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Akiko Terada-Hagiwara

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Akiko Terada-Hagiwara is Economist at the Macroeconomics and Finance Research Division, Economics and Research Department of the Asian Development Bank. This paper has benefited from comments from seminar participants at the Institute for Social and Economics Studies, Osaka University. The author appreciates the help of Charles Y. Horioka, Eswar Prasad, and Shikha Jha for useful discussions at different stages of the paper, and Aleli Rosario and Pilipinas Quising for capable research assistance. However, the author is solely responsible for any remaining errors.

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Abstract

From 1994 to 2006, the average household saving rate in the Philippines declined by 5.2 percentage points to about a mere 5% of disposable income. Using data from income and expenditure survey at the household level, this paper explains why households' consumption growth had been higher than income growth during this period. Tracing cohorts shows that saving declined across all demographic groups. A simple test that provides the strength of the precautionary saving motive yields a plausible explanation that households are financially constrained and less prudent in the recent years. This paper argues that these patterns are best explained by the extended coverage of social security system during the 1990s in the Philippines. Less prudent behavior may have been amplified by the severe financial constraint leading to the sharp fall in the saving rate.

I. Introduction

Filipino households' saving rates have been declining. This paper attempts to understand the reasons behind this stylized fact in Filipino households' saving. In doing so, we investigate whether reforms in social security system and changes in the demographic structure had influenced the saving behavior, and how physical and financial assets have affected the profiles of consumption and saving.

We use data from seven household income and expenditure surveys—from 1988 through 2006—which were conducted every 3 years. Although there is no panel element to these data, the large number of households surveyed and the large number of cross-sections allows us to track cohorts of people through time, and to observe the evolution of their levels of income, consumption, and saving as suggested by Deaton (1985). The earliest cohort this data can capture is for those who were born in 1890 or those who were 98 years old in the 1988 survey. Likewise, the youngest cohort is those who were born in 1994 or those who were 12 years old in the 2006 survey (both for household heads' age).

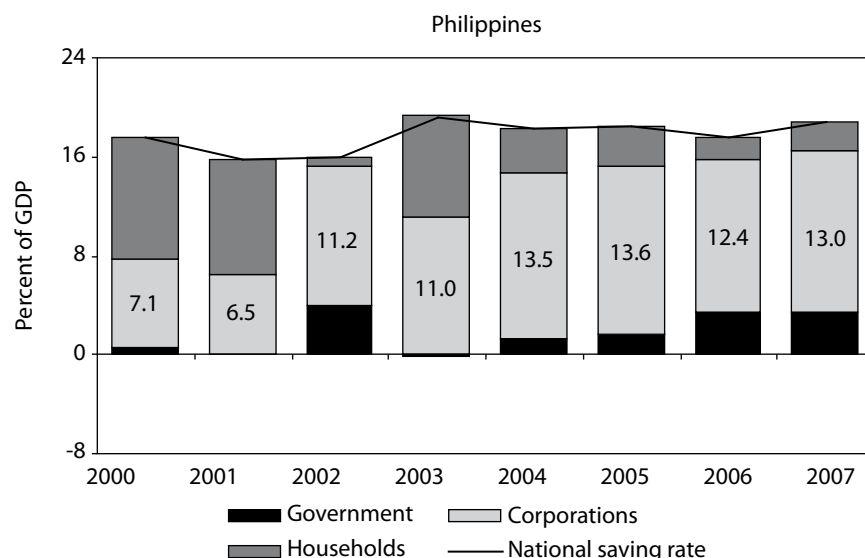
The Philippines provides an excellent laboratory in which to study the determinants of household saving. First, as Table 1 shows, the nation's social security system had evolved quite rapidly during the 1990s, which would affect the saving behavior significantly. Coverage ratio of the social security system increased substantially during the 1990s. By 1999, 7 out of 10 in the labor force were covered by the social security system while only a half of the entire labor force was covered by 1989—the coverage increasing by 20%. By reducing uncertainty about future expenses, an improved social security system can reduce households' precautionary saving (Chou et. al, 2003). While longer time series data are not available, as the national-level flow of funds data in Figure 1 indicates, the household saving rate has declined—from 9.8% of gross domestic product (GDP) in 2000 to 1.7% in 2006, then rebounded slightly to 2.4% of GDP in 2007.

Table 1: Coverage Ratio of Social Security System

Survey Year	A: Workers (thousand)	B: Employers (thousand)	A+B: Total Covered Labor Force (thousand)	C: Total Labor Force (thousand)	(A+B)/C: Coverage Ratio
1988	11,336	317	11,653	23,402	0.48
1991	13,153	376	13,529	25,499	0.52
1994	15,472	455	15,927	27,654	0.56
1997	19,080	537	19,617	28,902	0.66
2000	22,631	600	23,231	30,911	0.73
2003	25,051	703	25,754	34,571	0.72
2006	26,739	782	27,521	35,788	0.75

Source: Social Security System website, Asian Development Bank Statistical Database System, *Philippine Statistical Yearbook NSCB* (for government employees)

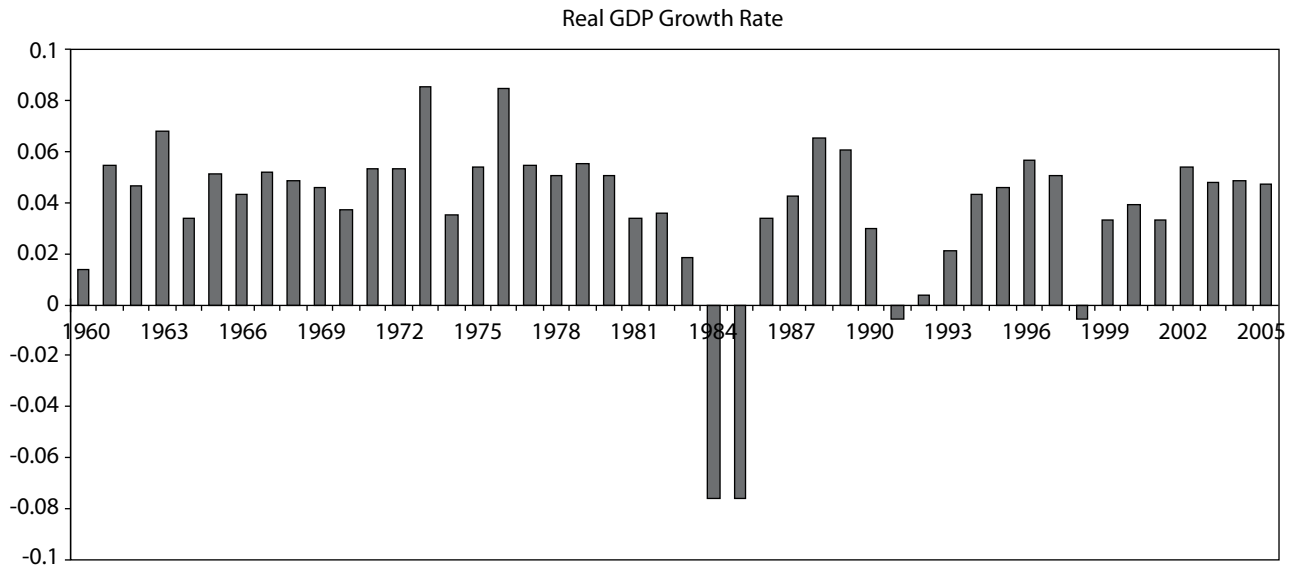
Note: Values for 1988 and 1991 are imputed assuming constant growth rates between 1979 and 1989, and 1989 and 1993, respectively.

Figure 1: National Saving Rate and Decompositions

Source: CEIC

Second, real GDP growth rate had undergone a transition from relatively steady growth in the 1960s and 1970s to sharp fluctuations in the 1980s and 1990s (Figure 2). It is obvious that different cohorts from the seven Family Income and Expenditure Surveys (FIES) lived in dramatically different economic environments. As a result, the older cohorts covered by earlier surveys enjoyed higher and steadier economic growth, while those relatively younger cohorts from the more recent surveys lived under relatively volatile economic situation.

Figure 2: GDP Growth Rate



GDP = gross domestic product.
 Source: International Financial Statistics, International Monetary Fund.

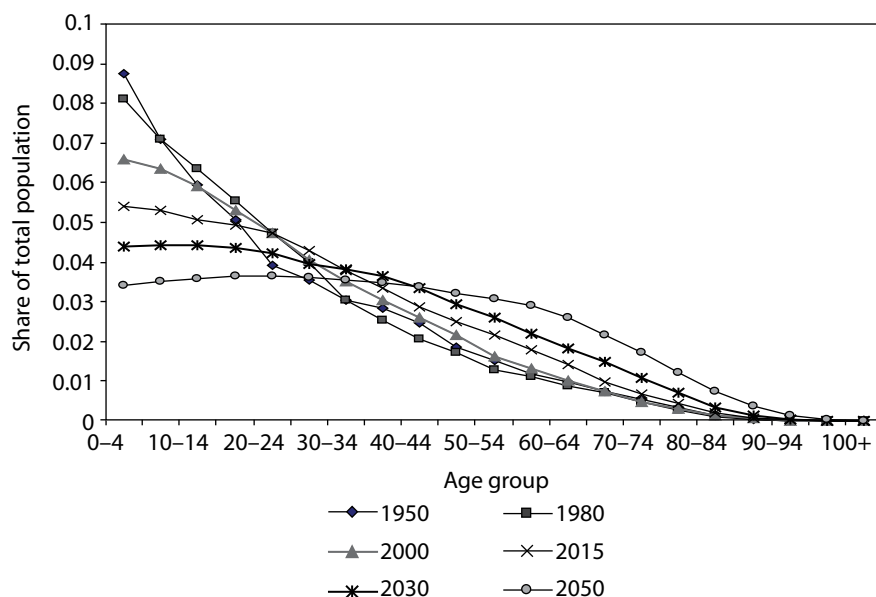
The third feature of the Philippines that is relevant to life-cycle saving is its demographic change over the last several decades from very high to moderately high population growth (Table 2). The annual population growth had been about 3% until late 1960s and remained well above 2% until the 2000s, when it slightly reached below 2%. The age distribution of the population has been sharply skewed toward the younger population during the survey period, though it started to become more like a bell shape by 2000. A real bell-shaped age distribution curve is expected to emerge only by 2050 according to the estimate by the United Nations Population division¹ (Figure 3). This demographic picture is very different from other middle income countries in the region, particularly of East Asia, where the concern has been more of an aging rather than a growing population.

¹ Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects.

Table 2: Population Growth Rate

Year	Medium variant
1950–1955	2.99
1955–1960	3.06
1960–1965	3.09
1965–1970	2.94
1970–1975	2.79
1975–1980	2.7
1980–1985	2.69
1985–1990	2.52
1990–1995	2.28
1995–2000	2.09
2000–2005	1.92
2005–2010	1.82
2010–2015	1.66
2015–2020	1.51

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2008 Revision, esa.un.org/unpp

Figure 3: Age Distribution

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2008 Revision, esa.un.org/unpp

In addition, the Filipino family composition can affect the saving behavior if grown-up working children live with their parents. In fact, according to FIES, the average number of employed household members is more than one even when the household's head is beyond the normal retirement age. Life cycle hypothesis assumes that an individual retires at about 60 years old and dissaves thereafter. But if a person is the head of a household where the children's income is substantial, this assumption does not hold.

An evolving social security system, stagnant economic growth, declining yet still high population growth, and fertility rate all have consequences for saving that could be predicted using the life cycle theory. We first investigate whether the observed patterns in consumption and saving across different households can be fit into the standard life cycle story without uncertainty. In particular, we examine the basic implication of a life cycle model that saving rate should decline with age. We also examine cohort effects in consumption and in saving. We examine whether younger cohorts' consumption profiles are any different from those of the old. This is of particular interest due to the economic fluctuations that the Philippines experienced over the last two decades. Liquidity constraint and precautionary behavior are then considered to see how they affect saving rates of Filipino households over time. This investigation naturally shifts our attention to consumption behavior with uncertainty.

This paper finds that the Filipino age–saving rate profile fits in the standard life cycle hypothesis showing a hump-shaped age–saving rate profile, once controlled for the demographic shifts and family composition. However, the decomposition analysis suggests that the declining saving rate over time remains unexplained even after controlled for demographic factors, and the declining trend cannot be simply due to the aggregate macroeconomic shocks as suspected. It is revealed that the declining saving rate has been due to the reduced precautionary motive in the 2000s as expected by the development of the social security system. More extensive coverage of the system appears to have reduced households' precautionary savings, which has been magnified by the financial constraint. Other explanations, such as habit formation, on the other hand, do not seem to explain the observed relationship.

Additionally, we find that consumption follows very closely with income, which is shared across different cohorts. This finding suggests that there is no evidence to support that a particular income source, such as remittance from abroad, smoothes out consumption fluctuations in general in the Philippines, as often emphasized.

The paper is organized as follows. Section II describes the survey data and provides some stylized facts on the saving behaviors of Filipino households. Section III adapts a decomposition analysis to gauge the impacts of age, time, and cohort effects separately after controlling for demographic changes. In Section IV, we introduce uncertainty in consumption to test for precautionary motives. Changing precautionary motives would explain the downward time-saving rate profile. Section V examines an alternative hypothesis as a robust test. The final section concludes.

II. The Survey Data and Stylized Facts

A. The Survey Data

We begin by discussing our dataset. In the Philippines, FIES is conducted every 3 years, and a total of seven survey results are available from 1988 to 2006 providing household level information for a number of variables, including detailed information on income and consumption expenditures. The surveys also provide demographic and employment information about household members, living conditions, and a number of other household characteristics.²

The measure of disposable income that we focus on includes agricultural and non-agricultural salaries and wages from regular employment, net share of crops, cash receipts, and other assistance from both abroad and domestic sources. Interest, pension and social security benefits, and dividends from investment are also included. Taxes are excluded. The consumption expenditure variable covers a broad range of categories. Table A1 describes the changes in the distribution of consumption across different survey years. All flow variables are expressed on an annual basis and, where relevant, nominal variables are deflated using the regional consumer price index. We measure saving as the difference between disposable income and total (and non-durable) consumption expenditures.³ (Table 3)

Table 3: Descriptive Statistics

Survey Year	Common Price Index	Average Family Size	Average Annual Family Income	Average Annual Family Expenditure
1988	35.7	5.3	105,107	87,258
1991	53.6	5.3	111,674	91,715
1994	68.6	5.3	113,234	93,779
1997	83.1	5.1	133,728	110,985
2000	100.0	5.1	132,005	109,896
2003	113.8	4.8	120,843	104,181
2006	137.9	4.8	117,842	102,158

Note: At constant 2000 prices.

Source: FIES, author's calculations.

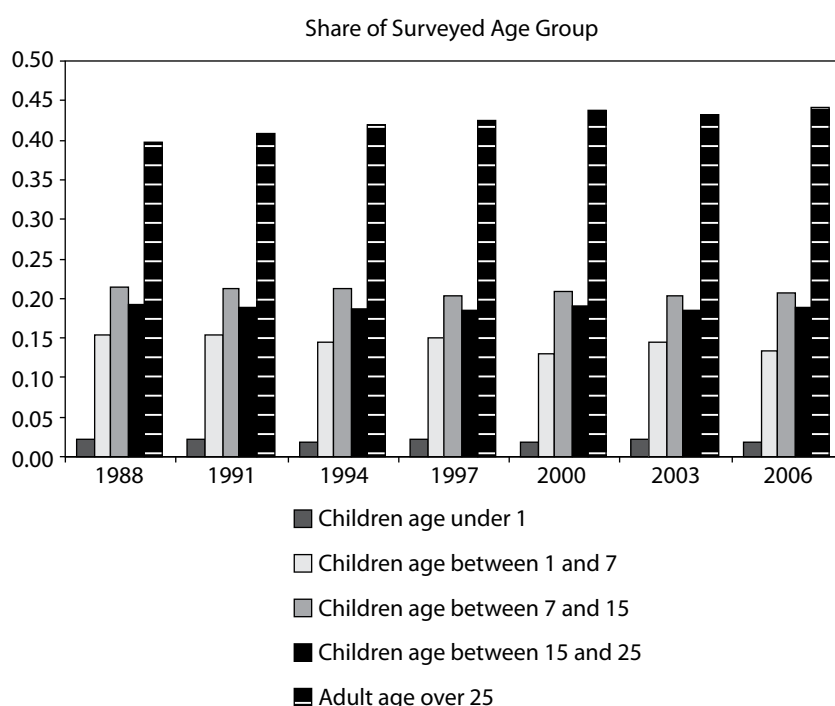
Since we are concerned with saving within a life cycle context, it is useful to look first at the demographic information in the surveys. Roughly speaking, about 0.1% of actual total population is surveyed each year. Representation of each age group is relatively constant across surveys (Figure 4). The share of adults (aged over 25) in each survey is about

² The survey design is described in data Appendix 1.

³ Potential discrepancy between macro-level and micro-level saving rates need to be kept in mind. Deaton (2005) documents systematic discrepancies whereby survey-based measure 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. Additionally, it is often the case that rich households are under-sampled, which could understate average savings.

42% of the total while it is about 37% for children aged 0 to 14. The remaining (about 20%) surveyed population is aged from 15 to 24. When we compare this distribution to the actual age distribution of the country's population, it is revealed that children under age 15 in the survey is more or less proportional to the actual share of about 33% (in the case of 2000 survey, for example). Meanwhile, the adult sample population is likely to be over-represented as the actual share of adults aged over 25 is only about 29% of total population. Evidently, the surveys fail to capture a substantial number of youngsters aged 15 to 24—presumably those in college, engaged in military service, or working in other households. These people are missing as a result of the survey design, and not because of any similar feature in the population.

Figure 4: Share of Surveyed Population across Age Group



Source: FIES, author's calculations.

For most of the interesting questions about saving and the life cycle, it is necessary to track individuals over time, and to observe the changes in consumption, income, and saving as people age. Although we cannot track individual households in the data, we can track cohorts of households, with cohorts defined according to their year of birth. With the FIES data, we can follow cohort means for 1988 to 2006.

Figure 5 shows how the cohort grouping can be used to show both the life cycle pattern of family formation and the cohort effects of increasing fertility. The age of the head of the household is plotted on the horizontal axis, while the vertical axis shows the average number of children in the household. Children here are defined those under age 25. The

plotted points are connected when we follow the same cohort through time, but different cohorts are left unconnected. To avoid clutter, we show only every tenth cohort, so that the first segment on the left hand side of the figure shows the number of children in households headed by those who were 25 in 1965. By the time these people are 35 in 1975, they are well launched into their child-rearing years, and have 3.5 children on average. The peak comes when the heads' age is about mid-40s with about 4.5 children on average. The falling fertility shows up in the profiles as we move from one cohort to the next.

Figure 5: Number of Children in the Household



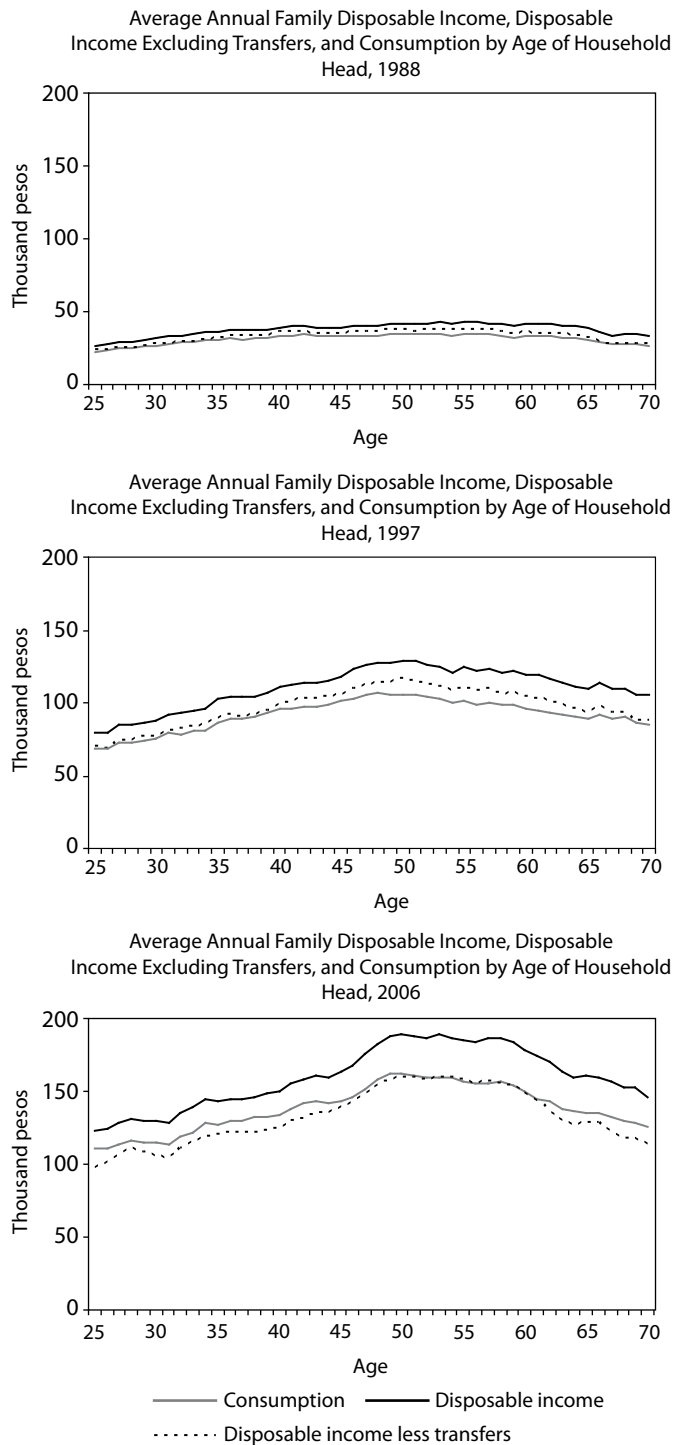
Source: FIES, author's calculations.

B. Stylized Facts of Household Saving Behavior

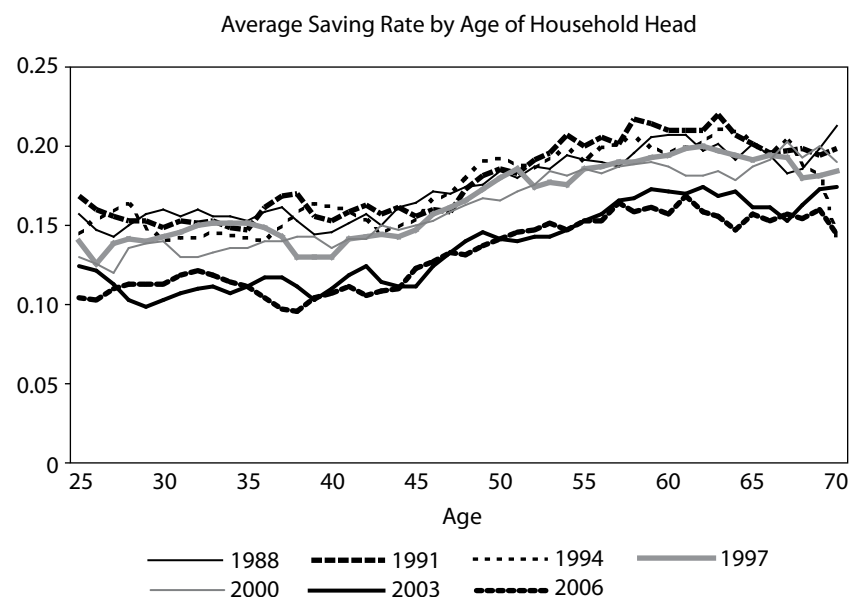
1. Puzzle on Increasing Age-Saving Rate Profile

The age profiles of income and consumption exhibit a familiar hump-shaped pattern in all survey years. That is, income initially increases with age, but, after peaking in the mid- to late 50s, begins to decline (Figure 6). Meanwhile, as found in Jha et al. (2009), the age-saving profile shows an interesting pattern, with an almost monotonic increase in saving rates in tandem with the age of the household head in all available surveys (Figure 7). This type of saving behavior is puzzling as it does not conform to the standard life cycle model without uncertainty, where the age-saving rate profile is expected to exhibit a hump shape.

Figure 6: Age-Income and Age-Consumption Profiles



Source: FIES, author's calculations.

Figure 7: Age–Saving Profiles

Source: FIES, author's calculations.

One argument that would explain the increasing age–saving rate profile is the case with households with an elderly head having working-age family members. This point is made by authors such as Deaton and Paxson (2000) and Attanasio and Szekely (2000). Therefore, one has to be careful in taking into account the factors driving family composition in different countries. In countries where it is the norm for elderly persons to live with their adult-age children, high household saving rates of households headed by older persons could reflect family composition rather than high individual saving rates of the elderly. This issue is looked at closely in the next section.

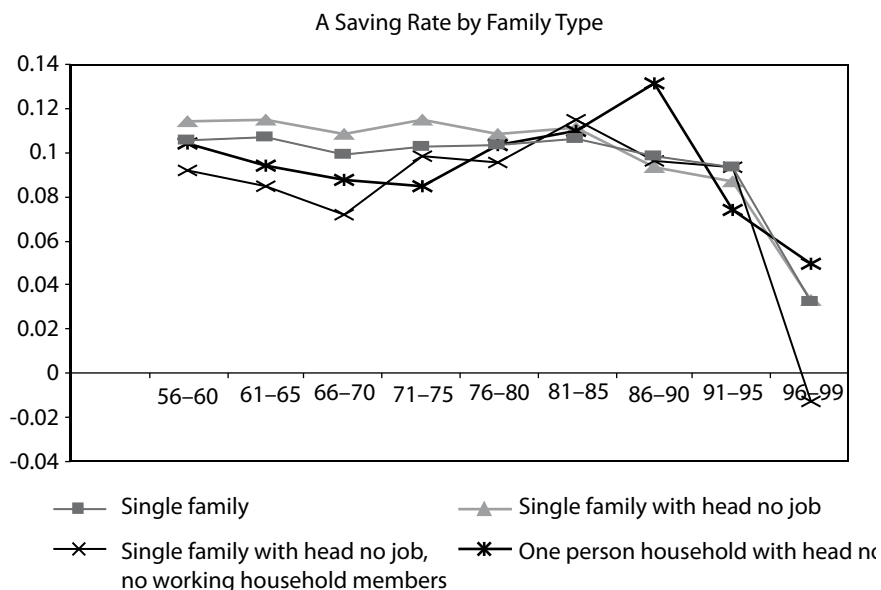
Additionally, the life cycle hypothesis suggests a hump-shaped age–saving rate profile with an assumption that the dissaving takes place with those who retired and have no jobs.⁴ In all of the FIES data, however, there are about 1.7 employed members in the households with the age of the head beyond the normal retirement age of 60. The employed members can be either the head of the household or a grown-up working household member living with his or her parents. Therefore, the standard assumption that the household head is the sole income source is not appropriate in this situation.

In Figure 8, we limit the analysis to single family households, and compare households with different employment status of the members for the period after the normal retirement age of the head. When plotting the age–saving rate profiles for single family households, the saving rates start to decrease after age 81—much later than what is generally thought. However, actual dissaving or negative saving rate is hardly observed. The age–saving rate profile of the households with no working members reveals that

⁴ Horioka (2009) and Horioka and Kan (2008) provide a comprehensive surveys on dissaving behavior of the elderly.

dissaving does take place—consistent with what life cycle hypothesis predicts, though only after age 95. While accounting for the employment status of the household members appears important in testing for dissaving behavior of the aged, the increasing age-saving rate profile until age 95 is still to be explained.

Figure 8: Age-Saving Profiles for Elderly Heads



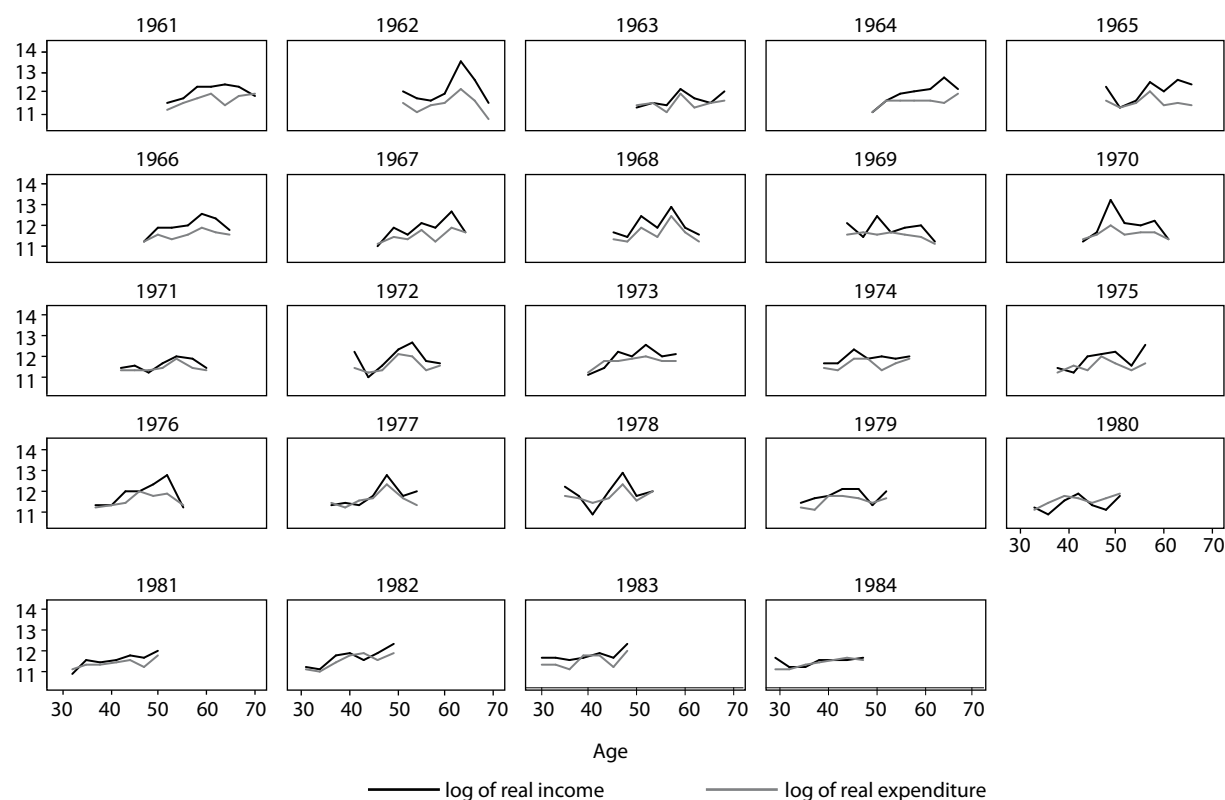
Source: FIES, author's calculations.

2. Puzzle on Declining Household Saving Rate

As discussed in the previous section, demographic development has been cited as one of the factors to explain the declining saving trend in the Philippines.⁵ The increase in the young dependency group would have increased the education and health expenditures, which could result in lower aggregate saving.

To gauge the time series characteristics of the household saving behavior, Figure 9 plots income and consumption against the age of the household head, with each line corresponding to a different cohort. For example, the first panel traces the income and consumption paths for households whose heads were 25 years old in 1960. This figure shows that consumption tracks income over the life cycle across cohorts, except perhaps for a few. This confirms the lack of consumption smoothing over the life cycle. Additionally, many cohorts experienced a sharp increase and drop in income and consumption—the observation shared across different cohorts. Most notably, those cohorts of 1980 or later are found to barely save regardless of their age. This finding suggests an importance of time effects in consumption and saving behaviors.

⁵ Bersales and Mapa (2006) analyze the same survey (up to 2003) and report that the declining trend has to do with the higher proportion of young dependents in the economy.

Figure 9: Mean Income and Consumption for Different Cohort Over Time

Graphs by cohort (head's age 25 in each year)

Source: FIES, author's calculations.

We have so far separately discussed cohort, age, and time effects, and their roles in driving saving behavior. Not surprisingly, these all operate simultaneously in the data and jointly determine aggregate household savings. In the next section, we use an econometric approach to disentangle these effects.

III. Controlling for Demographic Effects on Household Saving Rates: A Decomposition Analysis

The unconditional means of the saving rate in the previous section shows a rather unusual profile—monotonically increasing with age. While accounting for the employment status of the aged appears to reconcile some of the issues, saving behavior is subject to other factors such as year and cohort, in addition to age. As highlighted in the previous section, the Philippines, like many other countries, is undergoing a major demographic transition. Hence, a more careful analysis of demographic factors seems warranted in accounting for the observed saving behavior.

The cross-sectional age and cohort profiles of household saving in Section 2 represent a composite of age, cohort, and time effects. Different age and cohort groups are likely to have very different saving behavior and these are likely to change. It is therefore necessary to separate age, cohort, and time effects to more clearly characterize the effects of demographic variation on changes in saving patterns. The estimation strategy of this section follows a variant of Deaton and Paxson (1994).

A. Estimation Methodology

With no income uncertainty, the consumer has cash assets A_t , so that looking ahead T periods, there is a budget constraint

$$\sum_{t=1}^T (1+r)^{-1} c_{t+1} = W_t = A_t + \sum_{t=1}^T (1+r)^{-1} y_{t+1} \quad (1)$$

where c_t is household's consumption, r is interest rate, y is disposable income. Suppose that lifetime resources W_t are allocated equally over the T periods in the sense that the discounted present value of consumption from each period $t+i$, $(1+r)^{-1}c_{t+1}$ gets a fraction $1/T$ of the total. Since $(1+r)^{-1}$ is the "price" of consumption in period $t+i$, such an allocation can be thought of as equal budget shares for each period. The discount factor

is unity in period t , so the consumption in period t is given by $c_t = \frac{1}{T} W_t$. Thus, a life cycle model without uncertainty predicts that consumption is a function of resources (earnings plus inherited assets), with the constant of proportionality depending on the household head and the real interest rate. Given $1/T$ is a function of age, the consumption can be expressed as follows

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

where c_{ha} denotes the consumption of household h headed by an individual of age α and with lifetime resources W_h . Taking logs, we have

$$\ln c_{ha} = \ln f_h(a) + \ln W_h$$

This equation holds at the level of the individual, but given its additive structure, it can be averaged over all households of the same age as defined by the head's age in each year, t , which yields the following expression.

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

This treatment allows us to decompose into a wealth term, which is regarded constant within cohorts, and an age term. 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. Deaton and Paxson (1994) considered additional time effects to account for the presence of macroeconomic effects, which cannot be explained by cohort or age

effects. The life cycle model with uncertainty provides some basis to have time effects as once uncertainty is admitted, wealth levels will be revised in response to macroeconomic shocks. While this issue is looked at more closely in the next section, we follow a simple formula as in Deaton and Paxson (1994) in this section.

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

where $b = t - a$. 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.

$$\overline{\ln c_{at}} = D^a \alpha_c + D^b \gamma_c + D^t \theta_c + \varepsilon_c \quad (2)$$

where D^a , D^b , and D^t are matrices of age, year of birth, and year dummies, α_c , γ_c , and θ_c are the corresponding age, cohort, and year effects on consumption, and ε_c is the error term. Each observation in this regression is weighted by the square root of the number of original observations that its average is based on. To exclude unreliable observations, the observations are dropped when the number of original observations is less than 300 per each cohort.

Deaton and Paxson (1994) identify age and cohort effects by imposing a constraint that the year effects must add up to zero and be orthogonal to a time trend. This constraint forces the decomposition to attribute the rising income and consumption to age and cohort effects, not to time. Alternatively, Chamon and Prasad (2008) restrict the cohort effects to add up to zero and be orthogonal to a trend, allowing us to disentangle differences in saving behavior across age while controlling for the economy-wide income level. In the case of the Philippines, the country experienced macroeconomic fluctuations during the sample period, unlike Taipei, China in Deaton and Paxson (1994), where positive GDP growth was steadily recorded during the period. Thus, we believe it is more appropriate to control for the macroeconomic fluctuations while imposing constraint on the cohort effects as in Chamon and Prasad (2008).

Following equation (1), income is similarly estimated using an equation analogous to the one for consumption.⁶

$$\overline{\ln y_{at}} = D^a \alpha_y + D^b \gamma_y + D^t \theta_y + \varepsilon_y \quad (3)$$

where D^a , D^b , and D^t are matrices of age, year of birth, and year dummies as in equation (2), α_y , γ_y , and θ_y are the corresponding age, cohort, and year effects on income, and ε_y is the error term. Saving ratio is measured based on the estimated equations as the difference of the logarithms of income and consumption, or the equation (2)-(3).

⁶ Chamon and Prasad (2008) argue that to the extent the age profile of income is invariant to economic growth, then income can also be expressed as a function of age and lifetime resources.

B. Estimation Results

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 1988. 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 1963 and the year effect at its 1988 level. 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 1988 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 1963.

Figures 10 and 11 show the estimated age, cohort, and time profiles of income, consumption, and saving rates. When estimating these equations, we also include demographic controls. The estimate for Figure 10 includes log (family size) and log (employed members) while that for Figure 11 also includes the share of individuals in the household aged 1–6, 7–14, 15–24, and 25 and above.

1. Age Effects

In both cases, the results confirm that consumption tends to closely track income. The age effects show that income and consumption initially increase slightly with age before steadily declining as one would expect. Figure 10 shows that consumption decreases more than income with age up to about 60 years old before starting to fall. As a result, the age–saving profile indicates that young households initially save moderately before their saving rates start to decline reaching trough at their late 30s, but then saving rates gradually increase reaching its peak around the retirement age. The increase from the late 30s to early 60s is about 5 percentage points. This (shifted) U-shaped pattern of savings is highly unusual and is a striking departure from the traditional hump-shaped pattern as expected from life cycle model.

Nonetheless, the saving rate starts to fall after the retirement age unlike the monotonically increasing saving rate with age with the unconditional mean in Figure 7. This result can be attributed to the controls that are included—family size and number of earners. Given the fact that there are households where grown-up children live with parents, controlling for the number of earners seem particularly important in describing the saving behavior of elderly headed households as discussed in the previous section.

Furthermore, when the demographic factor such as the share of different age family members is also considered, the age-saving profile becomes hump-shaped as shown in Figure 11. The saving rate reaches its peak at the household head's age of about mid-50s, and its trough before the head reaches age 30 and again close to age 70. This result suggests that saving rate is lowest when household heads' age is about 40 because the children's education and associated costs are highest around this time.⁷

⁷ The result holds when we use non-durable consumption instead of the total expenditure.

2. Cohort Effects

The cohort profile of income, consumption, and saving suggest that younger and older cohorts had relatively higher income than those who were in their mid-50s in 1988. The resulting effect on savings suggests that the higher saving cohorts are older cohorts—those that were in their mid-60s in 1988—saving about 2–3 percentage points more than earlier cohorts. This is an interesting result, and may be capturing the fact that those cohorts had lived under a relatively stable economic environment in their working ages, and were unscathed by the economic downturns of the early 1980s and late 1990s.

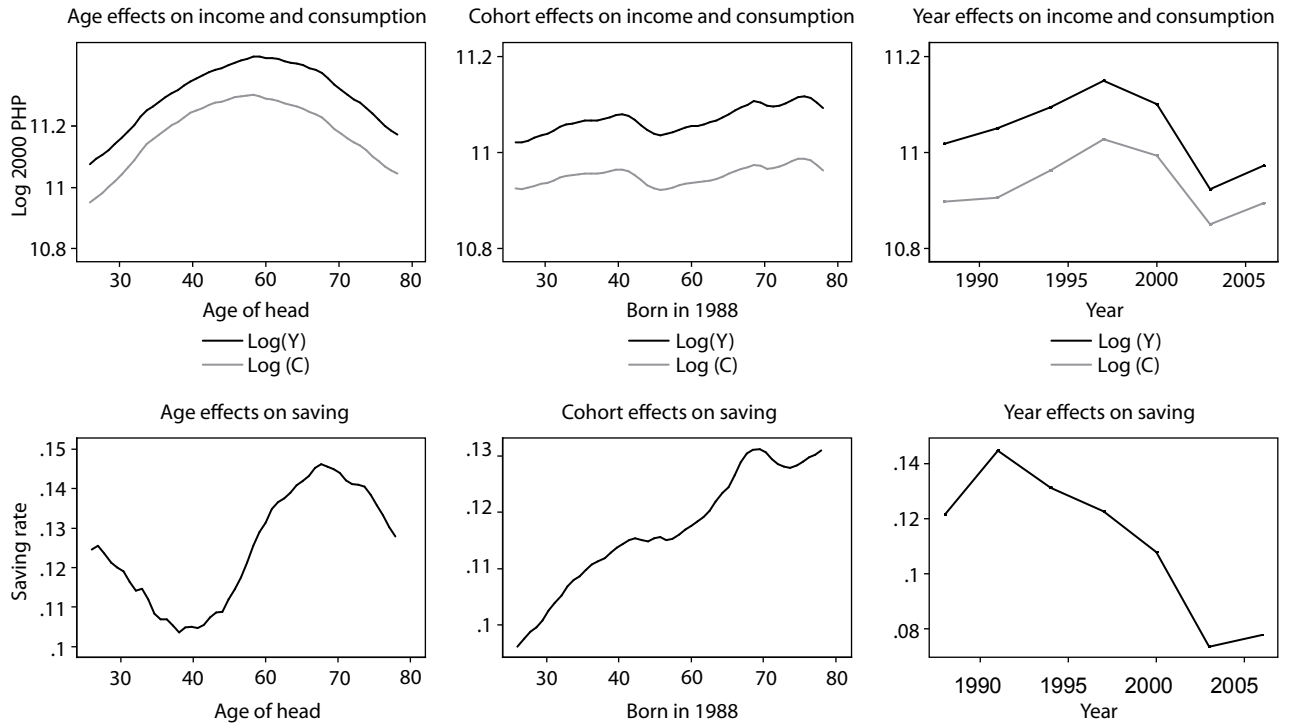
Another likely factor affecting the saving behavior is the development of the social security system in the Philippines. The Social Security Act was enacted in 1954, and implemented in 1957 covering the employed segment of the labor force in the private sector. However, it was only in 1992 that self-employed persons, including farmers and fishermen, were included. Household helpers and informal sector workers who earn at least P1,000 a month were also included by mid-1990s. This expanded coverage of the social security system implies a reduced need for younger cohorts to accumulate precautionary savings.

3. Time Effects

Finally, we turn to the time profile. The unrestricted time effects show a steady increase in both income and consumption until 2000 before both started to point downward. Real consumption grows faster than real income, resulting in a strong declining trend in savings. The time effects explain more than 7 percentage points decrease in the saving rate from 1988 to 2006. Given the fact that demographic characteristics are already controlled for, this is a significant number suggesting a limited role for demographic changes in explaining the decline in Filipino household savings over the last two decades.

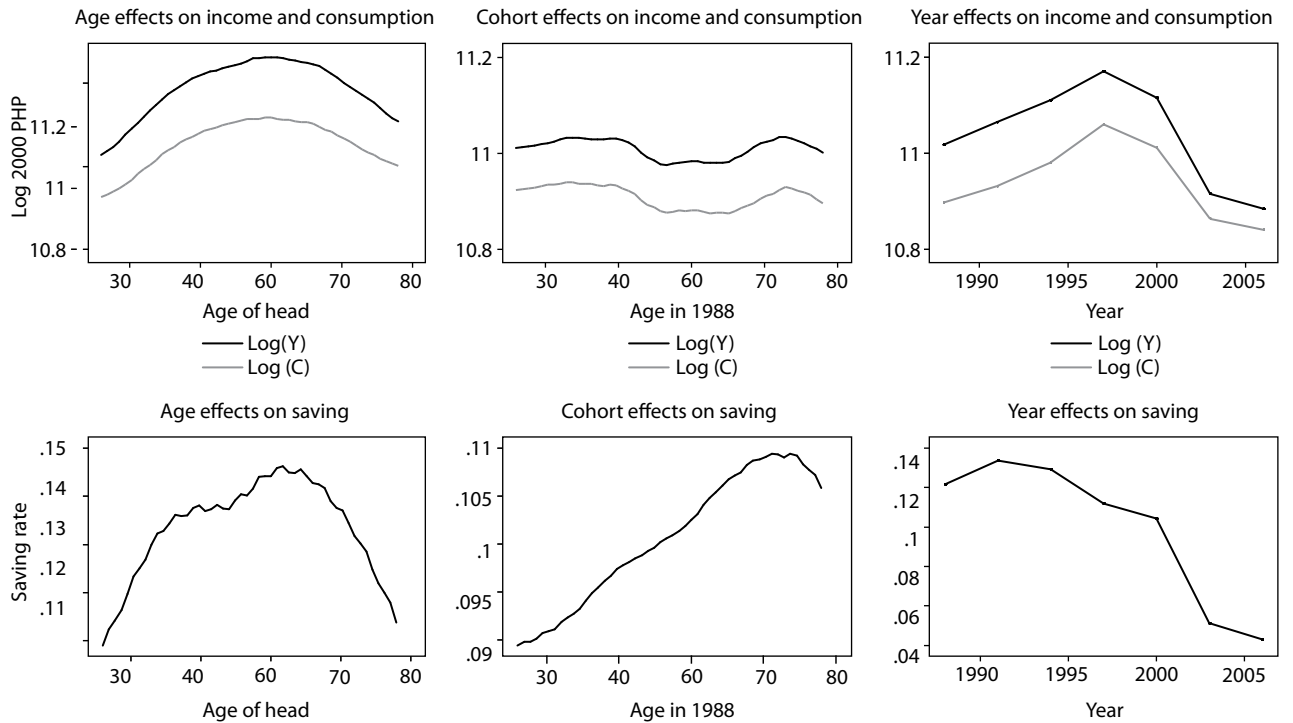
Either aggregate macroeconomic or institutional shifts explain the declining saving rate. One factor might be a higher inflation rate in the 2000s driven mainly by a hike in oil and food prices, and/or negative real interest rate. Alternatively, the saving behavior might have been affected by a shift in a precautionary motive of Filipino households, as also suggested from the cohort effects. One possible explanation is the development of the social security system. For example, the development of the social security system would affect the saving rate if households are less prudent compared to the past. These time series factors are investigated further in the next section.

Figure 10: Age, Cohort, and Year Effects in Consumption, Income, and Saving Rates



Source: FIES, author's calculations.
 Note: Family size and earners are controlled.

Figure 11: Age, Cohort, and Year Effects in Consumption, Income, and Saving Rates



Source: FIES, author's calculations.
 Note: Family size, earners and demographic characteristics are controlled.

IV. Precautionary Motive with Uncertainty in Consumption

Theories of precautionary saving have intuitive appeal and important implications. Deaton (1992) emphasizes that uncertainty may substantially alter consumers' behavior.⁸ Since demographic shifts do not seem to be able to account for the decline in household saving rate with time, we now discuss an alternative hypothesis that could account for the declining time–saving rate profile. As suggested in the previous section, we investigate if there has been a shift in the precautionary motive in the Filipino households and how macroeconomic developments affected the behavior. One would expect a declining saving rate over time if the household saving behavior has been less prudent in the recent years.

The Philippines' Social Security System developed significantly during the 1990s. In particular, the coverage of the system had been extended intensively. As part of the Employees' Compensation Program in 1992, coverage was extended for self-employed workers. In January 1992, compulsory coverage of self-employed farmers and fishermen earning at least P1,500 per month or P18,000 per annum was initiated. Later in the year, voluntary coverage was extended for non-working spouses of Social Security System members (RA 7192 – Women in Nation-Building Act). In 1993, compulsory coverage included household helpers earning at least P1,000 a month. In 1995, voluntary coverage was expanded to overseas contract workers and self-employed persons with a monthly net income of at least P1,000. In 1997, expanded compulsory coverage included self-employed workers and agricultural workers who are not paid any regular daily wage or who do not work an uninterrupted period of at least 6 months, household helpers, parents employed by children, and minors employed by parents.

That saving provides insurance for future contingencies has long been recognized in literature, but this precautionary motive has played a minor role in the empirical investigation of the household saving behavior in general, and Filipino households in particular.⁹ Because of the significant development of the social security system in the Philippines, we estimate relative prudence considering the liquidity constraints in this section.

A. Estimation Methodology and Results

The empirical framework follows Zeldes (1989), where the Lagrange multiplier associated with the liquidity constraint is added to the consumption Euler equation.

⁸ Skinner (1988) derives an approximation for optimal life cycle consumption that implies that, with plausible amounts of income uncertainty and risk aversion, precautionary saving is more than half of total life cycle saving.

⁹ Chou et al. (2003) provides a survey of past theoretical and empirical literature on the issue.

$$U'(c_{i,t}) = \left(\frac{1+r}{1+\delta} \right) E_t [U'(c_{i,t+1})] + \lambda_{i,t},$$

where δ is discount rate, and E_t is the conditional expectation operator, $\lambda_{i,t}$ is the Lagrange multiplier associated with the liquidity constraint. This condition shows that greater uncertainty is linked to greater saving when the third derivative of utility is positive. An increase in uncertainty raises the expected variance of consumption, which in turn implies higher expected marginal utility when marginal utility is convex.

Following Dynan (1993), taking the second-order Taylor approximation of $E_t [U'(c_{i,t+1})]$ around $c_{i,t}$ yields the consumption growth equation as follows.

$$E_t \left(\frac{c_{i,t+1} - c_{i,t}}{c_{i,t}} \right) = \frac{1}{\sigma} \left(\frac{r - \delta}{1 + r} \right) + \frac{\rho}{2} E_t \left[\left(\frac{c_{i,t+1} - c_{i,t}}{c_{i,t}} \right)^2 \right] + \tilde{\lambda}_{i,t}, \quad (4)$$

where σ is the coefficient of relative risk aversion, $-\frac{U''c_{i,t}}{U'}$; ρ is the coefficient of relative prudence, $-\frac{U'''c_{i,t}}{U''}$; and $\tilde{\lambda}_{i,t} \equiv -\left(\frac{1+\delta}{1+r} \right) \frac{\lambda_{i,t}}{c_{i,t}U''}$. $\tilde{\lambda} > 0$ for the liquidity-constrained households in equation (4). If ρ is positive, then higher expected consumption growth (which reflect higher saving) is associated with higher expected squared consumption.¹⁰

Having panel data to test this hypothesis is ideal—however, FIES does not provide the panel data. We therefore follow Deaton (1985) to form time series data from the cross sectional data that we examine from the FIES. Corresponding to individual behavior, a cohort version of the relationship of the same form for 12 regions in the Philippines exists—but “with cohort” means replacing individual observations. We eliminate the cohorts that do not exist for all seven surveys (1988–2006). As a result, the sample of this section has 64 cohorts from a maximum of 12 regions in the Philippines. Those cohorts include the heads who were born from 1910 to 1973.¹¹ We restrict the sample to households whose head is 25–70 years old. Again, each observation in this regression is weighted by the square root of the number of original observations that its average is based on.

Estimation specification uses an initial income as a proxy for $\tilde{\lambda}$ as in Zeldes (1989).

¹⁰ This condition holds for the constant risk aversion utility function and the constant absolute risk aversion function, but does not hold for quadratic utility, by which consumers' utility is affected by the presence of uncertainty, but their behavior does not change in response to it.

¹¹ Durable expenditures are excluded from the analysis because they affect utility for more than one quarter, violating the assumption that utility is time separable.

$$\frac{1}{N} \sum_{t=1}^N \left(\frac{c_{i,t+1} - c_{i,t}}{c_{i,t}} \right) = \beta_0 + \beta_1 \frac{1}{N} \sum_{t=1}^N \left(\frac{c_{i,t+1} - c_{i,t}}{c_{i,t}} \right)^2 + \beta_2 y_{i,0} + \eta_i, \quad (5)$$

where $\beta_0 = \frac{1}{\sigma} \left(\frac{r - \delta}{1 + r} \right)$, $\beta_1 = \frac{\rho}{2}$, N represents the number of periods, $y_{i,0}$ is the initial income, and η_i is the expectation error. The size of ρ determines the strength of the precautionary saving motive. We expect $\beta_2 < 0$ for the constrained and $\beta_2 = 0$ for the unconstrained. We use the instrumental variable technique. Squared consumption growth, which is a proxy variable for uncertainty, is instrumented with the household head's education, property ownership, tax rate, and interest income following Dynan (1993). Interest income earned by a household is a proxy for liquid asset holdings. Cohort dummy variables enter as a taste shifter, and macroeconomic developments are controlled by real interest rate.

Table 4 shows estimation results for the entire sample, and two subsamples. The first stage results show that the instruments explain only a small part of the variability of consumption. The R^2 statistics for the first stage regressions is 0.15 in the case of the entire sample result.

In the second stage, the estimated coefficients on the interest rate terms are small and insignificant as consistent with the past studies, i.e. Dynan (1993) and Zeldes (1989). This result suggests a minor role of macroeconomic development on the declining saving rate. Coefficients on initial income are negative in all three sample periods suggesting that the households are generally financially constrained. The coefficient on the initial income becomes even more negative and significant in the 2000s compared with that in 1990s suggesting that households have become more financially constrained.¹²

The estimated coefficients on the squared consumption growth for the entire sample reveal that risk affects consumption positively and significantly. This is what precautionary hypothesis predicts: households that face more risk save more. The estimated strength of the precautionary motive also appears to be significant and plausible in magnitude.¹³

The sample is then divided into two subsamples to investigate if there has been a shift in precautionary motive in Filipino households. The sample is divided into those up to the 1997 survey, and those after the 2000 survey to see if the precautionary motive was reduced after the social security system extended its coverage in 1990s. The results are interesting and intuitive. The estimation results suggest that the prudence parameter was positive and significant in the 1990s, with risk affecting consumption positively. The

¹² While there are good reasons why liquidity-constrained consumers may generally want to hold saved assets, borrowing restrictions cause only violations of the Euler equation without systematically pointing one direction for saving behavior (Deaton, 1992).

¹³ Mehra and Prescott (1985) cite a variety of studies that conclude that the coefficient of relative risk aversion is at least one, and their own analysis of the historical risk equity premium implies that the coefficient must be much larger than 10. The constant relative risk aversion (CRRA) utility would imply the size of prudence to vary between 2 and 5 corresponding to the coefficient ranging from 1 to 4.

relationship, however, reversed in the 2000s, with risk affecting consumption negatively and significantly. The motive for precautionary savings in the 2000s does not seem to exist, while borrowing constraint remains.

This result may look opposite to what might be expected for a constrained consumer—saving for rainy days. However, our results do explain the behavior of those low-income workers and/or consumers subject to considerable income uncertainty, who obtained access to social security benefits during the 1990s.

Table 4: IV Estimation Result: Consumption Growth

IV Consumption Growth	Whole Sample		2000–2006		1988–1998	
	Coefficient	Standard Errors	Coefficient	Standard Errors	Coefficient	Standard Errors
Square of (Consumption growth)	5.27	(0.69)***	–7.52	(1.91)***	3.32	(0.36)***
Income	–0.04	(0.07)*	–0.47	(0.08)***	–0.10	(0.05*)
Real interest rate	0.00	(0.00)	0.01	(0.01)	0.00	(0.00)
Over Identification	0.19		0.52		0.14	
First Stage R-squared	0.15		0.11		0.2	
Num of Obs	1949		904		1045	

Note: Over identification tests are based on Sargan F-tests.
Results for control variables are now shown to save space.

Source: Author's calculations.

V. Robust Analyses

A. Habit Formation

While the previous section provides a plausible explanation on why household saving rate fell particularly in the 2000s, there are other possible explanations. One possibility is a habit formation. Habit formation implies that consumption reacts slowly to declining income; this could explain why saving rates may decline during the period of stagnant income growth.¹⁴

Habit formation implies that current consumption growth is positively correlated with past consumption growth. Following Dynan (2000), we estimate the following equation:

$$\frac{1}{N} \sum_{t=1}^N \left(\frac{c_{i,t+1} - c_{i,t}}{c_{i,t}} \right) = \beta_0 + \beta_1 \frac{1}{N} \sum_{t=1}^N \left(\frac{c_{i,t} - c_{i,t-1}}{c_{i,t-1}} \right) + \beta_2 \theta_{i,t} + \eta_{i,t}, \quad (6)$$

Where $\theta_{i,t}$ is a vector of household characteristics including log (family size), share of different-age family members, and regional, cohort, and year dummies. We estimate this regression using the same data constructed in the previous section. We initially estimate

¹⁴ This hypothesis has been often used to explain why rapidly growing countries have high saving rates (Carroll and Weil 1994). However, the evidence in favor of it is weaker in household data (Dynan, 2000; Rhee, 2004).

this regression using OLS and also instrumental variable technique by instrumenting the first lag consumption growth with its third lag. The estimated coefficients on lagged consumption are always negative. That is, when a household experiences consumption growth above conditional average, it tends to have consumption growth below average in the following period, and vice-versa, in contrast to what the habit formation would predict.

Our estimates may be influenced by measurement error in consumption, which could bias the estimates downward. The estimation using errors-in-variable also yielded significant negative coefficient on the lagged consumption growth suggests that the habit formation is less likely to be a robust explanation to the declining time-saving rate profile.

B. Composite Sketch

As Deaton (1985) discusses, the way we construct the time series data of consumption and income from the cross-sectional surveys could introduce errors in variables.

Therefore, we now investigate the role of social security system using more direct measures as a robustness check. We estimate composite median regression (quantile regressions estimated at the median) for the household saving rate using the following controls:

- Dummies for the age of the head of households being 25–29, 30–34, ..., 60–64, and 65–69 years old, the log of household size, the share of household members aged 1–7, 8–15, 16–24, and 25 and above. These controls can inform us about how the presence of elderly persons and children of different ages affects saving rate, helping us to gauge saving motives related to future expenditures on health and education.
- Log of disposable income as well as dummies for education and regions are included. The dummies can capture the permanent income of a household with given characteristics.¹⁵
- Home ownership dummy, which is equal to one if the household owns its dwelling, is also included.
- Social security coverage ratio as in Table 1 is included to see if the expanded coverage acts to reduce the household saving rate.

Table 5 presents the regression results. We first present the results from a specification including only the income and demographic controls, and then a second specification that also controls for home ownership and social security system coverage ratio. We then split the sample into two subgroups, namely 1988–1997 and 2000–2006 to gauge a possible shift in coefficients. The results are interesting and intuitive.

¹⁵ Times dummies are not included as they have a multi-collinear problem with the coverage ratio variable.

Table 5: Median Regressions for the Saving Rate

Saving Rate	Entire sample			Entire sample			1988–1997			2000–2006		
	Coefficient	Standard Errors		Coefficient	Standard Errors		Coefficient	Standard Errors		Coefficient	Standard Errors	
Log (income)	0.17	(0.00)***		0.17	(0.00)***		0.18	(0.00)***		0.18	(0.00)***	
Home ownership				0.03	(0.00)***		0.03	(0.00)***		0.02	(0.00)***	
SSS Coverage ratio				-0.24	(0.01)***		-0.22	(0.01)***		0.23	(0.17)	
Share aged 25 or above	-0.05	(0.01)***		-0.05	(0.01)***		-0.07	(0.02)***		-0.04	(0.02)	
Share aged 2–7	0.05	(0.01)***		0.04	(0.01)***		0.03	(0.02)**		0.07	(0.02)**	
Share aged 8–15	-0.02	(0.01)		-0.03	(0.01)**		-0.04	(0.01)**		-0.02	(0.02)	
Share aged 16–24	-0.07	(0.01)***		-0.08	(0.01)***		-0.09	(0.02)***		-0.07	(0.02)***	
Log (Number of employed members)	0.06	(0.00)***		0.07	(0.00)***		0.07	(0.00)***		0.07	(0.00)***	
Log (Household size)	-0.12	(0.00)***		-0.12	(0.00)***		-0.12	(0.00)***		-0.11	(0.00)***	
Age 31–35	0.00	(0.00)		0.00	(0.00)		0.01	(0.00)		-0.02	(0.01)**	
Age 36–40	-0.01	(0.00)**		-0.01	(0.00)*		0.00	(0.00)		-0.02	(0.01)***	
Age 41–45	-0.02	(0.00)***		-0.01	(0.00)***		-0.01	(0.00)**		-0.02	(0.01)***	
Age 46–50	-0.02	(0.00)***		-0.01	(0.00)***		0.00	(0.00)		-0.02	(0.01)***	
Age 51–55	-0.01	(0.00)***		-0.01	(0.00)*		0.00	(0.00)		-0.01	(0.01)**	
Age 56–60	0.00	(0.00)		0.00	(0.00)		0.00	(0.00)		-0.01	(0.01)	
Age 61–65	0.00	(0.00)		0.00	(0.00)		0.00	(0.00)		-0.01	(0.01)	
Age 66–70	0.00	(0.00)		0.00	(0.00)		0.00	(0.00)		-0.01	(0.01)	
Constant	-1.78	(0.02)***		-1.68	(0.02)***		-1.73	(0.02)***		-2.03	(0.13)***	
Num of Obs.	143749			143749			98780			44969		

Notes: All specifications include dummies for regions (16 categories) and the head education (6 categories).
Source: Author's calculations.

The social security system coverage ratio turned out to be significant and negative in affecting the saving rate. This result suggests that higher coverage ratio is associated with lower saving rate as one would expect. Furthermore, when looking at subsamples, this negative relationship between the coverage ratio and the saving ratio is only present in the 1990s and the coefficient on the coverage ratio is insignificant in the 2000s sample period. This shift in the coefficients implies that once the coverage rate is sufficiently high, the variable per se would not affect the household saving behavior any more, and that it would be the altered saving behavior—whether prudent or not—that affects the saving rate.

Another possible factor that is examined in this analysis is the role of home ownership. Given the increasing home ownership in the Philippines, one might expect that households that already own their dwellings are less motivated to save. However, the result suggests that households that own their homes save about 3 percentage points more of their income in the surveyed period. The sign is opposite of what one would expect based on our contention of household saving for house purchases. This effect seems stably significant regardless of the sample period, suggesting that this is not the factor affecting the declining saving rate. Chamon and Prasad (2008) also find significant positive impacts of home ownership on the household saving rate in the People's Republic of China (PRC). They argue that the reason might be that much of the housing stock is unappealing and many households may be saving to improve and/or purchase new dwellings.¹⁶

Other demographic controls are reasonable and yield expected signs. The effect of income on the saving rate is positive and virtually remains stable over time. The age dummies confirm that household heads in their 40s save about 2 percentage points less than households with young heads. Households with a higher share of members aged 15 to 24 save much less, suggesting high education expenditures.

VI. Concluding Remarks

This paper explains why the average household saving rate in the Philippines declined substantially in the 2000s. Using data from income and expenditure survey at households, this paper explains why households' consumption growth has been higher than income growth, resulting in declining saving rate over time. Tracing cohorts over time indicates that saving declined across all demographic groups.

The extension of social security coverage can substantially reduce uncertainty about out-of-pocket expenditures, and thus reduce households' precautionary saving motive.

¹⁶ This issue can be addressed once we take into account the value of the housing, which indicates the quality of dwellings. This is left for future research.

An examination of the effect of social security on Filipino households' saving and consumption behaviors suggests that households significantly reduced their saving and increased their consumption when the coverage was extended to a larger set of work force. These results are robust to alternative specifications.

Contrary to what was generally believed, our decomposition analysis suggests that demographic factors do not explain the declining time-saving rate profile. On the other hand, we find that the declining saving rate is associated with the changing precautionary motives of Filipino households. Our empirical results are consistent with studies that have found that coverage by social programs, such as disability insurance (Kantor and Fishback, 1996), unemployment insurance (Engen and Gruber, 2001), Medicaid (Gruber and Yelowitz, 1999), and health insurance (Chou et al, 2003), are negatively associated with saving.

We find that the precautionary saving was strong in the 1990s when the coverage of the social security system was still limited. However, the precautionary motive does not seem to be present in the 2000s. This result is also supported by the median regression results using a more direct measure of the social security coverage ratio. Our evidence supports the contention that precautionary motives are an important determinant of saving. Our findings suggest that the expansion of social security coverage will contribute significantly to the decline in private saving.

This paper's finding sheds some lights on pending issues in rebalancing growth in Asia. Jha et al. (2009) argue that increasing uncertainty has contributed substantially to the high household saving rate in the PRC. The excessive level of savings in Asia, and the PRC, in particular, has been cited as a cause for the global imbalance. The finding of this paper confirms the notion that reduced uncertainty in future expenditure due to developed social security system is important in affecting household saving behavior.

Data Appendix 1

Survey Design

The Family Income and Expenditure Survey adopts the “shuttle type” of data collection wherein the samples are interviewed in two occasions using the same questionnaire. The first interview is usually done in July of the reference year to gather data for the first 6 months of the year (January to June). The second interview is done January of the following year, to account for the last 6 months (July to December). The scheme is done to minimize memory bias and to capture the seasonality of income and expenditure patterns. Annual data is estimated by combining the results of the first and second visits.

Throughout the seven surveys, the concept of “average week” consumption for all food items was used. Moreover, the reference period for “Fuel, Light, and Water,” “Transportation and Communication,” “Household Operations,” and “Personal Care and Effects” is limited to the “past month” and in some specified cases to “average month”. For all other expenditure groups, the “past 6 months” is used as reference period. Estimates of income and expenditures in kind are estimated based on prevailing market prices.

Sampling Design

The Family Income and Expenditure Survey uses a 2-stage cluster sampling design. The primary sampling units are the barangays, while the households in the selected barangays comprise the secondary sampling units.

Table A1: Average Expenditure Shares (%)

	1988	1991	1994	1997	2000	2003	2006
Food	58.1	57.1	56.4	54.3	53.4	51.5	50.0
Alcoholic beverages	1.2	1.2	1.1	1.1	0.9	1.0	0.9
Tobacco	2.4	2.1	1.8	1.8	1.5	1.6	1.3
Fuel, light, and water	5.7	6.1	5.8	5.7	6.7	6.8	7.8
Transportation and communication	3.5	3.8	3.5	3.8	4.6	5.4	6.2
Household operation	2.3	2.6	2.4	2.0	1.8	1.8	1.9
Personal care and effects	3.2	3.2	3.3	3.3	3.7	4.0	3.9
Clothing and footwear	4.2	3.8	3.5	3.3	2.6	2.8	2.3
Education	2.0	2.1	2.5	2.5	2.9	2.6	2.8
Recreation	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Medical care	1.4	1.5	1.8	1.7	1.5	1.8	2.1
Non-durable furnishing	0.3	0.3	0.4	0.3	0.2	0.2	0.2
Durable furniture	1.0	1.0	1.4	1.7	1.2	1.5	1.5
Tax	0.4	0.7	0.6	1.0	1.0	1.0	0.8
Rental	9.0	9.4	10.0	10.5	11.2	11.3	11.3
Housing maintenance and repairs	1.0	1.0	1.0	1.0	0.7	0.6	0.5
Special occasions	1.9	2.0	2.3	2.2	2.1	2.2	2.4
Gifts and contributions to others	0.8	0.8	0.8	0.7	0.7	0.9	1.0
Other expenditures	1.1	0.9	1.1	2.8	2.8	2.8	2.8
Total expenditures	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Average expenditure share for all households.

Source: FIES.

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About the Paper

Akiko Terada-Hagiwara notes that the average household saving rate in the Philippines declined sharply to about a mere 5% of disposable income by 2006. A simple test that provides the strength of the precautionary saving motive yields a plausible explanation that households are financially constrained and less prudent in the recent years. This paper argues that these patterns are best explained by the extended coverage of social security system during the 1990s in the Philippines.

About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries substantially reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to two-thirds of the world's poor: 1.8 billion people who live on less than \$2 a day, with 903 million struggling on less than \$1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.