Households' Consumption under the Habit Formation Hypothesis. Evidence from Italian Households using the Survey of Household Income and Wealth (SHIW)

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Abstract

This paper explores the mis-specification of preferences as a cause of the poor empirical performance of the traditional Life Cycle/Permanent Income model in explaining Italian households' consumption decisions. Consumption profiles generated under strict life cycle models could be hardly reconciled with those exhibited by Italian households.
We estimate how household consumption evolves over time by using an Euler equation approach, enriched both for the presence of habit formation in households' preferences and uncertainty. We test its performance by using a GMM estimation strategy. Our results prove that ignoring habit persistence can lead to misleading results in interpreting the determinants of consumption.

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1. Introduction

There are several reasons why the study of households' saving and consumption behaviour is interesting. As Deaton (1992) puts it 'If we believe that saving generates growth, and since there are close links between household and national saving rates.. then it is at the determinants of household saving that we must look if we are to understand economic growth'[1]. Saving is also of crucial relevance for understanding how people deal with fluctuations in their incomes. Different forms of uncertainty –on demographic, social and economic future conditions- influence households' decisions, by adding variability to the expected flow of incomes. Saving is one means of freeing desired expenditures from income fluctuations. By putting aside some resources during good times, people can accumulate assets for use in bad times. As the timing of resource availability often differs from the timing of households' needs, obtaining loans from financial institutions or resorting to intergenerational transfers can help fill the timing gap.

The most famous of the theories formalising this trade-off between consuming today or postponing consumption to future periods is the life cycle-permanent income model (LCPIH). Assuming free access of all agents to the credit market, perfect certainty, and the equality between the subjective discount factor and the interest rate, it is possible to derive a closed-form solution for consumption from this model. This shows that optimal consumption should be kept constant over time[2]. The main prediction of the LCPIH model is, therefore, that consumption changes should be independent on the variables in the information set of the consumer, including current and lagged values of disposable income.

[1] See Deaton (1992) and Deaton Grosch (2000) for a comprehensive survey on consumption decisions.
[2] In a situation of uncertainty, the same result can be achieved with a quadratic utility function.

In the stripped down LCPIH model, people receive constant labour income only until their retirement age, but keep their consumption stable over their entire lives. As a result, households exhibit positive saving rates when young and become dissavers during retirement. Thus, households' asset should increase till the retirement age and decrease till it dissolves at the end of the life cycle in the absence of bequests (households could not die in debt as this would violate the no Ponzi game conditions under which the optimal rule would be to get infinite indebtedness). The main prediction of the LCPIH, stating that households' consumption should be detached from income, has been tested several times, both by using the Euler equation approach and by estimating consumption in its level. The evidence suggests that it is difficult to reconcile the LCPIH predictions with modern developed societies.

The introduction of compulsory national pension schemes makes the voluntary long-term saving plan for retirement redundant, in particular in those countries where retirement pensions replace incomes at a very high rate (such as in Italy, Germany, the Netherlands). As underlined by Pemberton (1997), if the life cycle model holds, we should find evidence of a continuous decrease in the level of individual wealth, once the retirement age approaches. Pemberton (1997) considers the fraction of total wealth (excluding pension wealth) over the total level of income for the U.K. and compares those values with the ones he derived from a pure life cycle behaviour. The comparison highlights a huge gap between the real values and the ones predicted by the life cycle model. The basic specification of the model, therefore, is not supported by the data, which show, if any, a very smooth decline in wealth after the retirement age, in contrast with the sharp decrease that pensioners should present.

In this paper, we focus on more realistic models that generalize the life cycle/permanent income hypothesis by introducing habit persistence in preferences in an uncertain environment. Replacing the quadratic utility function with a negative exponential utility function, Caballero (1990) derives a closed-form solution for consumption, in the presence of uncertainty. Alessie and Lusardi (1997) generalise Caballero's model (1990) by allowing for habit formation. They show that in this generalised model, consumption depends not only on permanent income and labour income risk, but also on past consumption. The negative exponential utility function, however, is not a satisfactory representation of preferences because it does not rule out the possibility of negative consumption.

By considering a broader context of non-expected utility functions, which comprehends expected utility as a special case, Weil (1993) studies a hybrid case in which preferences are isoelastic intertemporally, but exponential with respect to the risk component. In the presence of non-diversifiable labour income uncertainty, he obtains a closed-form solution for consumption[3]. This form of preferences is more general as it allows the intertemporal substitution elasticity to be disentangled from the risk aversion parameter.

We estimate the presence of habit formation in consumption decisions by using the closed form solution of consumption developed in Guariglia and Rossi (2003). The closed form solution of consumption obtained is a weighted function of permanent income and past level of consumption, similarly to that obatined by Alessie and Lusardi (1997). We then estimate the Euler equation corresponding to the solution of consumption obtained by using data from the Italian Survey of Household Income and Wealth for the period 1989-2000.

The rest of this paper is laid out as follows. In Section 2, we describe the theoretical basis of the Life cycle model from which we depart. Section 3 describes the patterns of

[3] In a similar context, Van der Ploeg (1993) considers another type of hybrid preference function, where preferences are quadratic intertemporally and exponential with respect to risk.

Italian households' consumption. The data are described and the empirical results are shown in section 4 and 5, respectively.

2. The life cycle/permanent income theoretical framework

2.1. Consumption behaviour. A general view

Modern theories on consumption start with Keynesian models. In these models, consumption is a constant fraction of disposable income, and saving is just seen as a residual, once the level of consumption is determined. There is no trade-off between resources consumed today and resources left for consumption tomorrow through saving. Later theoretical frameworks formalise this trade-off by assuming an intertemporal optimisation behaviour of rational economic agents (consumers). The intertemporal context in consumption analysis arises from the concept of consuming itself. In fact, the act of consuming implies the choice between how many resources to spend today as opposed to the resources to retain for the future.

The most famous of the theories formalising this intertemporal choice is the LCPIH. This model was launched by the seminal works of Modigliani and Brumberg (1954) and Friedman (1957).

The stripped down life cycle theory assumes perfect capital markets. If there is no uncertainty about the future, consumers face a known stream of future incomes and interest rates, both of which determine the life cycle budget constraint. This constraint requires that the life cycle flow of discounted levels of income should not be bigger than the total flow of discounted levels of consumption. This is equivalent to saying that the consumer cannot die in debt, although s/he can borrow any amount of money during his/her life span (also known as the no-Ponzi game condition).

By maximising the utility function with respect to consumption, the first order conditions of this problem suggest that marginal utility is kept constant over time if the interest rate equals the subjective discount rate, as follows:

$$(1) \qquad u'(c_{t+1}) = u'(c_t)\left(\frac{1+\delta}{1+r}\right)$$

The optimal solution to this problem entails that agents try to smooth consumption over time in order to keep their marginal utility constant across different periods. The flow of incomes being positive, or higher, during their working lives, individuals save during middle age in order to face the expected future decline in income during retirement. On the other hand, when young, they borrow against future increases in income to keep a flat profile of consumption streams. The profile of saving and wealth should therefore be inversely U shaped, while consumption should follow a flat path.

The failure of the empirical performance of the basic model has enhanced the development of possible theoretical explanations able to capture paths of consumption different from those predicted by the standard LCPIH. While the empirical failure of the LCPIH is well established, the reason for this failure is not (Shea, 1995). The most frequently cited explanations for this failure are the presence of uncertainty, imperfections in the credit market (liquidity constraints), and the mis-specification of preferences, all these causes forcing consumption to follow a different track from the one predicted by the life cycle theory.

When uncertainty is taken into account, precaution enters the determinants of consumption, unless the utility function is quadratic. By using more plausible utility functions, we can derive that prudence is affecting consumption decisions, by increasing the amount of saving. Even if the amount of uncertainty is small, the conclusions of models assuming perfect certainty can be seriously misleading. If allowing for the presence of precaution leads to more general results, the drawback is that the non-tractability of these problems leads to an inability to find a closed form solution for the model and only numerical simulation methods can help track consumption profiles.

Liquidity constraints arise in the case of imperfect and incomplete information in the capital market. With asymmetric information (Stiglitz and Weiss, 1981, 1983), a borrower may not be able to convince a lender that s/he will repay his/her debt, a debt that is necessary to reach the optimal level of consumption. The consumer will therefore face, in the above case, borrowing constraints, forcing him to choose the constrained consumption instead of the optimal one, and, therefore, lowering his/her achieved utility. As constrained consumers cannot obtain loans or, if they do, the loan is inferior to the amount necessary, they experience excessive fluctuations in their consumption levels when their current income is below their permanent one. Under the hypothesis of liquidity constraints, consumption growth should be sensitive only to predicted increases in income, as nothing prevents consumers from smoothing consumption by saving if they expect a decrease in their future earnings. As a result, those consumers who have restricted access to the credit market should exhibit a consumption growth path that is only affected by expected increases in disposable income. On the other hand, consumers who have free access to credit should follow the traditional life-cycle predictions. However, according to Garcia et al. (1997), and Shea (1995), unconstrained consumers' expenditures appear to be affected by negative realisations of income. The presence of asymmetric preferences is the most plausible explanation for this finding. If consumers are averse to negative income changes, they will not revise their consumption downward in anticipation of negative income shocks, hoping that the shocks will not occur. Only when the shocks effectively take place, will they adjust their consumption (see Tversky and Kahneman, 1991; and Browman et al., 1993). These models allow for inertial consumption behaviour by assuming that households' utility depends not only on the level of consumption in each period, but also on the levels in previous periods. In other words, they allow for 'habit formation' implying that consumers' preferences are not time-separable. If preferences exhibit inertia, as in the case of habit formation, then households will adjust their consumption slowly to permanent income shocks[4]. In this case, the correlation between lagged variables and consumption changes is easily explained (Deaton, 1992). If habit determines consumption decisions, the hypothesis of separability in the utility function drops in favour of an alternative specification that includes the stock of habit.

The temporal dependency of preferences is generally captured in two different ways. The first one uses a stock of habit, -'habit stock'-; the other one is a short memory model that includes only the last period consumption in forming habit.

A great deal of empirical literature has investigated the empirical acceptance of the main implications of the life cycle theoretical background. Both time series data (Hall, 1978; Flavin, 1981...), and panel data (Hall and Mishkin, 1982; Zeldes, 1989; Runkle, 1991...) have been used to carry out the empirical tests. The main empirical findings were that income tracks consumption too closely to be able to confirm the life cycle consumption theory prediction, according to which consumption should be the annuity value of the total life resources (human and financial assets).

The renewed interest in habit persistence has been motivated by the poor empirical performance of the time separable utility models. Both within a macro and micro

[4] See for instance Meghir and Weber (1996), and Carroll et al. (1994).

framework, the habit formation hypothesis has been proposed in several theoretical models. With respect to the former, habit formation has been used as an explanation for the equity premium puzzle by, among others, Abel (1999) and Costantinides (1990). Moreover, Carroll, Overland and Weil (2000) argue that the cause of high levels of saving in the presence of high growth can be imputed to the presence of habit formation in preferences. Finally, Furher (2000) imputes to habit formation the reason for the 'excess smoothness in consumption'. These studies, based on aggregate data, conclude that serial correlation in consumption is due to different causes indifferent to preferences. For example, time average of aggregate data could lead to positive serial correlation as well as aggregation across individuals (Gali, 1990 and Clarida 1991).

At a micro level, there is a lack of empirical evidence on habit persistence in determining consumption decisions, presumably due to the limited information datasets usually contain on consumption. Exceptions in the recent microeconomic literature on habit persistence are the papers of Meghir and Weber (1996), Dynan (2000), Naik and Moore (1996) on American data, Guariglia and Rossi (2002) on British data and Carrasco et al. (2002) on Spanish data. Dynan and Naik and Moore use the Panel Study of Income Dynamics (PSID) and test the mis-specification of preferences due to habit forming on food consumption. Their findings do not show a significant effect of habit on consumption decisions. These types of analysis, however, require the assumption of separability in preferences between food consumption and other types of non-durable consumption goods. Unfortunately, as emphasized by Attanasio and Weber (1995), time separability between food consumption and other types of non-durable consumption have not been supported empirically.

Meghir and Weber (1996), using the Consumer Expenditure Survey, do not find support for habit persistence in the consumption decisions on food, transport and services.

Carrasco et al. (2002) find evidence in support of non separability of preferences, once time invariant unobserved heterogeneity is taken into account. Their results yield evidence of habit formation for food consumption and transport.

To my knowledge, consumption behaviour under the hypothesis of habit forming, with reference to Italian households has not been analysed yet.

Italy is an example of a country where rapid growth seems to have enhanced savings. This behaviour would be considered inconsistent within the standard life cycle/permanent income model. According to the LCPIH model, savings should be uncorrelated with the level of permanent income. Italian households' savings patterns can not be reconciled with a strict life cycle behaviour, according to which much lower levels of savings should be predicted. A possible way to reconcile the stylised facts with the economic rationale of consumption choices is by introducing habit formation in preferences.

3. Italian households' Consumption and Savings patterns. The last decade

According to the main prediction of the life cycle theory, households are net savers during their working years, and dissavers during retirement. While the elderly sell their assets to finance their consumption, the young accumulate assets to finance their retirement. Provided that there is neither population growth nor income growth, net aggregate saving in the economy as a whole should be nil.

In presence of either population growth or income growth, net aggregate saving should be positive reflecting the lower lifetime wealth of the elderly, who represent a smaller fraction of the population than the young.

Italy has been usually associated with Japan in terms of (high) saving rate. Italian households, despite the fact that their saving rates have declined during the last two decades, have showed a considerably higher propensity to save than other developed countries. In contrast with American households, Italian households exhibit a saving rate, which is hard to reconcile with a life cycle behaviour *tout court.* As highlighted by Deaton and Grosh (2000), 'life cycle model tends to overstate the degree to which consumption is in fact detached from income over the life cycle, and that aside from institutionalised employer or national pension schemes, relatively few households undertake the long-term saving and dissaving that is predicted by the model'. Italian households' saving rates still show peculiarly high levels compared to other developed countries with similar demographic and economic features. Moreover, the correlation between saving and growth is stronger in Italy than in countries at comparable stages of economic development (Guiso et al. 1994).

Several studies (among them, Guiso et al. 1992) point out that casual capital market imperfections could be responsible for the excessive closeness of consumption profiles to income ones. In fact, an economy where households are constrained on the credit market saves at a more sustained rate than an economy without frictions in the credit market, even in the case of equal growth in the two economies. In Italy, the degree of development of the credit and financial markets is by far the lowest among the major developed countries. High downpayment ratios for home purchase, other than high interest rate spread, act as a significant constraint in having access to credit, therefore generating additional savings. In the last two decades, the average downpayment ratio in Italy was around 40 or 50 percent, as opposed to 20 percent in the US and Canada, 15 percent in the UK, 20 percent in Finland and Sweden, and 35 percent in Japan. Moreover, the typical duration of a loan in Italy was much shorter (20 years) than in other countries with a similar level of development (30 – 40 years) (Jappelli and Pistaferri 2002). One crucial objection to considering liquidity constraints as determinants of households' saving attitudes is that the public sector with its generosity and the informal transfers among generations may help households circumvent liquidity constraints. However, as suggested by Guiso et al. (1994), in most types of public expenditures on social programmes, Italy is not among the OECD leaders. On the other hand, the ratio of pension benefits to GDP is one of the highest in the OECD countries. In this respect, however, the generosity of a social security system is often advocated to explain a low asset accumulation instead of a high saving rate.

Income risk could potentially represent another source of explanation for the Italian households' over-saving. According to the precautionary theory of saving, income risk prompts wealth accumulation if individuals are risk averse. In Italy, however, Jappelli and Pistaferri (1999) show that the subjective income risk is perceived by individuals as systematically lower than that perceived in the US. The reason for these findings could possibly be attributed to the higher security characterizing the Italian with respect to the American labour market.

Various attempts have been made to estimate the significance of precautionary saving in explaining the wealth accumulation process (see among others Lusardi 1997, Jappelli and Pistaferri 2000). All these studies highlight the significant role of income uncertainty in explaining household saving decisions, but a modest overall importance of the precautionary motive for saving.

3.1. Theoretical background

The basic hypothesis in consumer's theory is that utility increases in its argument (consumption), also known as 'more is better'. The higher the level of consumption, the higher the benefit obtained by the agent. In the past two decades, several studies have exploited the panel structure of data available to test the validity of life cycle. Most of these studies assume that preferences have the property of time-separability. This assumption implies that consumption decisions do not suffer from persistence or any form of comparison, neither with regard to peers nor with their own habits. In a more realistic picture, individuals form their preferences over time, being not immune to comparisons, both with peers and with their own past consumption decisions. The importance of habit can be traced back to James S. Duesenberry (1952) who incorporated habits in consumption behaviour. According to Duesemberry, once consumption habits are formed, it is not that easy to break away from them. The literature usually makes a distinction between two forms of habits. 'Internal habits' refer to the influence of our own past choices on our current behaviour, while 'external habits' arise when the consumption level of an individual is affected by the consumption choices of his/her social environment.

In this paper we focus on how current consumption decisions are affected by own past consumption. Thus, the issue of external habit is not addressed in our model.

In the most general specification current and past consumption levels contribute to form a stock of habit, S, as follows:

(2) $S_t=(1-\Theta)S_{t-1}+c_{t-1}$ with $0<\Theta<=1$

The stock is augmenting by the purchase of the past consumption but depreciating at the rate Θ. The stock of habits in (2) has a long "memory" as all past consumption levels contribute to form the stock of habit. If the parameter Θ is equal to one, we have the simplest case of habit, in which only consumption in the previous period influences current consumption decisions. The closer is Θ to zero, the larger the weight that we are attributing to past consumption in forming our habits.

With habit formation the utility function argument, at time t, includes not only current consumption level but also the stock of habits, S_t, as follows:

$$(3)\ U_t = U(c_t - \gamma S_t)$$

If γ is positive, utility is decreasing in S: this is the case of habit. If the stock of habit increases, the same quantity of resources consumed during each period provides less and less satisfaction to the consumer. On the other hand, if γ is negative we can interpret S as the service flow from past consumption. Therefore, in this case, the utility function incorporates durability of consumption. In the durable case, consumption over periods is a substitute instead of a complement. The sign of the parameter γ reveals whether households exhibit durability or persistence in their habits.

The model we use to estimate the Euler equation for non-durable consumption, departs from Weil's one (1993) and enriches it to allow for 'internal' habit formation. While traditional models involve time-additive expected utility functions and cannot distinguish between intertemporal substitution and risk aversion parameter, being able to disentangle them is the crucial relevance of the Epstein and Zin (1991) work, which has been used by Weil to derive the consumption rule under uncertainty.

The framework of time additive felicity function mixes the notion of risk aversion with the intertemporal substitution one. In the expected utility function framework, in fact, the concept of risk aversion and the intertemporal rate of substitution are inversely related. In particular, in the case of CRRA function the former is the reciprocal of the latter.

Attanasio and Weber (1989) showed that the non–expected utility structure of preferences can be very promising in the financial area. As stated by Attanasio and Weber, the contemporaneous presence of a high risk premium and a low interest rate is not coherent with the equality among the expected real rate of return, postulated by the joint hypothesis of efficient market and neutrality risk.

A way of reconciling the simultaneous presence of the high risk premium and low interest rate goes through the non-expected utility framework introduced by Kreps and Porteus (1978) (See also Epstein, Zin, 1989). They suggest an elegant axiomatisation that allows disentangling the intertemporal substitution from the risk aversion factor. Within this context, the property of time consistency is still maintained. The two authors also show that, in this case, the temporal resolution of uncertainty is also important. In particular, the Kreps Porteus approach collapses to the expected utility framework only if the assumption of indifference with respect to time resolution is introduced[5].

We estimate how consumption evolves over time by using the closed form solution derived in Guariglia and Rossi (2002), which is a generalisation of Weil's (1993) model, and by allowing for habit formation. Rather than being defined in terms of consumption (c_t) as in Weil (1993), the model in Guariglia and Rossi (2002) focuses on c^*_t, as the argument of the utility function, which is given by $c_t-\gamma c_{t-1}$ The value of γ represents the

[5] The effects of interest rate on consumption has been also recently estimated for the UK on the basis of a non-expected utility approach in order to test whether the equity premium puzzle could have been explained within this framework (Price, 1998).

force of habit in the consumption decisions of the household. If γ is positive, the model exhibits habit formation in a traditional sense. In this case, as Deaton (1992) puts it "the larger the γ, the less the pleasure from a given amount of consumption, and the larger must be the purchases to generate the same benefit" (p. 30). On the other hand, a negative γ implies that the households' decisions are subject to durability, in the sense that not only current, but also past consumption generates utility.

Let us denote with c_t, a_t and y_t respectively a representative agent's consumption, his/her total resources[6], and his/her labour income at time t. δ is the agent's subjective discount factor; and R, the interest factor. The agent has preferences characterised by a constant elasticity of intertemporal substitution equal to $1/\alpha$.

The income process is characterised as follows:

(4) $$y_{t+1} = \rho y_t + (1-\rho)\hat{y} + \varepsilon_{t+1} \ ,$$

where $\hat{y}$ represents the predicted component of labour income, and where the error term, ε_{t+1}, is i.i.d., normally distributed and has mean 0 and variance σ^2. The closed form solution of consumption to this problem, as in Guariglia and Rossi (2002), is given as follows:

(5)

$$c_t = \left(1 - R^{1-\alpha/\alpha}\delta^{1/\alpha}\right)\left(1-\frac{\gamma}{R}\right)\left[a_t + \frac{1}{R-\rho}\rho y_t + \frac{1}{R-\rho}\frac{R}{R-1}\left((1-\rho)\hat{y} + \varepsilon^*\right)\right] + \left(R^{1-\alpha/\alpha}\delta^{1/\alpha}\right)\gamma c_{t-1}$$

[6] Total resources are given by financial wealth, interest, and labour income.

The consumption equation in (5) subsumes three components: one in the level of labour income and total resources (the terms in a_t, y_t and $\hat{y}$); a precautionary component (the term in ε*); and a past consumption component (the term in c_{t-1}). If γ equals to 0, i.e. if preferences exhibit no habits, then Equation (5) collapses in the expression obtained in Weil (1993). Obviously, the importance of habits in influencing optimal consumption decisions is stronger, the bigger the γ coefficient. If there is no uncertainty and if γ equals 0, then we are left with the usual closed-form solution for consumption derived from the life-cycle/permanent income model[7].

The precautionary component ε* can be written as follows:

$$\varepsilon^* = -\frac{\sigma^2}{2}\left[\frac{\beta R}{R-\rho}\right]\left[(1-\delta)^{1/1-\alpha}\left(1-\frac{\left((\delta R)^{1/\alpha}\right)}{R}\right)^{\alpha/\alpha-1}\left(\frac{R-\gamma}{R}\right)\right] \tag{6}$$

The presence of habits affects the optimal consumption not only directly via c_{t-1}, but also indirectly, making this precautionary component itself smaller in absolute value. Another indirect effect of γ on c_t, is through a reduced effect of both the precautionary term and the terms in labour income and total resources[8].

In order to derive the Euler equation for the model enriched with habits and precaution, we introduce the simplifying assumption that δR=1. This equality implies that the subjective discount rate, measuring the impatience of an individual to consume today, is compensated by the remuneration for postponing consumption, i.e. the interest rate. This yields:

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[7] It is also noteworthy that if Rδ=1 and if the income process follows an ARMA rather than an AR(1) process, Equation (5) is observationally equivalent to Equation (9) in Alessie and Lusardi (1997).
[8] This is due to the fact that both terms are multiplied by (1-γ/R).

(7) $$\Delta c_{t+1} = \gamma \Delta c_t + \frac{R-1}{R}\left(1-\frac{\gamma}{R}\right)\left[\left(\frac{R}{R-\rho}\right)\left(\varepsilon_{t+1} - \varepsilon *\right)\right],$$

where ε* is the above described precautionary component [9], and ε_{t+1} is the residual obtained from the labour income process illustrated in Equation (4).

4. Data Description

4.1. The Survey of Households Income and Wealth (SHIW)

We use the survey of household Income and Wealth to examine whether intertemporal non separability could be responsible for the close coordination between consumption and income. The SHIW dataset overcomes the problem of non separability between food consumption and other non durable consumption as both types of household consumption are recorded in the dataset.

The Bank of Italy's first Survey of Household Income and Wealth (SHIW) was conducted in 1965. Since then, the survey was conducted yearly until 1987 (except 1985) and every two years thereafter[10].

The primary purpose of the Bank of Italy Survey of Income and Wealth is to collect detailed information on demographics and the socio-economic behaviour of Italian households, such as households' consumption, income and balance sheets.

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[9] According to Equation (6), ε* is negative. This means that the precautionary component affects consumption changes positively (i.e. consumers face uncertainty by postponing consumption).
[10] For more details see Brandolini A. and L. Cannari (1994)

The SHIW surveys a representative sample of the Italian resident population. Sampling takes place in two stages, first Municipalities and then households[11]. Households are randomly selected from registry office records. From 1987 through 1995 the survey was conducted every other year and covered about 8,000 households, defined as groups of individuals related by blood, marriage or adoption and sharing the same dwelling. Starting in 1989, each SHIW has re-interviewed some households from the previous surveys. Respondents included in the panel component of the dataset have increased over time: 15 percent of the sample was re-interviewed in 1989, 27 percent in 1991, 43 percent in 1993, 45 percent in 1995, 37 percent in 1998 and 48 percent in the year 2000. From the previous section it is clear that the analysis based on the Euler equation with habit can only be conducted with longitudinal data on consumption.

The SHIW being a rotating panel we are able to control for unobserved heterogeneity, which could be responsible for a spurious relationship between current and past consumption if not taken into account. Given the rotating sample structure, the number of repeated observations on households in our sample ranges from a minimum of two to a maximum of six.

4.1.1. Descriptive Statistics

Each wave of the SHIW dataset respondents are asked the following question regarding their level of consumption. *"What is the average monthly amount of money spent in total consumption? Consider both food and non food goods and exclude only: jewellery, furniture, cars and durable goods, mortgage rent, insurance premiums,*

[11] Municipalities are divided into 51 strata defined by 17 regions and 3 classes of population size (more than 40,000, 20,000 to 40,000, less than 20,000).

housing rent,..". Households are required to supply a precise figure in answer to this question, not in bracket

Given that our proxy for ε* will be based on the variability of the net earnings of the head of the household, we limit our sample to those households whose head is employed. More generally, we restrict the sample to those households whose head is aged between 20 and 65 and is employed, and for whom there are valid data on expenditure, occupation, education, and net earnings. These restrictions bring the sample size of our unbalanced panel to 20,113 person-year observations. All the relevant income and expenditure variables are expressed in 1995 Italian lira.

Both self-employed and employees are included in the analysis. In Italy the self-employed population represents a larger share than in the other European countries and its incidence has been quite stable since the early 1980s (see Istat Labour Force Survey, 2002)[12]. A career as an employee in Italy, in particular in the pubic sector, is characterised by high security, along with a low level of uncertainty in income level. Due to the high labour cost and high firing costs, the Italian labour market has witnessed a huge increase in positions midway between employee and self-employed (such as collaborators). The anomaly related to this category of self-employed is that they are *de facto* working as employees for firms; however, they are much more vulnerable to the risk of being fired or not having their contract extended than employees. Thus, excluding the self-employed in Italy would mean excluding these individuals who have to face the greater burden of income uncertainty, compared to the employees who have an almost predetermined career pattern. An additional element in favour of the inclusion of both categories of employment, is that the existing literature on precautionary saving in Italy has included both employees and self-employed in the sample (see Guiso et al. on this).

Table 1 presents summary statistics of the variables of interest for our analysis relative to the sample selected as described above.

Figure 1 depicts consumption and income trends over the years 1989-2000 for the sample of households whose head is in employment and aged between 25 and 60. Consumption patterns are drawn for each fifth cohort, beginning with those born after 1966 and then moving back five years at a time, finally reaching the cohort of those born before 1937. **Figure 1** shows that consumption rises rapidly with age for all cohorts except the very oldest. With more emphasis on the youngest cohorts, consumption rises with age, however, the rate of increase in consumption is slower the older the cohort to which the households' head belongs to. For the older households we were able to trace, we can observe a drop in consumption at around age 55. In a recent paper, Miniaci et al. (2003) have investigated the way consumption changes around retirement age. Using the Italian Survey of Family Budget (SFB) data they document the existence of a one-drop in consumption (also known as the retirement consumption puzzle) at retirement of the household head, as is also the case in the UK and US.

They explain their empirical findings by attributing the consumption drop to increases in leisure at retirement.

Figure 2 shows, separately for each cohort, the household income and consumption profile by the age of the household head. The earning profile appears to rise steeply with age for all cohort groups. Consumption tracks income for each cohort group. All cohort groups accumulate resources over the life cycle, raising net worth throughout their working lives. Even when households are still young and their current income levels are lower than their future ones, Italian households do not show any dissavings.

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[12] In 1998, this was equivalent to around 30% of total employment (compared to the EU average of 17% in 1995).

5. Econometric analysis

5.1. Baseline specification

The Euler equation under the no habit formation hypothesis, such as in Hall (1978) and Flavin (1981), predicts that consumption changes at time t should be not predictable at time t-1. By adding preference, non separability and uncertainty we obtain that consumption changes should depend essentially on consumption changes at time t-1 and on the precautionary component, ε^*. The Euler equation that we estimate, therefore, takes the following form:

$$\Delta c_{it} = B_0 + \gamma\Delta c_{i(t-1)} + B_1 VAR_{it} + X_{it}'B_2 + v_i + v_t + e_{it}, \quad (8)$$

where Δ is the first-difference operator taken with respect to time. The subscript i refers to household i, while the subscript t refers to time; c_{it} represents the household's annual expenditure on total non-durable household consumption.[13] The difference in consumption levels over time depends on the lagged difference of consumption and a set of socio demographic variables.

VAR_{it} is a proxy for ε^*, the precautionary component term. It can be intended as the labour income risk faced by the head of household i in year t. According to Equation (6), the precautionary component of consumption is in fact a function of σ^2, which represents the variance of the residuals of the labour income equation, which is described in Equation (4). In order to calculate VAR_{it}, we proceed as follows. We first regress the household's head usual net monthly earnings on his/her lagged earnings, age, age squared, gender, regional dummies, educational dummies, occupational dummies, and

[13] Note that we abstract from modelling the decision rule for labour supply. Another implicit assumption is therefore the additive separability between non-durable consumption and leisure.

interactions of the last two groups of dummies with age by using a random-effects model.[14] From this regression, we generate the residuals and we calculate the sample variance of these residuals relative to the two or more years preceding and including year t[15].

Given that the utility function is likely to vary with socio-demographic variables like family composition, education and marital status of the household head, which represent shifts in tastes, we add these variables (in difference) on the right-hand side of our Euler equation (X_{it}).[16]

Finally, the error term of Equation (8) is made up of three components: v_i, v_t, and e_{it}, which represent in turn, a household-specific effect, a time-specific effect, and an idiosyncratic component. We account for the time-specific effect by including year dummies in all our specifications.

The model in equation (8) includes a lagged dependent variable. Unfortunately, the standard OLS technique for approaching the individual or household effect, the random effect or the fixed effect model, are not consistent in this context. Nickell (1981) derives an expression for the bias of γ when there are no exogenous variables. The bias tends to zero when T approaches infinity. Thus, the performance of the Least Squares Dummy Variable Estimator is satisfactory only when the time dimension of the panel is sufficiently large.

Several estimators have been proposed to estimate panel data with a dynamic component in the absence of a large temporal dimension. Anderson and Hsiao (1981) propose two instrumental variable procedures. By first differencing the equation of

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[14] All the explanatory variables used, except lagged earnings can be seen as proxies for $\hat{y}$ in Equation (4).

[15] As consumption is a variable at household level we used, as a proxy for household uncertainty, the shocks to income of the household's head. In this way, however, we rule out the possibility that other household member's income shocks could also contribute to attenuate or exacerbate uncertainty. Our approach follows the approach used by Lusardi (1998).

interest ($\Delta c_{i,t}$-$\Delta c_{i,t-1}$) the error terms are correlated with the dependent lagged variable ($\Delta c_{i,t-1}$–$\Delta c_{i,t-2}$) used as a regressor. The set of instruments recommended by the authors are the dependent variables levels Δc_{it+2} or ($\Delta c_{i,t-3}$–$\Delta c_{i,t-2}$) which are uncorrelated with the disturbance. Arellano (1989) shows that using the lagged difference as an instrument results in an estimator that has a very large variance. Arellano and Bond (1991) and Kiviet (1995) confirm the superiority of using the lagged level as an instrument with simulation results. The approach we choose to estimate our dynamic equation is therefore the Arellano and Bond model.

5.2. Regression Results

Table 2 illustrates the results estimates for a range of different estimates. In all specifications, lagged changes in consumption enter significantly and negatively current consumption changes, with coefficients ranging from –0.6 to -0.3. This indicates that the coefficient γ is negative, suggesting that the utility function exhibits durability in Deaton's (1992) sense. Thus, the empirical findings suggest that ignoring habit formation in households' preferences can be seriously misleading.

The negative sign of the parameter γ indicates that consumers derive utility from past levels of consumption. The derived consumption pattern should then exhibit a decreasing profile instead of a constant one, all other variables kept constant.

Column 1 of Table 2 refers to OLS estimates. Durability affects current consumption decisions. An 10% increase in past consumption level depresses current consumption levels by 6%. This effect indicates that the higher the past consumption

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[16] See Zeldes (1989), Attanasio and Weber (1993), and Attanasio and Browning (1995) for similar approaches.

level, the lower current consumption has to be to keep individuals on the same utility level.

The coefficient in front of the precautionary term (VAR) is significant and positive indicating a steeper profile of consumption due to uncertainty. An 10% increase in uncertainty generates a 6% additional saving, evaluated at sample means. Moreover, this effect is enhanced if the household's head is a self-employed. OLS estimates, however, do not control for the possibility of unobserved household-specific effects and may therefore result in upward-biased estimates of the autoregressive coefficients. A downward bias is also likely to affect the estimate of γ because of measurement error in consumption.

In column 2, we report estimates obtained using a first-differenced Generalized Method of Moments (GMM) estimation procedure. First-differencing allows us to control for the fixed effects, and also to get rid of the time-invariant component of the measurement error which is likely to affect both $\Delta c_{i(t-1)}$ and VAR_{it}. Given that $\Delta c_{i(t-1)}$ and VAR_{it} might also suffer from a time-variant measurement error, and more in general from endogeneity problems, we instrumented them using $\Delta c_{i(t-2)}$, $VAR_{i(t-2)}$, and further lags.[17] Our estimated value for γ now equals –0.300.

The precautionary motive for saving is not significant. However, the effect of precautionary saving is positive and significant if the household's head has changed his/her occupational status (VAR_{it}*$selfemployed_{it}$). On the contrary, households whose head became self-employed ($selfemployed_{it}$) show a negative shift on consumption changes overall, a shift that can be compensated by the entity of the income variability which positively affects the evolution of consumption. A change in employment status causes consumption to grow slower than no status change in employment. The magnitude

[17] See Arellano and Bond (1991) on the application of the GMM approach to panel data.

of the coefficient relative to the variance of income could also capture the effect of the omitted variable of income changes, which is included in column (3).

Concerning the demographic and occupational variables that we included in Equation (8), we can see that only the number of income receivers is not significant in explaining the consumption dynamics. Increasing the number of household components makes consumption grow over time. Family changes due to new births, keeping the household size and number of income receivers constant (that is equivalent to substituting an adult with a child within the family), generates a negative impact on future consumption (-38,000 Liras) relative to the current one. A bigger household size boosts consumption increase by almost 60,000 Liras. This is an additional effect that enhances savings over time.

The tests performed, *J* statistic and the test for second order serial correlation of the residuals (*m2*), show that the model is correctly specified. The former test is the Sargan/Hansen test for overidentifying restrictions, asymptotically distributed as a chi-square with degrees of freedom equal to the number of instruments less the number of parameters. If the model is correctly specified, the variables in the instrument set should in fact be uncorrelated with the error term e_{it} in Equation (8). The *m2* test is asymptotically distributed as a standard normal under the null of no second-order serial correlation, and provides a further check on the specification of the model and on the legitimacy of variables dated t-2 as instruments[18]. In the first specification of our model (column 2) we can see that there is no evidence that the behaviour of the households in our sample violates our generalisation of Weil's (1993) model. The marginal significance of the *J* test is in fact 0.40, and there are no signs of second order serial correlation of the residuals at the 15% level.

We also try an additional specification, once again based on the Arellano and Bond estimation strategy, which includes the predicted income changes as an explanatory variable, as in Column 3. The specification that includes the presence of liquidity constraints shows that households model their consumption changes according to the predicted income changes, which should have no additional explanatory power without the presence of liquidity constraints. However, according to our estimates, we cannot rule out the presence of liquidity constraints as determinants of Italian households' consumption behaviour. The estimate of the impact of persistence on consumption is again negative (-0.283) and significant. However, this effect is offset if a predicted change in income occurs. A positive realisation of 1000 liras in the household's head income makes consumption grow by almost 400 liras.

This evidence suggests that frictions in the credit market, which are extremely active during the first stage of the life cycle, are responsible for a slower rate of consumption growth, while durability acts in the opposite direction, making consumers satisfied according to the level of consumption reached in the previous year.

6. Conclusions

This paper attempts to reconcile consumption patterns of Italian households within a life cycle context by adding habit formation to households' preferences. By using a generalisation of Weil's (1993) model, we estimate the presence of habit formation in consumers' preferences with reference to Italian households. The estimates are based on a Euler equation approach, where consumption changes are a function of past consumption changes and labour income risk. The estimate results are based on data drawn from the

[18] If the disturbances are not serially correlated, there should be no evidence of second order serial correlation. This test is based on the standardised average residual autocovariances which are

SHIW, for the period 1989-2000. According to our results, lagged changes in consumption have a strong negative effect on current changes. Preferences exhibit durability instead of habit persistence. These results are in line with some of the earlier literature (Dynan 2000 and Guariglia Rossi 2002).

We have also allowed our model to take into account excess sensitivity to income changes. Our results show that, both durability and excess sensitivity to predicted changes in income are significant determinants of consumption changes, albeit acting in opposite directions. This indicates that the erroneous assumption that preferences are separable over time might play some role in the empirical failure of the life-cycle/permanent income model.

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asymptotically normal N(0,1). See Arellano and Bond for more details (1991).

7. References

Abel, A. (1990), "Asset Prices under Habit Formation and Catching up with the Jones." *American Economic Review* vol.40, pp. 38-42.

Abel, A. (1999), "Risk Premia and Term Premia in General Equilibrium" *Journal of Monetary Economics*, v. 43, iss. 1, pp. 3-33

Alessie, R. and A. Lusardi (1997), "Consumption, Saving and Habit Formation," *Economic Letters* 55, pp. 103-08.

Arellano, M. and S. Bond, 1991, "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies*, 58,277-297.

Attansasio O. And Browning, (1995), "Consumption over the Life Cycle and over the Business Cycle"; *American Economic Review*, v. 85, iss. 5, pp. 1118-37

Attanasio, O. and G. Weber (1989), "Intertemporal Substitution, Risk Aversion and the Euler equation for Consumption." *The Economic Journal,* (99), pp. 39-73.

Attanasio O. and Weber G, (1995), "Is consumption growth consistent with intertemporal optimisation? Evidence form the Consumer Expenditure survey", *Journal of Political Economy*, 103, 1121 -1157

Bowman D., D. Minehart, and M. Rabin (1999), "Loss aversion in a consumption--savings model", *Journal Of Economic Behavior And Organization* (38)2 pp. 155-178

Brandolini, A., and L. Cannari (1994), "Methodological Appendix: The Bank of Italy. Survey of Household Income and Wealth", in *Saving and the accumulation of wealth. Essays on Italian households and government behavior*, A. Ando, L. Guiso and I. Visco eds. Cambridge: Cambridge University Press.

Caballero, R. (1990), "Consumption Puzzles and Precautionary Savings." *Journal of Monetary Economics* vol. 25, pp. 113-36.

Campbell, J. and J. Cochrane (1995), "By Force of Habit: A Consumption-Based Explanation of Aggregate Stock Market Behavior", *NBER* Working Paper No. 4995.

Carrasco R., Labeaga J.M. and D.L. Salido, "Consumption and Habits: Evidence From Panel Data", *CEPR* working paper, n. 3520, Nov. 2002

Carroll C. D., (1996), "Buffer-Stock Saving and the Life Cycle/Permanent Income Hypothesis", *NBER* Working Paper No. W5788

Carroll, C., J., (1998), "Why do the rich save so much?", *NBER*, Working paper 6549

Carroll, C., Overland J. and Weil, D. (2000): "Saving and Growth with Habit Formation", *American Economic Review*, 90(3), 341-355.

Carroll, C. D. and A. Samwick (1997), "The Nature of Precautionary Wealth," *Journal of Monetary Economics* vol. 40, pp. 41-71.

Carroll, C. D., and A. Samwick (1998), "How Important is Precautionary Saving?", *Review of Economics and Statistics,* pp. 410-418.

Constantinides, G. (1990), "Habit Formation: A Resolution of the Equity Premium Puzzle." *Journal of Political Economy* vol. 98, pp. 519-43.

Clarida, R.H., (1991), "Aggregate stochastic implications of the life cycle hypothesis", *Quarterly Journal of Economics*, 106(3), pp851-867

Deaton, A. (1992), *Understanding Consumption.* Oxford: Oxford University Press.

Deaton, A. Grosh, M. (2000); *Designing household survey questionnaires for developing countries: Lessons from fifteen years of the Living Standards Measurement Study*. Volume 1, pp. 91-133, Washington, D.C.: World Bank

Duesemberry, J. S., (1952), *Income Saving and the Theory of consumer Behavior*, Harvard University Press.

Dynan K, “Habit formation in consumer preferences”, (2000), *American Economic Review*, vol. 90, n3, pp. 391-407

Epstein L. G., S. E. Zin, (1989), “Substitution, risk aversion, and the temporal behavior of consumption and asset returns: a theoretical framework”, *Econometrica*, vol.57, (4), pp.937-969.

Flavin M. (1981), “The Adjustment of Consumption to Changing Expectations about Future Income.” *Journal of Political Economy* vol. 89, pp. 974-1009.

Friedman, M. (1957), *A Theory of the Consumption Function.* Princeton: Princeton University Press.

Fuhrer, J. C. (2000) “Habit Formation in Consumption and Its Implications for Monetary-Policy Models”; *American Economic Review*, v. 90, iss. 3, pp. 367-90

Gali J, “Infinite Horizons Life Cycle Savings and Time Series Evidence on Consumption”, (1990) *Journal of Monetary Economics*, 26(3)433-53.

Garcia, R., Lusardi, A., and Ng, S. (1997), “Excess Sensitivity and Asymmetries in Consumption: An Empirical Investigation.” *Journal of Money, Credit, and Banking* vol. 29 (2), pp. 154-176.

Guariglia, A. and Rossi, M., (2002). “Consumption, habit formation and precautionary saving: evidence from the British Household Panel Survey”. *Oxford Economic Papers*, vol. 54, pp. 1-19.

Guiso L., Jappelli T. and Terlizzese D., (1994) “Why is Italian Saving rate so high?” In Ando A, L. Guiso and I. Visco *Saving and the accumulation of Wealth*

Guiso, Luigi, Tullio Jappelli and Luigi Pistaferri (1999), “What determines earnings and employment uncertainty?”, London: *CEPR* Discussion Paper n. 2043.

Guiso, L., Jappelli, T. and D. Terlizzese, (1992), “Earnings Uncertainty and Precautionary Saving”; *Journal of Monetary Economics*, November, v. 30, iss. 2, pp. 307-37

Hall, R. (1978), “Stochastic implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence”, *Journal of Political Economy*, 86, pp.971-987

Hall, R. and Mishkin, F. (1982), “The Sensitivity of Consumption to Transitory Income: Estimates from Panel Data on Households.” *Econometrica* 50, (2) pp. 461-82.

Hayashi F., (1985), “The Permanent Income Hypothesis and Consumption Durability: Analysis based on Japanese Panel Data”, *Quarterly Journal of Economics*, 100(4) 1083-113

Jappelli T. and L. Pistaferri, (1999) “The Dynamics of Household Wealth Accumulation in Italy”, October, Centre for Studies in Economics and Finance (*CSEF*) working paper, University of Salerno, Italy.

Jappelli T. and L. Pistaferri, (2000). "Intertemporal Choice and Consumption Mobility," Econometric Society World Congress 2000 Contributed Papers 0118, Econometric Society

Jappelli T. and L. Pistaferri, (2002). "Incentives to Borrow and the Demand for Mortgage Debt: An Analysis of Tax Reforms," Centre for Studies in Economics and Finance (*CSEF*) working paper n.90, University of Salerno, Italy

Kiviet J.F. (1995),On Bias, Inconsistency, and Efficiency of Various Estimators in Dynamic Panel Data Models; *Journal of Econometrics*, July , v. 68, iss. 1, pp. 53-78

Kreps, D., Porteus, E. (1978), “Temporal Resolution of Uncertainty and Dynamic Choice Theory”, *Econometrica*, 96, pp.91-100.

ISTAT, Labour Force Survey, 2002.

Lusardi, A. (1997), “Precautionary Saving and Subjective Earning Variance.” *Economic Letters,* vol. 57 (3), pp. 319-26.

Lusardi A. (1998), “On the importance of Precautionary Saving Motive”, *American Economic Review, Papers and Proceedings*, Vol. 88, No. 2, pp. 449-453.

Meghir, C. and G. Weber (1996), “Intertemporal Nonseparability or Borrowing Restrictions? A Disaggregate Analysis using a U.S: Consumption Panel. *Econometrica* vol.60 (5), pp. 1151-81.

Miniaci R Monfardini C. and Weber G, (2003) “Is there a Retirement Consumption Puzzle in Italy?” *IFS* wp03/14

Modigliani, F. and Brumberg, R. (1954), “Utility Analysis and the Consumption Function: An Interpretation of the Cross-Section Data.” In (ed. K. Kurihara) *Post-Keynesian Economics,* New Brunswick, NJ: Rutgers University Press pp.388-436, 1954.

Naik, N. Y. and Moore, M. J. , Habit Formation and Intertemporal Substitution in Individual Food Consumption.(1996); *Review of Economics and Statistics*, v. 78, iss. 2, pp. 321-28

Nickell, S., (1981), "Biases in Dynamic Models with Fixed Effects," *Econometrica*, 49, 1417-1426.

Pemberton, J. (1997), “The empirical failure of the life cycle model with perfect capital markets”, *Oxford Economic Papers,* , 49, (2), pp.129- 151

Price, S. (1998), “Recursive utility, interest rates, uncertainty and consumers' expenditure in the UK”, City University, London, UK.

Runkle, D. (1991), “Liquidity Constraints and the Permanent Income Hypothesis.” *Journal of Monetary Economics* 27, pp. 73-98.

Sargent, T. J. (1987), “*Dynamic Macroeconomic Theory*”, Harvard University Press.

Shea, J. (1995), “Myopia, Liquidity Constraints, and Aggregate Consumption: A Simple Test.” *Journal of Money, Credit, and Banking* vol. 27 (3), pp. 798-805.

Stiglitz J.E. and A. Weiss, (1981), “Credit Rationing in Markets whith Imperfect Information”, *American Economic Review*, 71, pp.393-410

Stiglitz J.E. and A. Weiss, (1983), “Incentive Effects of Terminations: Applications to the Credit and Labor Markets”, *American Economic Review*, 73, pp.912-927.

Tversky, A. and D. Kahneman (1991), “Loss Aversion in Riskless Choice: A Reference-Dependent Model.” *Quarterly Journal of Economics* vol. 106 (4), pp. 1039-61.

Weil, P. (1993), “Precautionary Savings and the Permanent Income Hypothesis.” *Review of Economic Studies,* pp. 367-81.

Zeldes, S. (1989), “Consumption and Liquidity Constraints: An Empirical Investigation.” *Journal of Political Economy* vol. 97 (2), pp. 305-346.

Figure 1.Average level of households' consumption by year of birth (cohort) and age.

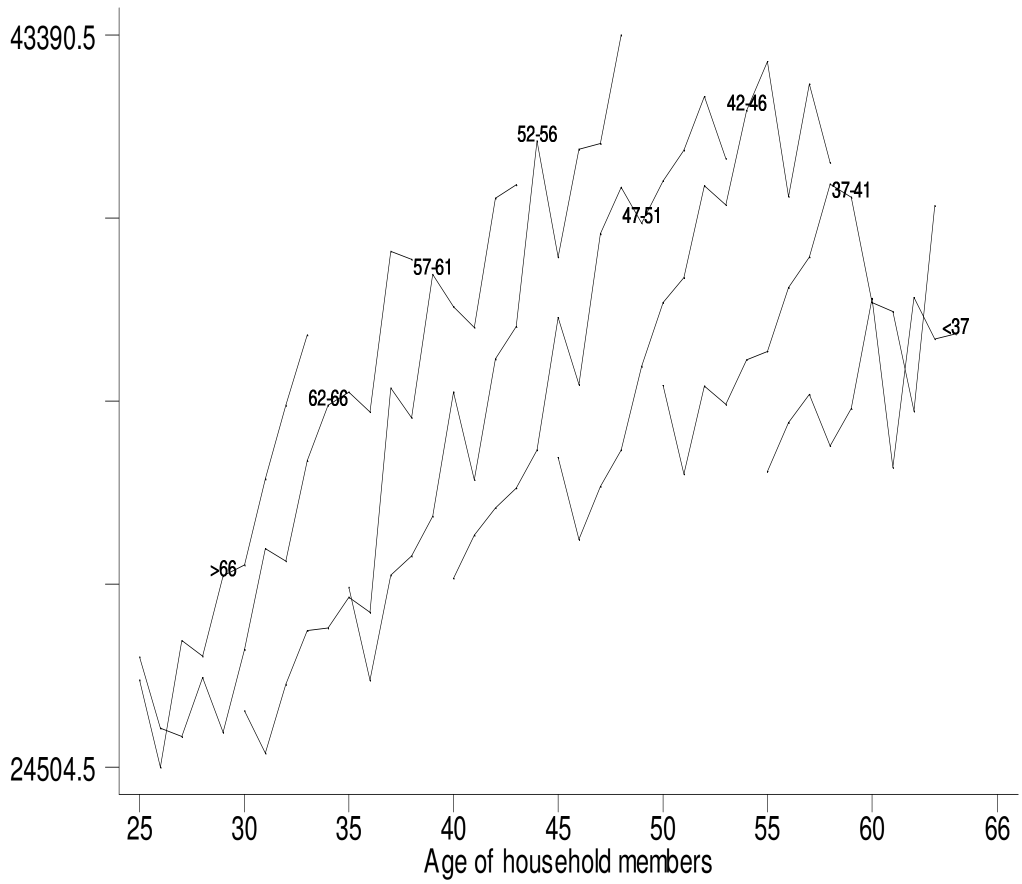

Figure 2. Average level of households' consumption and income by age (each cohort separately).

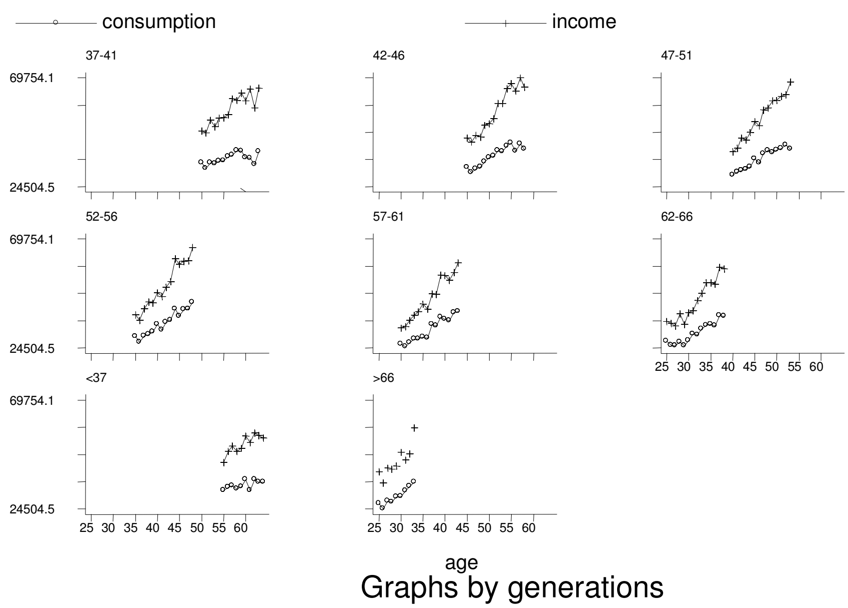

Table 1. Characteristics of the SHIW households.

	Mean	Standard deviation
	(1)	(2)
Age of the head of the household	46.759	9.109
Monthly household expenditure on non-durable consumption (c_{it})	4,257,746	1800133
$\Delta(c_{it})$	536,933	1728373
$\Delta(c_{it-1})$	614,696	1700783
Usual net monthly earnings of the head	4,728,089	2441714
Household size	3.567	1.140
Number of income receivers	1.905	0.794
Married (%)	0.868	0.339
Self-Employed[19]	0.248	0.432
Education level of the head of the household(%)		
No education	0.007	0.085
Primary school	0.132	0.339
Junior School	0.394	0.489
Secondary School	0.341	0.474
University	0.126	0.331
No. of observations	1669[20]	

[19] 10% of employed individuals changed from self-employed to employee and 2% changed from employee to self-employed

[20] Note that the drop in observations in our sample is due to the small panel component of our dataset that is necessary to construct our dependent variable (Δc_{it}) and the lagged dependent variable Δc_{it-1}. As these variables refer to the same household, we need at least four consecutive observations for the household in

Table 2. Euler Equation Estimates

Dependent variable: $\Delta c_{it}/1000$	OLS LEVELS	FIRST DIFFERENCED GMM (without liquidity constraints)	FIRST DIFFERENCED GMM (with liquidity constraints)
	(1)	(2)	(3)
$\Delta c_{i(t-1)}/1000$	-0.653**	-0.300**	-0.283**
	(36.98)	(7.02)	(6.47)
$\Delta y_{i(t-1)}$			0.384**
			(3.50)
$VAR_{it}(*10^{-5})$	0.001**	-0.020*	0.004
	(4.37)	(2.22)	(0.37)
$VAR_{it}(*10^{5})*selfemployed$	0.007**	0.038**	0.038**
	(7.38)	(9.90)	(9.77)
Number income receivers	4.328	4.568	5.952
	(0.85)	(0.49)	(0.64)
Hhsize	38.451**	59.473**	57.896**
	(5.43)	(4.08)	(3.95)
Number of children	-29.306**	-39.036**	-38.277**
	(4.47)	(2.85)	(2.78)
Self-employed	-22.876	-270.896**	-272.618**
	(1.07)	(4.71)	(4.72)
Constant	72.113**	6.734	2.906
	(10.50)	(0.95)	(1.38)
m2		-1.46	-1.36
P value		(0.146)	(0.175)
J		6.31	6.56
P value		(0.389)	(0.36)

Notes: c_{it} represents annual consumption for non-durable goods at a household level. VAR_{it} is our proxy for labour income risk, for the head of household i in year t. T statistics are reported in parenthesis. * is significant at 5% and ** is significant at 1% level.
Time dummies were included in all equations. Instruments in column (2) and (3): regressors X_{it}, and lagged levels of the regressors, sex of household's head, and $\Delta c_{i(t-2)}$ and its further lags.
Self-employed is a dummy variable taking the value of one if the household head has changed his/her status and become self-employed.
The time dummies were always included in the instrument set. *m2* is a test for second-order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The *J* statistic is a test of the overidentifying restrictions, distributed as chi-square under the null of instrument validity. The p-value can be interpreted as the probability of generating the reported statistic under the null of instrument validity.

order to be able to estimate our model. Moreover, as the estimation strategy relies on first differencing, we are able to use data only referring to 1995, 1998 and 2000.