform process. They bore much of the uncertainty related to the move towards a market economy and do not have as many years ahead of rapid income growth as the younger cohorts to reap the benefits of those reforms. Moreover, they may have found themselves in a situation where their past savings were no longer appropriate in an environment of increased uncertainty, and as a result had to re-evaluate their savings plans and make up for past savings that were not made.[20]

Finally, we turn to the time profile. As expected, the time effects point to upward trends in both income and consumption. Income grows more rapidly than consumption, resulting in a strong increasing trend in savings. This time effect would explain a 9 percentage points increase in the saving rate from 1990 to 2005. This is a large effect, particularly

[19] Gourinchas and Parker (2002) estimate that young U.S. households behave as buffer-stock savers, and they start to save for retirement when the household head is around age 40.

[20] Prior to the SOE reforms, workers received a number of housing, health, education and pension benefits through their employer. As some benefits are reduced or their future becomes more uncertain due to SOE restructuring, households have stronger motives to save.

considering the host of life-cycle and demographic characteristics we are controlling for. This suggests a limited role for demographic changes in explaining the rise in Chinese household savings over the last decade and a half. The results were similar when we dropped the controls for family composition, or dropped cohort effects.

IV. Potential Explanations

We now review a number of likely explanations for the household saving behavior that we have documented in the previous section. It is not straightforward to nest these explanations within a unified model, so our approach is to assess the empirical relevance of each of these explanations independently.

IV.1 Habit Formation

Habit formation could help explain why saving rates would increase during a period of rapid income growth (Carroll and Weil, 1994). Under habit formation, the utility derived from consumption depends not only on its level but also on a "habit", which is a function of past consumption. As a result, consumers will smooth their consumption growth, and consumption may not keep up with a high rate of income growth, thereby boosting savings. We can use the synthetic cohorts described in the previous section to estimate the effect of past earnings growth on savings. Following Deaton and Paxson (1994), we estimate a regression of the form:

$$\overline{\ln y_{bt}} - \overline{\ln c_{bt}} = \beta_0 + \sum_{i=1}^{4} \beta_i (\overline{\ln(e_{bt-j})} - \overline{\ln(e_{bt-j-1})}) + \varepsilon_{bt}$$

where $\overline{\ln y_{bt}} - \overline{\ln c_{bt}}$, the difference between the logarithms of income and consumption, is the saving rate, and $\overline{\ln(e_{bt-j})} - \overline{\ln(e_{bt-j-1})}$ is the growth in earnings for cohort *b* at year *t-j*. Earnings include labor income, entrepreneurial/self-employment income, and pensions. In order to

attenuate the influence of retired households (or those close to retirement), we only consider households whose head was 30 to 60 years old.[21]

The first column of Table 3 presents the results for this baseline regression. Past earnings growth is associated with lower savings, contrary to what habit formation would suggest. If we include age, cohort, and year dummies as controls (column 2), the effect of past earnings growth becomes small and not statistically significant. Habit formation effects should be stronger among younger households. Older households have fewer years ahead, so the utility cost of raising present consumption on their consumption habit is smaller than in the case of younger households (which have more years to live with the higher consumption habit). If we restrict the sample to younger households whose head is 50 years of age or younger (column 3), then past earnings growth raises the saving rate, as habit formation would predict. The point estimate suggests that a steady 7.5 percent per year growth in real earnings (close to the average in that period) would raise the saving rate by about 3 percentage points. While this effect is economically quite large, it is substantially smaller than the increase in saving rates that has taken place over time. If we add age, cohort and year dummies as controls, the estimated effect of past earnings growth on the saving rate is no longer statistically significant.[22] Thus, while habit formation could help explain the high saving rates among younger households, it does not account for the high levels and recent increases in saving rates across the board.

IV.2 Durables Purchases and Savings

Even at present, consumer financing remains limited in China.[23] As a result, instead of borrowing against future income to purchase durable goods, Chinese households are more

[21] Since we use four lags for earnings growth, and income, consumption data for households with heads aged 25 or older, the youngest households for which the fourth lag of earnings growth is available are those with 30 year old household heads. Even among households whose head is 60 years old, pensions account for over half of total earnings.

[22] Since age is correlated with earnings growth, the inclusion of age dummies as controls could be biasing the estimates of the effect of earnings growth on savings.

[23] Total consumer loans issued by all financial institutions in China increased from near zero in 1997 to about 2.2 trillion yuan by end-2005 (12 percent of GDP). Real estate loans account for about 80% of

(continued)

likely to rely on their savings. This could cause households to postpone some of those desired purchases and to save more in the process. The UHS provides detailed information on consumption expenditures, from which we construct a measure of durables consumption.[24] Beginning in 2002, it is possible to trace the same household across consecutive survey years (with households remaining in the sample for 3 years). A regression of the household saving rate at time *t* on durable good purchases at time *t+1* suggests a negligible impact.[25]

The lack of a relationship between savings and future durable good purchases is not surprising given the high saving rates. On average, Chinese households spent 7 percent of their disposable incomes in durable goods in 2005. Most households could have financed such purchases just by saving less during that year, without needing to draw on past savings. In 2005, the 95th percentile of the ratio of durables purchases to disposable income was 20 percent, so only the largest (and rare) purchases would require a depletion of past savings. Moreover, since a significant share of Chinese households' wealth is in liquid assets such as bank deposits, even large purchases could be financed by drawing on those liquid savings, without having to postpone other consumption.

Table 4 reports the ownership rates for some of the major durable goods in urban China. These are surprisingly high considering average income levels, with the notable exception of automobiles (only 3.4 per 100 households in 2005). Automobile purchases are likely to become more common as Chinese households become increasingly affluent, and the development of automobile financing combined with an increase in auto purchases could have some effect on household savings. The net effect is, however, hard to predict as it will depend on the relative speed of the increase in demand for cars (which could increase the savings rate in the cross section if households have to self-finance auto purchases) versus the rate of development of consumer financing for cars.

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total consumer loans outstanding, and auto loans account for about 7.5%. Household consumption (from the national accounts) amounted to 7 trillion yuan in 2005.

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

[25] These results are not reported here but are available from the authors. The point estimate was actually slightly negative, suggesting that the typical durable goods purchase would mildly lower saving rates, by about 1 percentage point.

IV.3 Housing Purchases and Savings

The most important "durable good" is housing. Table 5 shows the average home ownership rate for the households in our sample. The proportion of households that own or partially own their homes increased dramatically from 17 percent in 1990 to 86 percent in 2005 (the increase in the full UHS sample is very similar). A lot of that increase can be explained by the housing reforms that took place over the last decade. In the past, housing was often provided by state enterprises to their employees. As part of the housing reform, much of that stock was sold to the workers, typically at below-market rates. In fact, 58 percent of the households in our sample that owned or partially owned a home in 2005 had purchased it through the housing reform. Figure 9A plots average home ownership rates by age group. The home ownership rate among households with heads aged 25-35 years is nearly identical to that for the average household. Figure 9B plots, by age group, the share of households in 2005 that have bought their homes through the housing reform. As expected, a smaller share of the younger households obtained their home through the housing reform (for example, 40 percent of households headed by 25-35 year olds, compared with 57 percent for the full sample average).

This privatization of the housing stock could help explain the large and rising household saving rates, since home purchase and construction expenditures are considered household savings. Table 5 also reports the ratio of home purchase and construction expenditures to disposable income. That ratio has averaged about 6.5 percent in the last ten years. We estimate how much of those expenditures were financed by depleting past savings by computing the average of:

Min [Housing purchase and construction expenditures, Saving deposit withdrawals].

If a household did not have any housing purchase or construction expenditures in a given year, as is typically the case, that variable will equal zero. If it had positive housing purchase and construction expenditures in that year, that variable will equal the lower of that expenditure and its savings withdrawals. Thus, this variable provides an approximation of how

much of the observed housing purchase and construction could have been financed by saving withdrawals.[26]

In order to gauge the magnitude of housing-related savings, we take the ratio of the variable above (including the majority of observations for which its value is zero) with respect to the average disposable income in that year. This ratio suggests that in recent years aggregate housing purchase/construction related saving withdrawals correspond to about 6 percent of aggregate household income.[27] These back-of-the-envelope calculations suggest that the rapid privatization of the housing stock contributed significantly to the rising saving rates over the last decade and a half.

Table 5 also reports the ratio of the average repayment of home loans with respect to the average income. That ratio is small since, despite a rapid increase in recent years, the proportion of households that have used mortgage financing and are repaying a home loan is still low, standing at only 5 percent in 2005 (that proportion is 11 percent among households whose head is 25-35 years old). But while relatively few households are repaying home loans, the ones that are making repayments devote a substantial share of their income to those payments: 20 percent in 2005. Unfortunately, we do not have any information that would allow us to separate interest payments (which should not be considered savings) from amortization of principal on those loans.

If home ownership motives have indeed been an important contributor to savings, the high ownership rates that have now been attained point to a potential decline in saving rates in the near future. But anecdotal evidence suggests that many households would like to upgrade their living conditions (which seems particularly relevant for owners of older units obtained through the housing reform) and that, despite the high home ownership rate, the housing market in China remains very active. It is possible that developments in mortgage markets would have an effect on household saving behavior. Lower down payment requirements could

[26] We implicitly assume that the withdrawals were used to finance the house purchase, which seems a reasonable approximation since a household is unlikely to buy a house following an adverse shock to its income that would require withdrawing savings for consumption smoothing. Moreover, such household could have smoothed its (non-housing) consumption by postponing/adjusting the house purchase/construction expenditure instead of depleting its savings.

[27] To the extent that the real return on savings is lower than average real income growth, this ratio will in fact underestimate the relative size of past savings that were made for housing motives.

reduce savings motivated by housing purchases. Perhaps more importantly, if households were able to tap their illiquid housing wealth, the need for precautionary savings would decline (since, in the event of an adversity, households would be able to borrow against their housing equity, using the house as collateral).

IV.4 Effects of State Enterprise Restructuring on Saving Behavior

Increased precautionary saving due to uncertainties stemming from China's transition to a market economy, which has picked up steam over the last decade, is another factor that could potentially help explain the increase in saving. It is difficult to quantify the strength of those effects using micro data, however, since that increase in aggregate uncertainty affects all households (and we need some variation across households in order to identify an effect). But insights can be obtained by analyzing variations in saving behavior across different groups of households that faced different dimensions of this "transition risk."

One relevant dimension for comparison is based on SOE employment. In most economies, SOE employment is likely to be more stable so, all else being equal, workers employed in the state sector should save less. In the case of China, concerns related to SOE reforms could have contributed to an increase in saving rates of households reliant on SOE labor income relative to other households. By comparing the savings of SOE and non-SOE households, we can gauge whether the SOE reform process has contributed much to savings and, more importantly, whether that difference can account for the rising saving rates.

The restructuring of state enterprises has indeed been an important component of the move towards a more market-oriented economy in China. Table 6 shows the breakdown by type of employer among households whose head is 25-59 years old. Employees in SOEs still account for a large share of total employment. But there has been a gradual yet marked decline in the share employed by SOEs and collective units and an increase in the share employed by the private sector. SOEs accounted for 78 percent of employment among heads of household in 1995; this share had dropped to 54 percent by 2005. The drop in SOE employment is similarly large if we also consider other household members (from 68 to 43 percent). Has this shift in employment patterns, and the uncertainties induced by state enterprise restructuring, affected savings of SOE and non-SOE employees differently?

We estimate median regressions for the household saving rate, where the effect of SOE employment is captured by two dummies. The first equals one if there is one SOE employee in the household, and the second equals one if there are two or more SOE employees. This specification allows us to capture possible nonlinearities in the effect--i.e., for a given level of income, the marginal effect could be different depending on whether some or all of the household's labor income comes from the SOE sector.[28] In one set of estimates, we add log income as a control. In the other, we control for income using dummies for the household's position in the overall income distribution (income quintiles). Additional controls include dummies for each of the 10 province/municipalities in our sample, dummies for the age of the head of household being equal to 25-29, 30-34,..., 55-59 years, the log of household size, and the shares of household members aged 0-4, 5-9, 10-14, 15-19, and 20 or higher. Table 7 reports the estimates for every other year beginning in 1993.

The results are somewhat surprising. First of all, contrary to expectations, households with at least one member employed in the SOE sector do not save less, even after controlling for income levels and other household attributes. In fact, households with at least one SOE employee on average used to save more than households with no SOE employees, but that effect has declined over time. In 1993, households with 1 or more SOE workers on average saved 3-4½ percent more of their income compared to households with no SOE workers. In 1995, the effect is largely limited to households with 2 or more SOE employees, with those households saving 2 percent more of their income relative to households with no SOE workers. The same is true for 1997 and 1999, although the effects are not statistically significant in those years. The estimates for 2001 appear to be outliers (with the effect comparable to those of 1993). In the most recent years, there is little difference in saving rates between SOE and non-SOE households.

One possible explanation is related to housing. SOE workers used to receive subsidized housing while employed but had to move out of this housing at retirement. Hence, they had to save for making house purchases. With the privatization of most of the housing stock, this

[28] The results that we report here were similar if, instead of these dummies for SOE employment, we used the share of household income from SOE earnings as a regressor.

factor has become less important over time (although the timing of the housing reform can also help explain higher savings for SOE workers around 2000).

The coefficients on the other controls are in line with our expectations and results from the previous sections. Saving rates increase with income, with that relationship increasing over time. For example, in 2005, moving from the bottom to the top quintile yields saving rates that are 28 percentage points higher, compared to 15 percent higher in 1995. The effect of the age group dummies (not reported in the table) shows limited variation, although younger and older households continue to save more than other households. But these estimates are noisy and not statistically significant, probably because of the inclusion of other controls. The demographic controls (also not reported) indicate that having household members aged 10-19 lowers saving rates. The negative effect of having a member in that age group in a three-person household has become 2 percentage points stronger from 1995 to 2005, and is consistent with the increasing shift from public to private provision of education.

Our interpretation of the results in this section is that SOE reforms by themselves do not account for a significant portion of the increase in aggregate saving rates. Of course, our results have little to say about the effects of aggregate uncertainty on saving rates.[29] The fact that SOE households on average have saving rates that are at least as high as those of other households is an interesting finding to be investigated further in future research.

IV.5 Target Savings

One of the possible explanations for why Chinese household saving rates have risen from already high levels even as real interest rates have turned negative is the target saving hypothesis. The basic idea is that households have a target level of saving that they want to achieve by the end of their working life, which means that saving rates will tend to be negatively correlated with the real returns on savings. This is of course just a way of restating the relative importance of substitution and income effects of changes in interest rates on intertemporal consumption decisions. The usual presumption is that the substitution effect dominates, so that a lower real rate of return on savings leads to a lower saving rate.

[29] Meng (2003) finds that Chinese urban households try to self-insure against transitory income shocks. These results suggest that the rising individual-level and macro uncertainty could drive up precautionary saving.

It is difficult to test this hypothesis using time series data since the span of available data is limited and the economy has been undergoing numerous changes over the last decade and a half. It is also difficult to test this at the household level since different households may face different rates of return on their savings, depending on the composition of their financial wealth. We do not have this information in our dataset.

Given these constraints, we devise an indirect test by exploiting cross-province differences in inflation rates. The vast majority of household financial savings takes the form of bank deposits and, since the deposit rate is fixed by the central bank, all households face the same nominal rate of return on their savings. Thus, inflation differentials across provinces can be interpreted as a proxy for differences in real interest rates.

We use UHS data on per capita income and consumption averages for 31 Mainland provinces/municipalities for the period 1992-2006 (yielding a total of 421 observations). We regress the provincial/municipality average saving rate on the log of the average disposable income, the ex-post one-year-ahead inflation rate, province dummies, and year dummies (which capture differences in the nominal interest rate across years and trends in savings).

Our estimates indicate that a one percentage point increase in the one-year-ahead ex-post inflation rate is associated with an increase of 0.24 percentage points (with a standard error of 0.08) in the household saving rate (Table 8, first column). This correlation provides some indirect support for the view that lower real interest rates are associated with higher saving rates.[30] We re-estimated the regression using the ten-province sample (column 2) as well as using the underlying household data for those provinces (column 3). The coefficients are smaller in magnitude, although they are still positive and significant.

These results should of course be interpreted with caution as there are other reasons why expected inflation could affect savings. Furthermore, by construction we can tease out only a cross-province effect rather than an aggregate nation-wide effect of a change in interest rates on savings. Even if taken at face value, our point estimates suggest that the effect is not quantitatively important. For example, based on the province-level results, it would take an inflation rate 4 percentage points above the national average in that year to raise provincial

[30] The estimated coefficient on the log of disposable income is 0.16, which is in line with the other estimates in this paper.

saving rates by 1 percentage point. Thus, even if our estimated correlation held up at national level, it would not explain the large (and rising) household national saving rates. Nevertheless, what we find most intriguing is that we cannot, based on our rather crude and indirect test, refute the target saving hypothesis altogether.

V. Discussion and Implications for Aggregate Saving Patterns

To conclude, we review our main findings and discuss their implications in light of other macroeconomic data. We find a limited role for demographic considerations in explaining Chinese household savings. Taken at face value, the estimated age profile of savings shown in Figure 7 would suggest negligible changes in the saving rate as China's population ages. That is the case since both the young and the old have among the highest saving rates (so population aging would just replace one group of large savers by another). Projections for the evolution of the Chinese population by age range are available up to 2050 from the U.N. Population Division (Figure 10). Despite the large projected changes in the demographic structure, its combination with our estimated age-profile of savings for the 25-69 age group implies a change of less than 0.2 percentage points in the average saving rate from now to 2050.[31]

Of course, the age-profile of savings that we have found in Chinese data is very unusual, and may have been influenced by one-off effects of China's transition to a market economy. If that profile reverts to a more traditional hump-shaped pattern, population aging would affect savings. Another point of caution about our demographic results is that the observed household-level income and consumption profiles probably downplay life cycle effects by not taking into account life cycle consumption smoothing decisions made by the non-household sector on behalf of households (e.g., state pensions). Nevertheless, our results suggest that the effects of population aging on savings are likely to be smaller than one would expect a priori.

[31] Such a back-of-the-envelope exercise involves a number of simplifying assumptions. For example, it ignores the fact that the age-profiles estimated are for the head of the household, whereas the projected population shares are for individuals. Moreover, our estimates are based on urban households, whereas the projected demographic changes also cover rural areas.

Saving rates are very high across the board, and consumption tends to parallel income (i.e., there is little consumption smoothing over the life cycle). This suggests that models of buffer-stock savings may be more relevant than standard life cycle models in understanding saving dynamics in China. Habit formation considerations could in principle help explain the rise in saving rates, although we find only limited evidence supporting that channel (which, at best, can only explain a small increase in the saving rate). The massive privatization of the housing stock seems a more promising explanation for this surge in savings, with simple back-of-the-envelope calculations suggesting that savings driven by the motive of home ownership could account for about 5 percentage points of the increase in the household saving rate from 1995 to 2005. Since this is a one-off event (albeit one that has been playing out over several years), the proportion of savings driven by this factor should decline over time.

Borrowing constraints, attributable to limited financial market development rather than individual credit constraints, seem to play an important role in driving up saving rates despite rapid income growth, especially among younger households. We have also presented circumstantial evidence that the increasing costs of education, health, and housing directly faced by households have contributed to the increase in their saving rates. The effects of that shift, together with precautionary motives stemming from state enterprise restructuring and other market-oriented reforms, should eventually fade as households adjust their consumption plans and build-up a level of assets appropriate for this post-transition environment.

Finally, we also found some indirect evidence in support of the "target saving" hypothesis whereby Chinese households save as much as they do because they are targeting a certain level of wealth and the real return on their savings, most of which goes into bank deposits, is small (and has recently become negative as inflation has risen).

What are the implications of our findings for the debate about how to "rebalance" China's growth by boosting domestic consumption? As financial markets develop, households should benefit from being able to borrow against future income, better opportunities for portfolio diversification, and more favorable rates of return on their savings. The development of China's social safety net would pool the risks associated with idiosyncratic income shocks and health expenditures, reducing the need for households to save in order to self-insure against these risks. Increasing public provision of education could also lower household savings by reducing the need to accumulate assets to finance future education expenditures.

Thus, policies that foster financial sector development and increased social expenditures could play an important role in helping to smooth consumption over the life cycle. This would moderate household saving rates and thereby help in rebalancing growth towards consumption.

Appendix
A Simple Model of How Growth and Borrowing Constraints Can Affect Savings

This appendix provides a simple illustration of how rapid income growth can affect saving behavior in an economy with limited financial development. It is based on the work of Japelli and Pagano (1994), although our simpler setting makes it easier to see how specific parameters that of interest to us influence this channel.

For an infinitely-lived agent, expected 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 is that, given borrowing constraints, it is easier to smooth consumption going forward than to consume out of 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 lifetime 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:

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

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 (Figure A1). But once γ>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).

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

The expression above implies that there is a local peak for the aggregate saving rate in the region where γ≤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 γ≤2, since agents can then smooth their consumption simply by saving less in the first period. But it will lower savings for γ>2. We assume that β is sufficiently small so that $\beta \le \dfrac{\gamma+1}{3\gamma^2}$ and $\beta \le \dfrac{1}{2\gamma+1}$. 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 γ>2) are:[32]

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

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

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

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 A2.

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.

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Table 1. Summary Statistics

Year	Observations	Income (2005 RMB)	Consumption (2005 RMB)	Transfer Expenditures (2005 RMB)	Household Size	Saving Rate (% of Income)
1990	4846	12795	10897	915	3.4	14.8
1991	4913	13221	11332	995	3.3	14.3
1992	6273	14890	12556	1070	3.3	15.7
1993	6109	15879	13412	1119	3.2	15.5
1994	6290	17306	14517	1188	3.2	16.1
1995	6297	17677	14964	1256	3.2	15.4
1996	6288	18232	15193	1362	3.2	16.7
1997	6242	19065	15806	1525	3.2	17.1
1998	6255	20250	16721	1696	3.1	17.4
1999	6294	21237	17485	1815	3.1	17.7
2000	6261	23179	19031	1993	3.1	17.9
2001	6300	24344	19354	2093	3.1	20.5
2002	16607	25324	20378	2708	3.0	19.5
2003	19351	26824	21257	2805	3.1	20.8
2004	20680	29068	22755	3037	3.0	21.7
2005	21849	31450	24412	3084	3.0	22.4

Notes: Data for 1990-1997 are from the subset of the Urban Household Survey available through the Databank for China Studies of the Chinese University of Hong Kong. Data for 1998 onwards are from the National Bureau of Statistics. Income and consumption are converted to constant 2005 prices based on the Urban CPI. Saving rate defined as 1-consumption/income. Definition of consumption expenditures does not include transfer expenditures.

Table 2. Representativeness of 10 Provinces/Municipalities Sub-Sample

Year	Saving Rate in 10 Province/Municipalities Sub-Sample (% of Income)	Saving Rate in Entire Sample (% of Income)	Income in Sub-Sample/Income in Entire Sample
1992	15.7	17.5	1.15
1993	15.5	18.1	1.15
1994	16.0	18.4	1.16
1995	15.2	17.4	1.13
1996	16.7	19.0	1.13
1997	16.8	18.9	1.13
1998	17.3	20.2	1.15
1999	17.6	21.1	1.12
2000	17.9	20.4	1.16
2001	20.7	22.6	1.14
2002	20.0	21.7	1.06
2003	21.4	23.1	1.02
2004	22.3	23.8	1.04
2005	22.8	24.3	1.04

Notes: Saving rates based on 1 – average per capita consumption/average per capita disposable income. Taking per capita averages (as opposed to household averages) yields results slightly different from those in Table 1, but this is necessary for purposes of comparison with the published tabulations of the entire survey.

Table 3. Estimates of the Effect of Lagged Earnings Growth on Saving Rates

	Ages 30-60		Ages 30-50	
Δin(earnings)$_{t-1}$	-0.036	0.030	0.176	0.041
	(-0.046)	(0.032)	(0.048)**	(0.047)
Δln(earnings)$_{t-2}$	-0.15	-0.033	0.101	-0.051
	(0.049)**	(0.035)	(0.052)	(0.049)
Δln(earnings)$_{t-3}$	-0.194	-0.057	0.072	-0.049
	(0.049)**	(0.033)	(0.051)	(0.042)
Δln(earnings)$_{t-4}$	-0.141	-0.019	0.06	-0.010
	(0.044)**	(0.029)	(0.042)	(0.035)
Age, Cohort and Year Controls	No	Yes	No	Yes
Sum of coefficients of Lagged earnings growth	-0.520	-0.079	0.409	-0.069
	(0.122)**	(0.098)	(0.131)**	(0.130)
N	341	341	231	231
R^2	0.06	0.82	0.06	0.62

Notes: Standard errors in parentheses, (*) and (**) denote statistical significance at the 5 percent and 1 percent levels, respectively. Saving rate defined as log(Y) - log(C). Earnings include wages, entrepreneurial/self-employment income, and pensions.

Table 4. Ownership of Durable Goods per 100 Urban Households

Durable Good	2000	2005
Washing Machine	90.8	95.5
Refrigerator	80.5	90.7
Color TV	116.7	134.8
DVD Player	37.1	68.1
Mobile Phone	18.3	137
Automobile	0.63	3.4

Source: CEIC (based on NBS Urban Household Survey data--full sample).

Table 5. Home Purchase and Construction Expenditures Financed By Saving Withdrawals

Year	Home Ownership (%)	Average Home Purchase or Construction Expenditures/Average Income (%)	Average of Min(Home Purchase or Construction Expenditures, Savings Withdrawals)/ Average Income (%)	Average Repayment of Home Loans/ Average Income (%)	Share of Households Repaying a Home Loan (%)	Average Housing Loan/Average Income Among Households Repaying Housing Loan (%)
1990	17.0	0.8	0.3	0.0	0.3	13.3
1991	18.5	1.2	0.7	0.1	0.3	9.9
1992	16.6	2.4	1.5	0.1	0.5	6.9
1993	20.6	3.8	2.5	0.2	1.4	7.5
1994	28.3	5.6	3.7	0.1	1.4	7.6
1995	30.9	2.3	1.4	0.1	1.4	7.4
1996	35.5	4.2	3.0	0.1	1.2	7.5
1997	47.7	4.2	2.8	0.2	1.3	13.0
1998	55.4	8.4	6.3	0.3	1.3	12.3
1999	64.6	7.0	5.2	0.2	0.9	22.2
2000	72.7	7.1	4.9	0.5	1.8	16.7
2001	76.7	6.0	4.1	0.6	2.3	17.5
2002	79.5	6.5	5.5	0.7	2.7	18.7
2003	79.9	7.0	5.7	1.1	3.5	20.1
2004	83.5	8.0	6.7	1.4	4.0	21.4
2005	86.0	6.6	5.5	1.7	5.2	20.0

Notes: High ownership rates partly reflect the housing reform. For example, 65% of the households that owned a home in 2005 purchased it through the housing reform. All ratios reported are based on the ratio of the averages of each variable (not the average of the ratios). Min(Home Purchase or Construction Expenditures, Savings Withdrawals) is a measure of how much of the observed home purchase and construction expenditures were financed from saving withdrawals. For example, if a household draws down its savings but does not report any such expenditure, the value is zero. If a household reports a home purchase or construction expenditure, this variable is the smaller of (i) the expenditure and (ii) the saving withdrawal (in the latter case, we assume that the entire withdrawal is used to finance the housing expenditure).

Table 6. Type of Employer for Households With a Head in the Age Range 25-59
(all figures in percentage terms)

Type of Employer	1995	2000	2005	1995	2000	2005
	Heads of household			All members		
SOEs	77.6	70.7	54.4	67.8	61.9	42.9
Collective Units	11.9	9.3	4.5	18.0	12.2	6.1
Other types of units (including private)	1.5	4.6	11.7	1.7	5.3	11.9
Entrepreneurs	0.5	2.9	7.8	1.0	3.1	6.7
Employees of individuals	0.3	1.3	6.5	0.8	3.1	9.2
Re-employed retirees	1.5	1.7	2.3	1.3	1.8	2.6
Other employed	0.1	0.5	2.9	0.4	1.1	4.3
Retirees	6.5	8.8	9.7	8.5	10.9	14.7
Other	0.0	0.1	0.2	0.5	0.6	1.7

Notes: Breakdown excludes households where head is a student, has lost the ability to work, is unemployed, or is waiting for an assignment. Breakdown among household members also excludes those categories.

Table 7. Does SOE Employment Affect Household Savings?

	1993	1995	1997	1999	2001	2003	2005
	Controlling for log (Y), demographic characteristics, and regional dummies						
Log(Income)	0.124	0.131	0.149	0.12	0.148	0.146	0.168
	(0.010)**	(0.007)**	(0.007)**	(0.008)**	(0.007)**	(0.005)**	(0.004)**
1 SOE	0.035	0.004	-0.002	-0.008	0.029	-0.015	-0.002
Worker	(0.012)**	(0.009)	(0.01)	(0.011)	(0.010)**	(0.007)*	(0.006)
2 or more	0.032	0.015	0.006	0.01	0.035	0.004	0.001
SOE Workers	(0.011)**	(0.009)	(0.009)	(0.011)	(0.010)**	(0.008)	(0.006)
Observations	5282	5302	5307	5305	5114	15128	16801
	Controlling for income quintile, demographic characteristics, and regional dummies						
2nd Income	0.028	0.044	0.061	0.067	0.048	0.075	0.089
Quintile	(0.009)**	(0.008)**	(0.009)**	(0.008)**	(0.012)**	(0.009)**	(0.007)**
3rd Income	0.059	0.077	0.084	0.081	0.109	0.114	0.134
Quintile	(0.010)**	(0.009)**	(0.010)**	(0.008)**	(0.012)**	(0.009)**	(0.008)**
4th Income	0.097	0.117	0.137	0.114	0.138	0.167	0.183
Quintile	(0.010)**	(0.009)**	(0.010)**	(0.009)**	(0.013)**	(0.009)**	(0.008)**
5th Income	0.146	0.181	0.191	0.18	0.233	0.226	0.277
Quintile	(0.012)**	(0.010)**	(0.012)**	(0.010)**	(0.014)**	(0.010)**	(0.008)**
1 SOE	0.039	0.004	0.001	-0.002	0.029	-0.003	0.002
Worker	(0.010)**	(0.009)	(0.010)	(0.008)	(0.011)**	(0.007)	(0.006)
2 or more	0.046	0.019	0.016	0.015	0.038	0.012	0.008
SOE Workers	(0.010)**	(0.009)*	(0.010)	(0.008)	(0.011)**	(0.007)	(0.006)
Observations	5282	5302	5307	5305	5114	15128	16801
	Average value of dummy for 1 or more SOE workers						
	0.874	0.882	0.881	0.847	0.814	0.720	0.657
	Average value of dummy for only 1 SOE worker						
	0.268	0.265	0.277	0.302	0.344	0.354	0.348
	Average value of dummy for 2 or more SOE workers						
	0.606	0.617	0.604	0.545	0.470	0.366	0.309

Note: Standard errors in parentheses, (*) and (**) denote statistical significance at the 5 percent and 1 percent levels, respectively. Results based on median regressions. Sample restricted to households whose head is between 25-59 years old, and was neither disabled, unemployed, nor a student. Demographic controls include dummies for the age of the head of household within the age ranges 25-29, 30-34, ..., 55-59, the log of the household size, and the share of household members aged 0-4, 5-9, 10-14, 15-19 and 20 or higher. The regressions include provincial dummies.

Table 8. The Effect of Cross-sectional Differences in the Real Interest Rate on Saving Rates

	Provincial-level Regressions		Household-level Regression
	All Mainland	10 Province/Municipality Subsample	
One-year ahead	0.243	0.217	0.153
Inflation	(0.079)*	(0.128)	(0.057)**
Log(Income)	0.159	0.092	0.145
	(0.023)**	(0.025)**	(0.001)**
Province Dummies	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes
N	421	160	144813
R^2	0.06	0.82	0.06

Note: Standard errors in parentheses, (*) and (**) denote statistical significance at the 5 percent and 1 percent levels, respectively. Provincial-level regression in the first column covers all provinces—it is based on aggregate data for per capita income, consumption, and inflation in1992-2005 covering 31 Mainland provinces/municipalities. Provincial-level regressions for our 10 Province/Municipality subsample are based on similar data covering the period 1990-2005. Household-level results (last column) are based on a median regression for the household saving rate. The sample is restricted to households whose head is 25-70 years of age. Additional household-level controls (not shown above) include dummies for age and year of birth of the head of household, the log of the household size, and the share of household members aged 0-4, 5-9, 10-14, 15-19, and 20 or higher.

Table A1. Saving Rates and Household Income in Household Surveys and National Accounts

Year	Household Saving Rate (% of income)				Household Per Capita Income (current RMB)				Urban
	Household Survey			National	Household Survey			National	Population
	Urban	Rural	Average	Accounts	Urban	Rural	Average	Accounts	(% of total)
1992	17.5	15.9	16.7	31.1	2,027	784	1,125	1,544	27.5
1993	18.1	16.5	17.3	29.9	2,577	922	1,385	1,888	28.0
1994	18.4	16.7	17.6	32.6	3,496	1,221	1,870	2,575	28.5
1995	17.4	16.9	17.2	N/A	4,283	1,578	2,363	N/A	29.0
1996	19.0	18.4	18.7	30.8	4,839	1,926	2,814	3,795	30.5
1997	18.9	22.6	20.6	30.5	5,160	2,090	3,070	4,054	31.9
1998	20.2	26.4	22.9	29.9	5,425	2,162	3,250	4,223	33.4
1999	21.1	28.6	24.3	27.6	5,854	2,210	3,478	4,321	34.8
2000	20.4	25.9	22.5	25.5	6,280	2,253	3,712	4,542	36.2
2001	22.6	26.4	24.0	25.4	6,860	2,366	4,059	4,819	37.7
2002	21.7	25.9	23.1	28.6	7,703	2,476	4,519	5,329	39.1
2003	23.1	25.9	24.0	28.9	8,472	2,622	4,993	5,733	40.5
2004	23.8	25.6	24.3	31.6	9,422	2,936	5,645	7,184	41.8
2005	24.3	21.5	23.5		10,493	3,255	6,367		43.0
2006	26.0	21.1	24.7		11,760	3,587	7,175		43.9

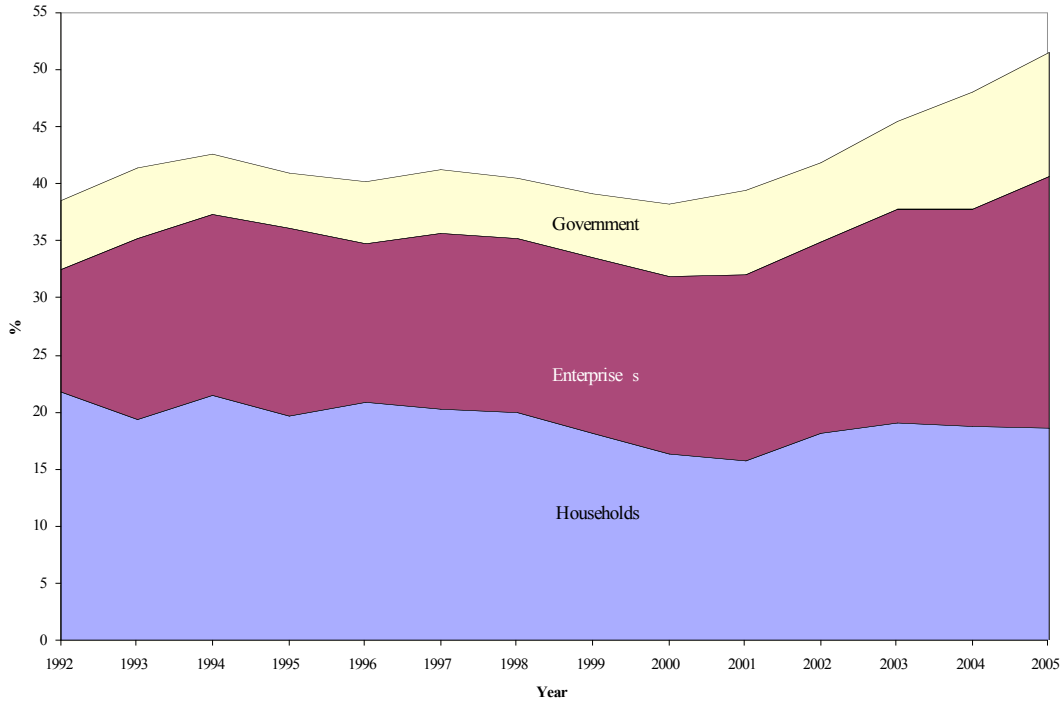
Notes: Household survey data based on tabulations for per capita income and consumption available through CEIC. Saving rates from the Urban and Rural Household Surveys expressed as a share of disposable income and net income, respectively. Saving rates from National Accounts (Flow of Funds) expressed as a share of disposable income. The large increase in household income from 2003 to 2004 in the National Accounts is partly driven by data revisions (and matched by a similar, albeit smaller, increase in household consumption).

Table A2. Breakdown of Consumption Expenditures Across Different Categories (all figures in percentage terms).

Year	Food	Housing	Health	Education and Recreation	Transportation and Communication	Other
1992	52.8	6.0	2.5	8.8	2.6	27.2
1993	50.1	6.6	2.7	9.2	3.8	27.5
1994	49.9	6.8	2.9	8.8	4.7	27.0
1995	49.9	7.1	3.1	8.8	4.8	26.2
1996	48.6	7.7	3.7	9.6	5.1	25.4
1997	46.4	8.6	4.3	10.7	5.6	24.5
1998	44.5	9.4	4.7	11.5	5.9	23.9
1999	41.9	9.8	5.3	12.3	6.7	24.0
2000	39.2	10.0	6.4	12.6	7.9	24.0
2001	37.9	10.3	6.5	13.0	8.6	23.7
2002	37.7	10.4	7.1	15.0	10.4	19.5
2003	37.1	10.7	7.3	14.4	11.1	19.4
2004	37.7	10.2	7.4	14.4	11.7	18.6

Notes: Based on tabulations of the entire Urban Household Survey (available through CEIC).

Figure 1. Contributions to Gross Domestic Savings as a Percentage of GDP



Source: CEIC and IMF.
Notes: Household savings shown here are based on national accounts data, which imply higher saving rates than those based on household survey data (see Table A1).

Figure 2. Saving Rate and Share of Total Savings by Income Quintile

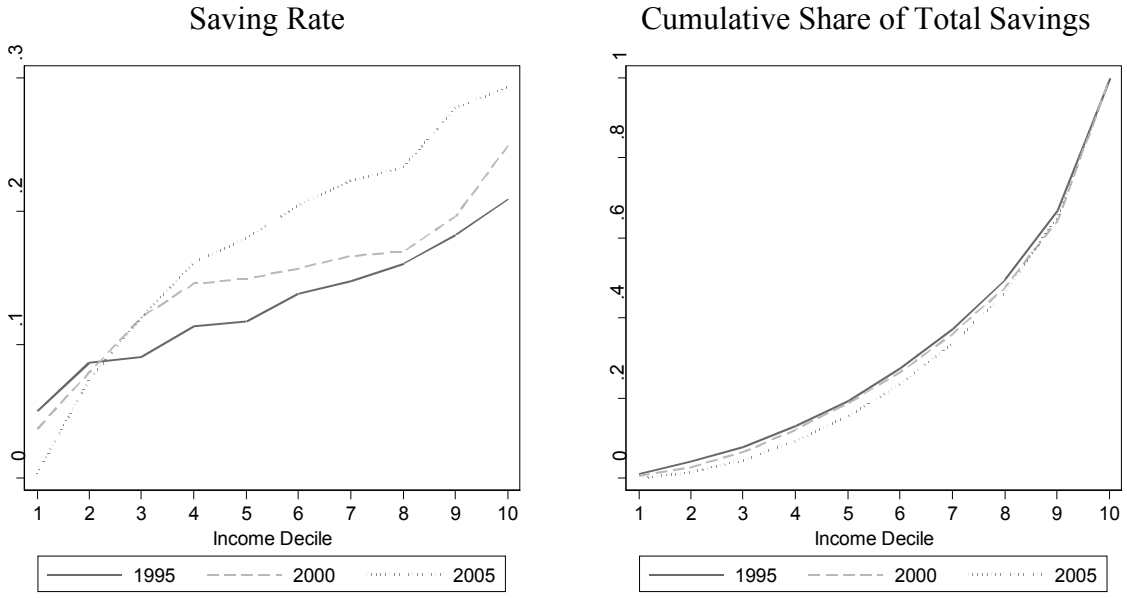
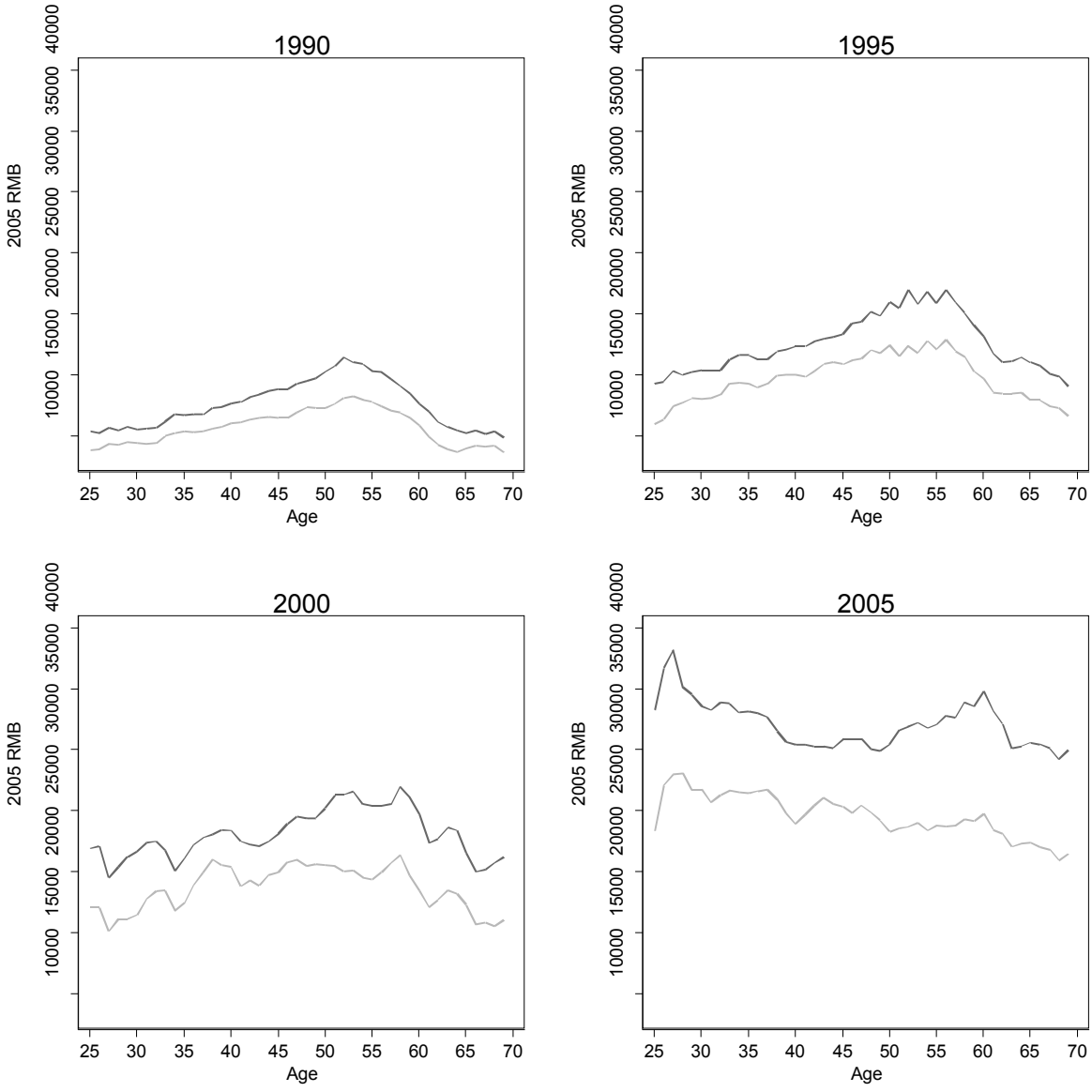


Figure 3. Average Disposable Income, Disposable Income Excluding Transfers, and Consumption by Age of Head of Household.



Notes: In all plots, disposable income corresponds to the top line and consumption to the bottom line. Income and consumption profiles were smoothed by a 3-year moving average (the averages for each age were combined with those for the ages immediately above and below).

Figure 4. Income and Consumption for Different Cohorts Over Time

Figure 4A. Income (Solid Line) and Consumption (Dashed Line)

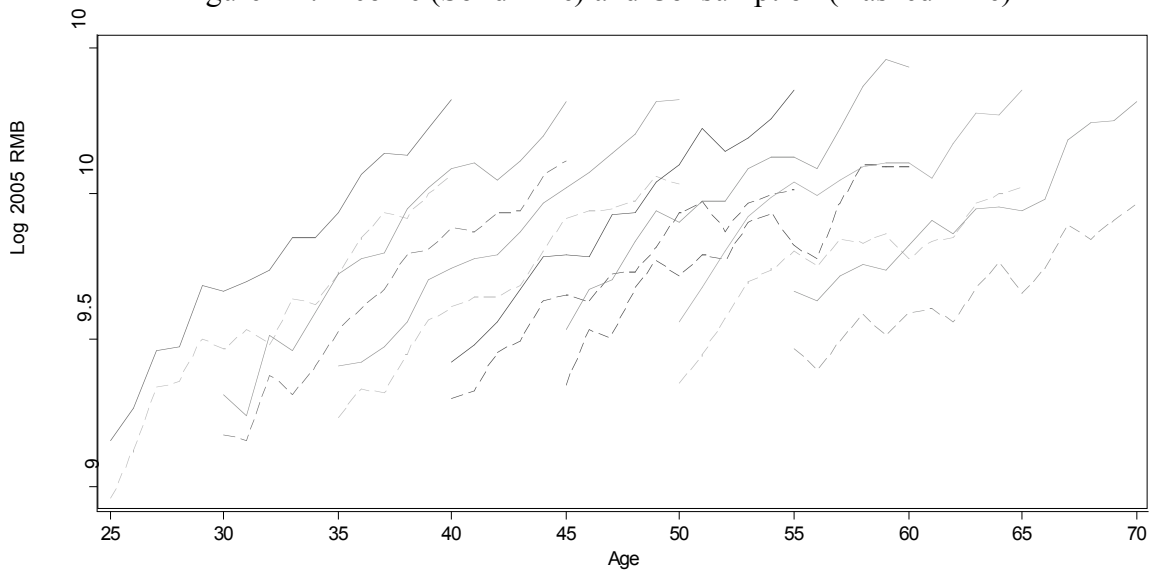
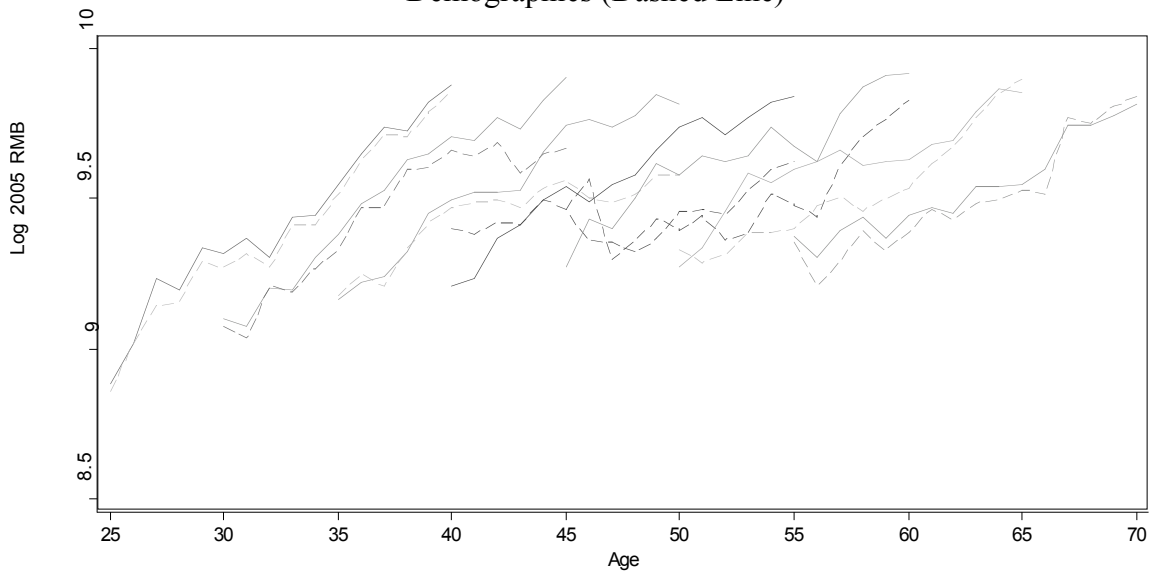


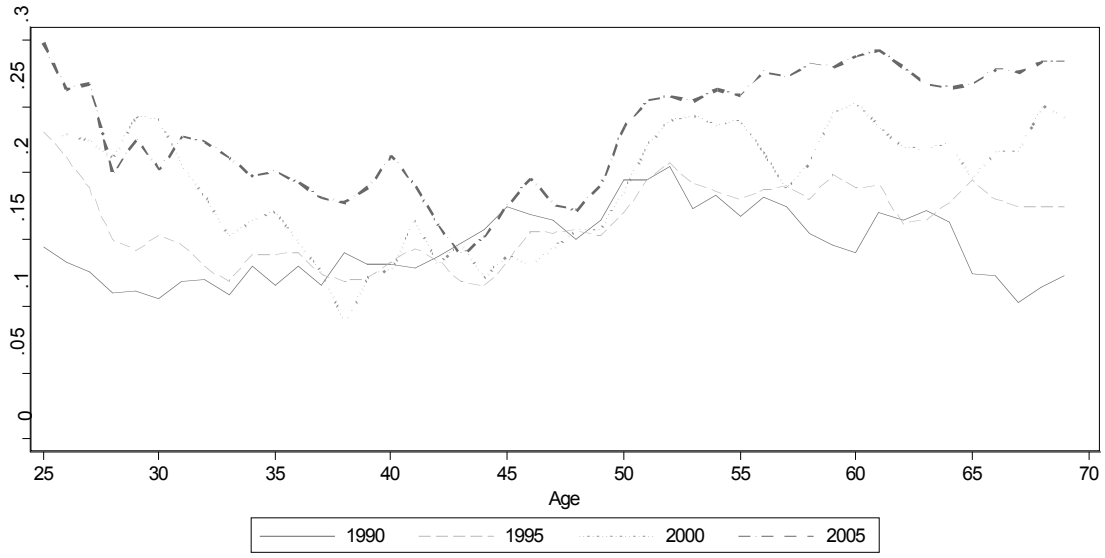
Figure 4B. Consumption (Solid Line) and Consumption Adjusted for Changes in Demographics (Dashed Line)



Notes: Consumption adjusted for changes in demographics obtained by regressing, at the synthetic cohort level, log(consumption) on: log(household size), number of children, number of adults, and a dummy for whether the household has a children. Results for adjusted consumption reported correspond to a household consisting of two adults.

Figure 5. Average Saving Rates by Age of Head of Household

(Saving Rate = 1 – Consumption/Disposable Income)



Notes: Income and consumption profiles were smoothed by a 3-year moving average (the averages for each age were combined with those for the ages immediately above and below).

Figure 6. Average Age of Household Head Relative to Age of Individual Household Member in 1990 and 2005

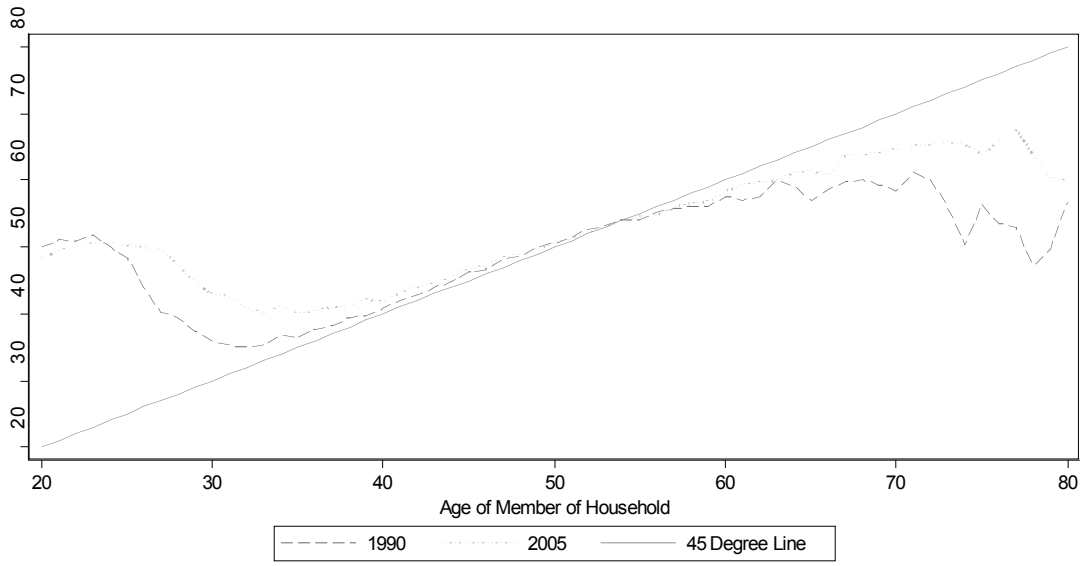
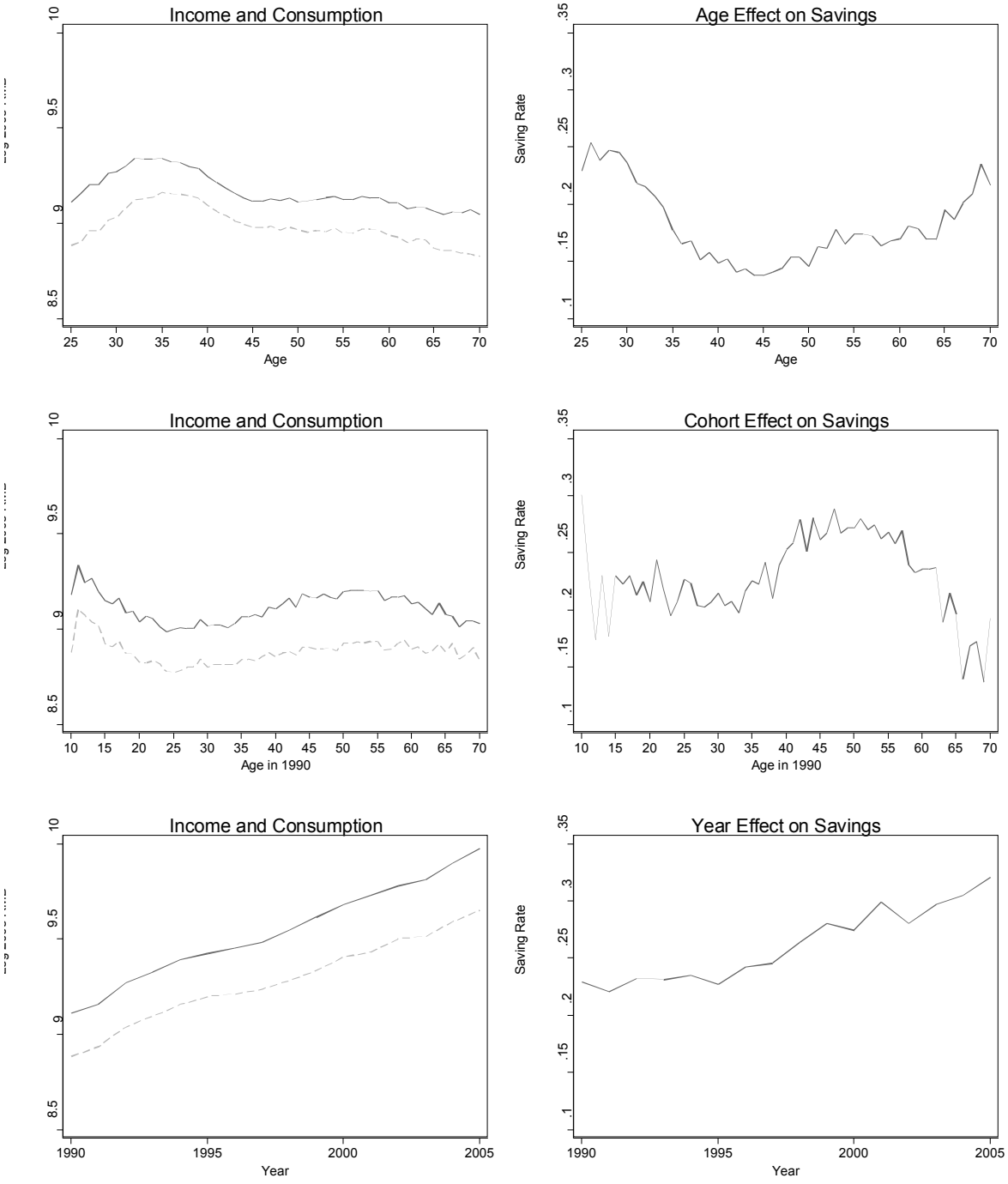
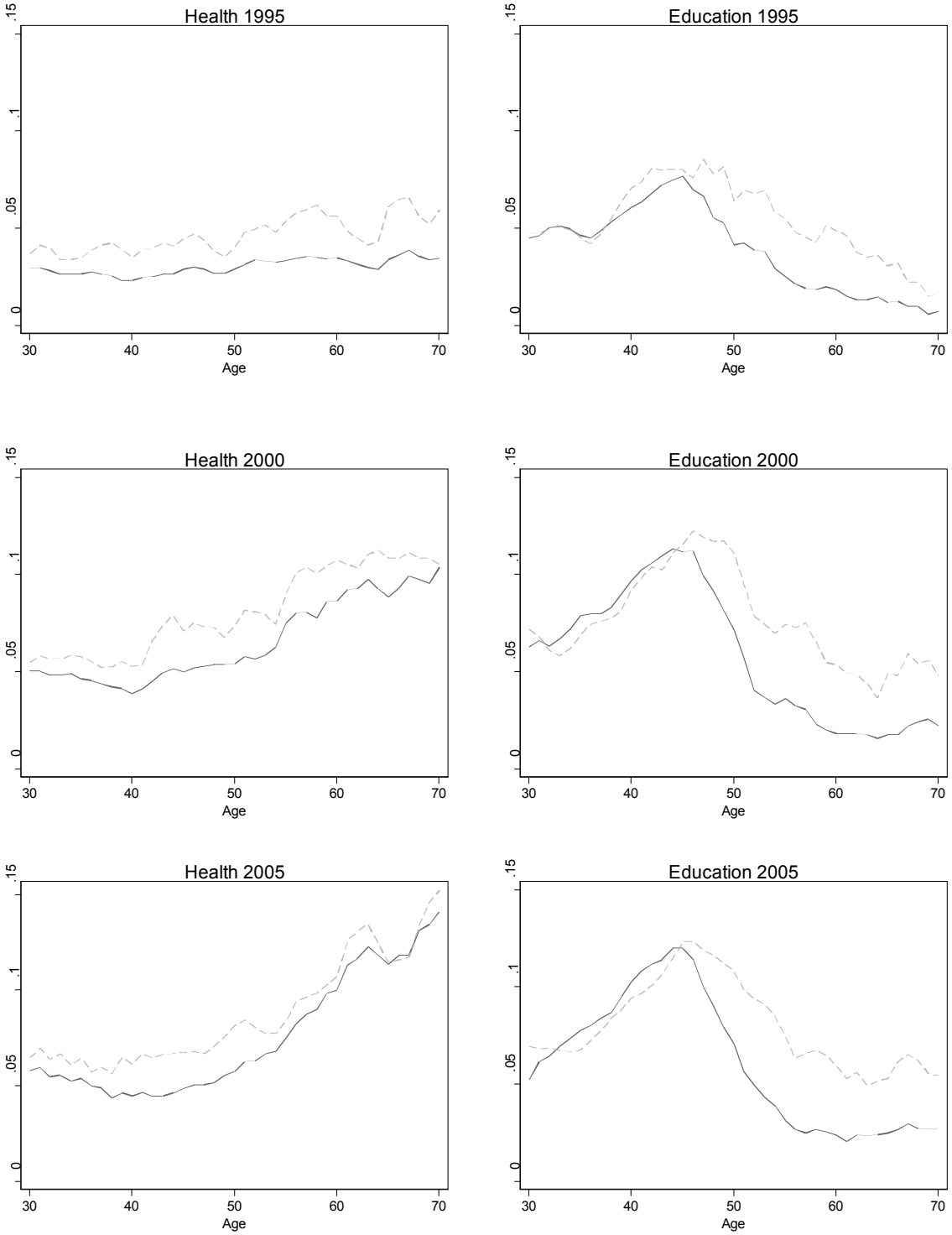


Figure 7. Age, Cohort, and Year Effects on Income, Consumption, and Saving Rates



Note: Effects based on a regression of average log(Y) and log(C) on a vector of age, cohort dummies and time dummies. Cohort dummies constrained to add to zero and be orthogonal to a linear trend. Log(Household Size), and share of household members aged 0-4, 5-9, 10-14, 15-19 and 20+ used as controls. Reference household is one that was 25 years old in 1990. Each profile displayed holds the other two effects constant at their respective levels for the baseline household. For example, the age profile shows how income, consumption, and savings vary with age holding the cohort effect constant at its level for households aged 25 in 1990, and the year effect constant at its 1990 level.

Figure 8. Average and Standard Deviation of the Shares of Consumption Expenditures on Education and Health as a Function of Age of the Head of the Household



Notes: Solid line corresponds to average share of consumption expenditures on health (education) and dashed line to its standard deviation.

Figure 9. Home Ownership by Age of the Head of Household

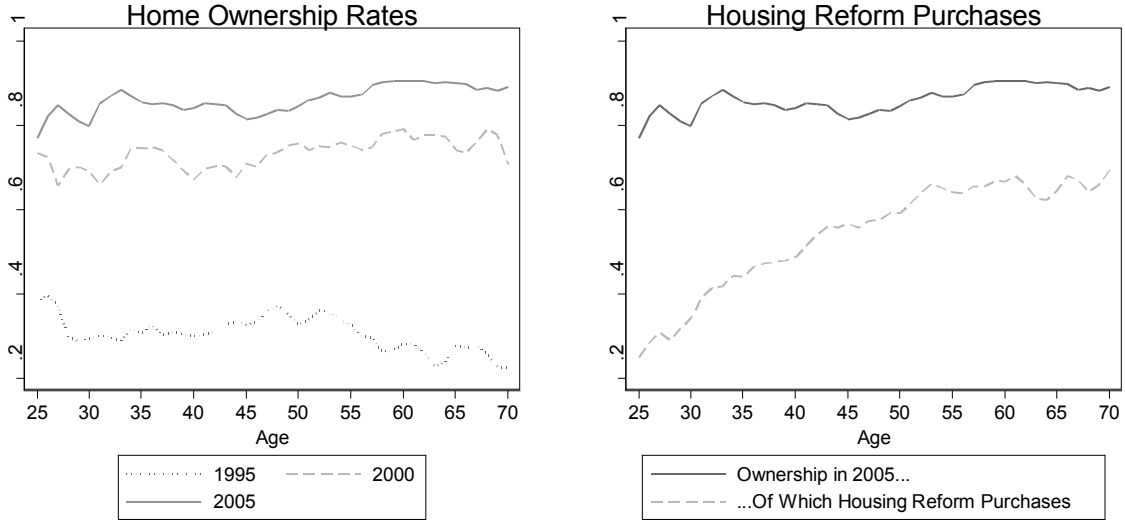
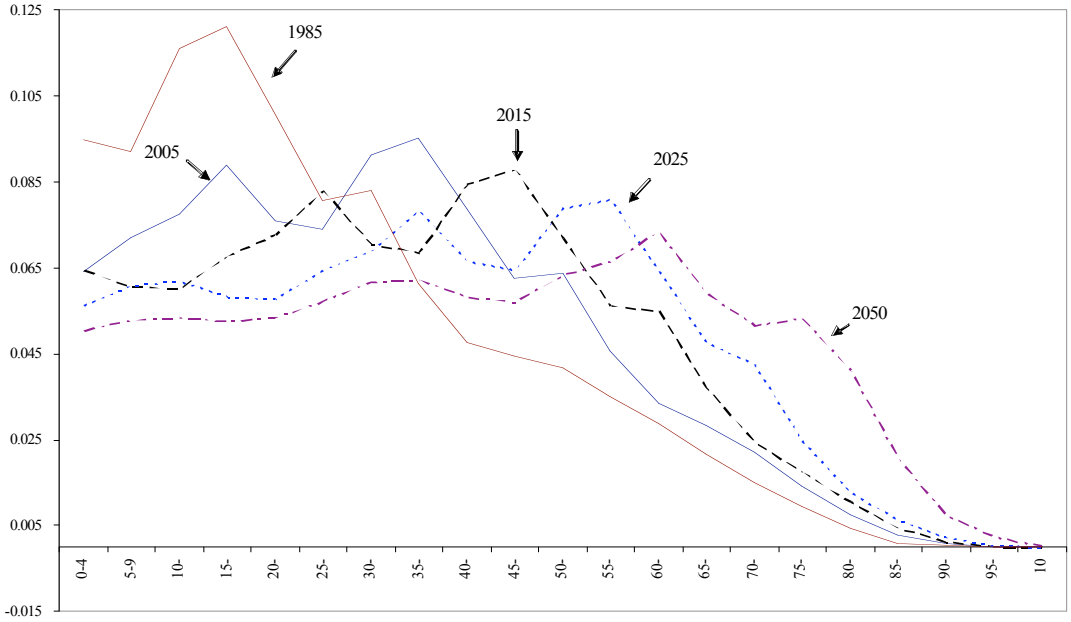
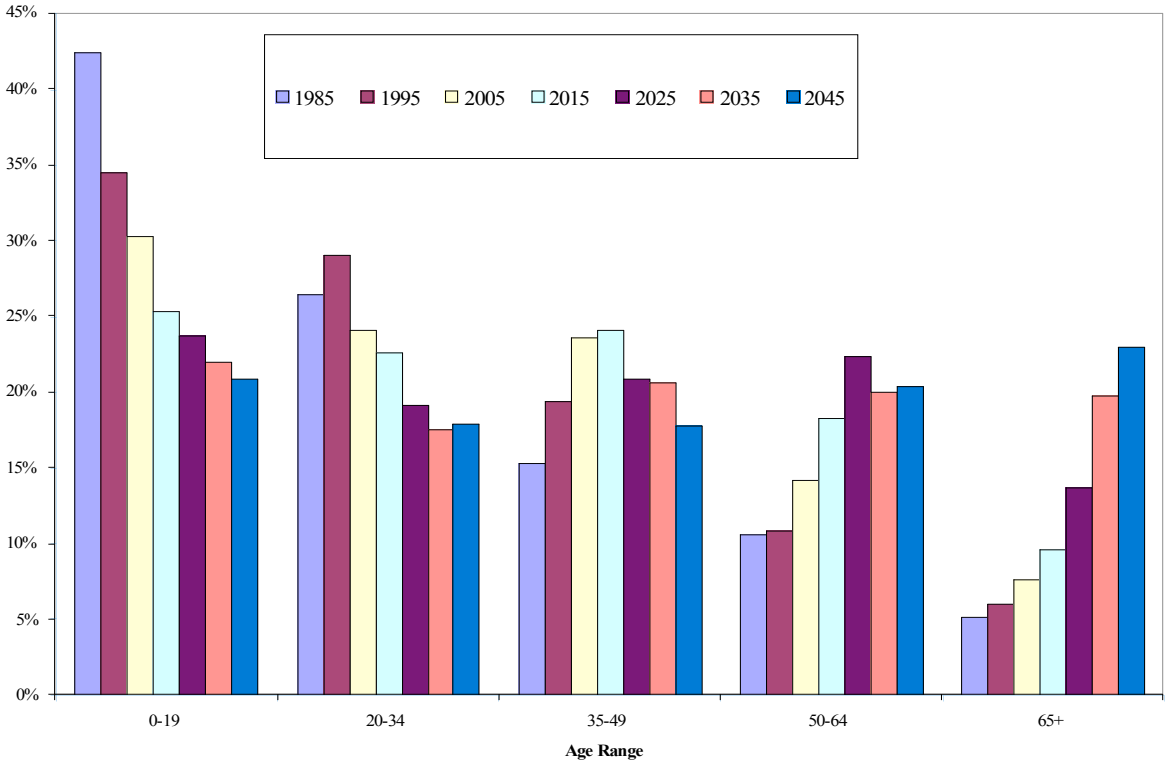


Figure 10. Age Distribution of the Chinese Population: Estimates and Projections





Source: U.N. Population Division

Figure A1. Aggregate Saving Rate in an OLG Model with Credit Constraints as a Function of Geometric Growth Rate of Wages

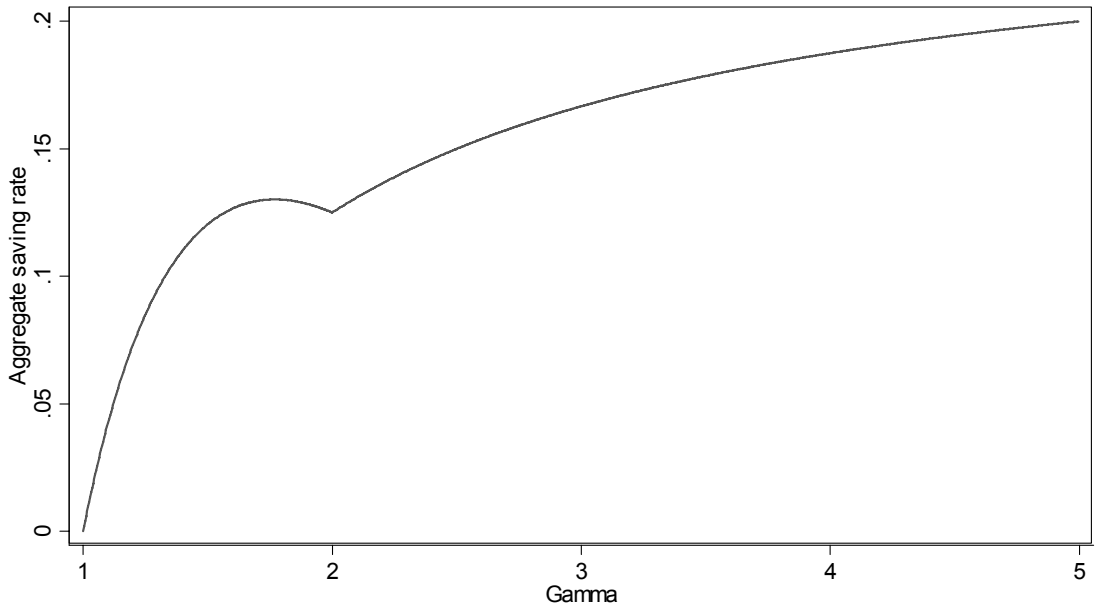


Figure A2. Aggregate Saving Rate in an OLG Model with Credit Constraints as a Function of the Geometric Growth Rate of Wages and the Credit Constraint