An appraisal of the wealth effect in the US: evidence from pseudo-panel data

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Abstract

How does household wealth influence consumption? The empirical evidence brought so far by the literature is unclear, mostly because of the low quality of the data more readily available: aggregate data, cross sections and panel datasets lacking important variables all present major shortcomings for a proper analysis of the wealth effect. The aim of our paper is to contribute to the appraisal of the wealth effect using a new, accurate dataset, and employing a proper estimation technique. We perform a pseudo-panel analysis for the USA (1989-2007) combining information from the Consumer Expenditure Survey and the Survey of Consumer Finances. We divide between durables and non durables consumption, and we also investigate the roles of the different components of household wealth, both gross and net. Our estimates indicate that there is a significant tangible wealth effect (between 3 and 6 cents per dollar), confirming the economic importance recognized by some of the previous empirical literature. On the contrary, financial wealth seems to have no significant effects on consumption, even when debt considerations are included in the analysis. In addition, the wealth effect seems to matter more for older households, for which both the house of residence and the rest of the real estate properties positively affect consumption.

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1. Introduction

Aggregate savings rates in the USA and in other developed countries have declined considerably during the Nineties and the beginning of the new Millennium (Hüfner and Koske, 2010). Due to the contemporary growth of stock prices up to 2000, and of housing prices afterwards, many economists have seen a direct relationship between the two phenomena (for instance, Bernanke, 2005; Greenspan, 2003). However, the theoretical literature provides only limited guidance on how savings respond to shocks in household wealth (Gan, 2010). Accordingly, the recent literature is mainly empirical, and is mostly devoted to the study of the effects of household wealth on household consumption and savings, through the so called 'wealth effect' channel.[1] These studies aim at understanding the possible role of wealth in exacerbating the effects of a slowdown of the economy in case of constant or declining share and housing prices (Paiella, 2007a). With the 2007 subprime mortgages crisis and the following financial and economic crisis, this scenario, from mere hypothesis, has become reality. In light of that, our article explores deeply the role of household wealth on consumption and, consequently, on savings.

As said, the mechanism through which wealth affects consumption is not clearly understood, and this may be one of the reasons for the incredibly wide variety of the literature results. For instance, while there are authors blaming capital gains for the decline in saving rates (Juster et al., 2005), others conclude that there is at best a weak evidence of a stock market wealth effect, and underline the importance of housing wealth in determining the households decisions on consumption and savings (Case et al., 2005). Another possible explanation for the incongruence of previous results lies in a weakness shared by many: the use of inappropriate data, such as aggregate data or non accurate household-level data. As for the USA, this is due to the fact that no single existing dataset contains detailed data both on consumption and wealth. In our article we overcome this problem using a household-level dataset specifically built for this purpose, combining information from two different surveys, the Consumer Expenditure Survey (CES) and the Survey of Consumer Finances (SCF), by imputing the SCF wealth variables to the CES households (that is, we use the SCF as a donor to enrich the variables set of the CES).[2] Moreover, employing a methodology introduced in Browning et al. (1985) and Deaton (1985), we construct panel data from the resulting time series of

[1] This definition is used in the microeconomic literature to indicate how wealth and expenditure are linked, either directly (changes in wealth directly cause changes in consumption through their effect on households' contemporaneous budget sets) or through the collateral channel (Cynamon and Fazzari, 2008).

[2] To the best of our knowledge, a similar procedure has been exploited only once previously for similar purposes, by Bostic et al. (2009). However, we improve the matching methodology implemented by Bostic et al. (2009) in order to obtain a much larger dataset than theirs, following closely the guidelines on data matching suggested by Ridder and Moffitt (2007). As a result, we do not limit ourselves to the analysis of home owners only, and we use a richer set of variables. Finally, our analysis includes the years 2004 and 2007, while Bostic et al. (2009) have data up to 2001 only.

cross sections. Finally, we use this pseudo-panel to estimate a consumption equation with wealth, in various decompositions, as one of the main explanatory variables, for the period 1989-2007.

In our analysis we differentiate between financial and tangible wealth, the latter further disaggregated into the value of the house of residence and the other real estate properties; in addition, we investigate the role of debt on consumption decisions by studying both gross and net wealth. We also deepen the analysis by concentrating on the behavior of the older households, by performing the analysis separately for the subsample of households whose head is more than 64 years old.

The main result of our study is that tangible wealth is the main type of household wealth to significantly and positively affect consumption. In particular, the house of residence is the part of tangible wealth which is responsible for the highest direct wealth effect. The estimated elasticity of consumption spending with respect to tangible wealth ranges between four and six cents per dollar, which is not far from previous estimates. This seems to suggest that the fears of sizable reverse direct wealth effects due to a sudden declines in housing values could have been overstated previously (one exception being Case and Quigley, 2008), since the values involved are not impressive. Indeed, the dynamics of the recent economic and financial crises (2007-2009) do not reveal any direct linkage between the declining housing prices and household consumption, rather they shed light on the perverse mechanisms of the real estate and credit (mortgages in particular) markets.

Among the additional results, older households experience a higher wealth effect (that is, extract more liquidity from their assets, as predicted by theory), around 6 cents per dollar, both from the house of residence and the rest of their real estate properties, while they have a lower income elasticity of consumption with respect to the younger households.

The rest of this paper is organized as follows. Section 2 provides a brief review of the previous literature. Section 3 describes the data used and how they were combined. Also, the econometric models are presented. Section 4 illustrates the results. Section 5 concludes briefly.

2. The previous empirical literature

There is a large literature about the wealth effect, and most of it is based on the life-cycle model originally proposed by Ando and Modigliani (1963). According to this theory, an increase in wealth leads the individuals to gradually increase consumption, thus lowering their savings. Also, the propensity to consume out of wealth, whatever its form, should be the same small number (Paiella, 2007b). In practice, this is likely to be violated, "if assets are not fungible and households develop 'mental accounts' that dictate that certain assets are more appropriate to use for current expenditure

and others for long-term saving" (Paiella, 2007b, 191). Additionally, Lettau and Ludvigson (2004) stress that wealth shocks must be perceived as permanent in order to affect consumption. As a result, the appraisal of the wealth effect is something that must be quantified empirically, and it has been done in a fair number of articles that make use of either household-level or aggregate data. Consequently, a wide range of estimates have been produced. For the U.S economy, they usually lie between 2 and 7 cents of additional consumption per year per 1 dollar increase in household wealth. This is consistent with the magnitude of the effect estimated by the research staff of the Board of Governors of the Federal Reserve System, that maintains the longest and most regularly updated wealth effect estimates for the USA.

In the latest studies, different results have been found according to the type of household wealth analyzed, mainly dividing between house equity and financial wealth. The reason lies in the fact that households may perceive these two kinds of wealth differently under several perspectives, and this may influence the way it affects consumption (see Case et al., 2005, for an excellent discussion). The empirical evidence seems to confirm this intuition, and even go beyond that. For example, Edison and Sløk (2002) further differentiate financial wealth between technology and non-technology segments of the US stock market, finding differences in the wealth effect channel accordingly. Case et al. (2005) study both the financial and the housing wealth effect for the US, finding a significant effect for the latter only. Bostic et al. (2009) disaggregate household wealth into financial, house of residence and other real estate, finding different effects. Other authors concentrate either on the first or the second component: to name a few, Belski and Prakken (2004) and Carroll et al. (2006) study the housing wealth effect, while Davis and Palumbo (2001) concentrate on the financial wealth effect.[3]

The empirical appraisal of the wealth effect poses some issues, such as endogeneity and the problem of omitted variables. Endogeneity is present in this kind of analysis, since the value of household wealth is the result of both past savings and movements of the asset prices. In this respect, a common weakness of the articles that investigate the wealth effect is that they use either aggregate data or non accurate household-level data. In both cases the analysis lack proper instruments to deal with endogeneity. In the first case there are some well known problems, such as aggregation issues and difficulties in decomposing age, cohort and time effects, as it is well explained by Attanasio and Banks (2001). About the second case, even if there are many sources of household-level data for the USA, each one of them, taken singularly, has some drawbacks for the type of analysis that is considered here. The Panel Study of Income Dynamics, (PSID, used for example by Lehnert, 2004, Juster et al, 2005), contains data on food consumption only, and data on

[3] See Paiella (2007a) for an excellent survey on the empirical evidence on wealth effects.

household wealth have been collected since 1984 every five year only. The CES (used by Dynan and Maki, 2001, to name one) has very detailed consumption data, but the quality of its wealth data is low. On the other hand, the SCF does not contain detailed consumption variables, while information on wealth is collected very accurately.

In order to overcome these well-known problems of the literature, the strategy of this paper is to build a new household-level dataset combining CES and SCF data. We use a sample combination procedure (explained in the next section) to obtain the variables that we judge to be important in our analysis: specifically, we use it to impute the SCF wealth values to the CES individuals for which we already have detailed consumption data. Thus, we are able to use a very large amount of information, dealing with the problem of omitted variables and therefore moderating the issue of endogeneity. Methods of integrating different sources of information similar to the one that we utilized here, have been recently used by some national institutes of statistics as a convenient way to obtain detailed datasets without having to bear the costs of producing brand new surveys (for instance, see Rosati, 1998, D'Orazio et al., 2006, Del Boca et al., 2005). Moreover, we use the dataset resulting from the sample combination to build a pseudo-panel, following the idea originally proposed by Browning et al. (1985) and Deaton (1985).

3. Data: sample combination and pseudo-panel characteristics

3.1 CES and SCF data

In our analysis we use the wealth data from the SCF to enrich the information contained on the CES, that already contains detailed consumption data, for the period 1989-2007.[4] Then, we exploit this "augmented" CES to perform the econometric analysis on the wealth effect, since this new dataset is perfectly appropriate to shed light on the effects of household wealth on consumption.

The CES is collected by the Bureau of Labor Statistics (BLS) to compute the Consumer Price Index, and contains data on up to 95 percent of total household expenditures. It is a rotating panel in which each household is interviewed four consecutive times over a one year period. Each quarter 25% of the sample are replaced by new households. The survey contains quarterly data, thus we had to extrapolate data on yearly consumption. Moreover, the interviews are conducted monthly about the expenditures of the previous three months: for example, a unit interviewed in January will appear in the same quarter of a unit interviewed in February or March, even if the reported information will cover a slightly different period of time. This overlapping structure of the sample complicates the operation of estimating annual consumption in many dimensions. First, the year

[4] The CES is formed by the Diary Survey and the quarterly Interview Survey. We used the latter.

over which we have information for each household is different depending on the month in which the household completes its cycle of interviews. Second, and even more important, not all households complete the cycle of four interviews, thus they don't report all the expenditures made in one year.

In order not to waste a vast amount of information, we have chosen to use the data of the households present for the whole year of reference, as well as the data of the households that were interviewed three periods or less, using the following procedure. First, we harmonized the expenditure variables using the Consumer Price Index, differentiated for food, energy and the other goods, in order to have all expenditures expressed with the prices of June of the reference year. Second, we deseasonalized the quarterly measures of consumption using the ratio to moving average method. Finally, we used a simple technique to extend these corrected quarterly expenditures to the whole year of interest: we multiplied by four the expenditure of the households present for one quarter only, by two the expenditure of two quarters and by four thirds the expenditure of the households interviewed for three quarters. For the households that were present for four quarters in a row, we just had to compute the sum across quarters. Thanks to this procedure, we were able to obtain a very large dataset (for instance, with more than 14,000 households for the year 2007). We checked whether this operation led to a dataset differing from the original (quarterly) one in terms of distributions of the variables that we used in our analysis, finding no significant difference. For each household, in addition to the expenditure variables, both for durable and for non-durable goods, we kept socio-demographic variables and annual income.[5]

The household wealth data that we imputed to the CES households come from the SCF, which is triennial and is produced by the Federal Reserve Board. This survey also includes socio-demographic information that proved valuable for the statistical matching procedure, as well as for the estimation of the consumption models. In particular, we used data on marital status, race, age, education and occupation of the household head, home ownership status and family size. The period covered by the analysis starts in 1989, mainly because the SCF question frame was different in earlier periods, and ends in 2007, for a total of 7 periods. Moreover, we used the information contained in all the five implications of the SCF (implications that derive from the multiple imputation procedure used to approximate the distribution of missing data, as explained in Kennickell, 1998), by performing the sample combination with the CES separately for each implication. To correctly take into account multiple imputation, the estimation of the consumption

[5] We had to decide about whether and when to drop households for which socio-demographic variables changed from one quarter to another. For example, we dropped the households for which the marital status changed, since we wanted to get rid from the effects of weddings and divorces. In cases of less dramatic changes, we have been more parsimonious. For example, when the educational status changed from one quarter to another, we kept the household and used the educational status of the quarter closer to the central quarter of the year.

models were then carried out using Repeated Imputation Inference (RII), as explained by Montalto and Sung (1996). In a few words, this method exploits all the different versions of the dataset due to the multiple imputation technique and combines the resulting estimates in order to produce more correct estimates in case of imputed missing values (as, in the CES case, the ones concerning income).

3.2 The sample combination procedure

The aim of the procedure is to look for similar households across the two surveys and then to attach the wealth variables observed for the SCF households to the most similar ones in the CES, so to get an "augmented" CES that contains detailed information on wealth in addition to the consumption and socio-demographic variables originally collected by the BLS. In constructing and applying the matching procedure we followed several principles and suggestions given by Ridder and Moffitt (2007) so to make sure to produce a high quality new dataset. The details of the procedure are the following.

We first partitioned both samples into cells based on six categorical variables in order to avoid to match individuals that differ in important characteristics. For the year 2007, and similarly for the other years, more than 700 cells were created using:

* Race - white, black or other;
* Marital status - married or not;
* Education - twelfth grade or less, high school, some college or more;
* Tenure - home owner or not;
* Occupation - not working, managers and professionals, technicians, services, operators, other;
* Family size - one, two, three or four or more people in the household.

Thanks to this highly detailed partition that took into account many different variables, we were able to avoid the risk of matching pairs of households differing in fundamental characteristics. Almost every cell contained individuals from both surveys, and the imputation of the wealth variables to the CES households has been done only using SCF households pertaining to the same cell. Thus, within every cell, we looked for the most similar individuals across the two surveys according to the values of income and age, building a unique distance function able to measure the differences in this two variables.[6] In this way, we were able to select the pairs of households coming from the two different surveys in which the SCF household wealth values were assigned to the CES household. We also refined the matching by dropping the individuals for which the distance function displayed too high value, that is, the matched individuals had non-deniable differences in

[6] We did it performing a bivariate (income and age) propensity score matching based on Mahalanobis distance.

age and/or income to be paired together.[7] The sample combination process yielded a dataset with more than 14000 observations in 2007.[8]

We checked the result of the matching procedure in two different ways. We verified the similarity among the correlations between income (which is observed in both surveys) and the wealth variables both in the SCF and in our augmented CES (after-matching). Table 1 shows that the similarity is very high, suggesting the fact that the procedure did not change the distribution of the imputed variables, a signal of good quality of the overall sample combination. Furthermore, we produced the graphs of the probability density functions of the matched variables obtained with a kernel density estimation, finding comfortingly similar curves. Figures 1-7 report the graphs for household net wealth: we have chosen to report this variable because it comprehends both assets and debt, therefore it summarizes more than other variables the results of the matching procedure. Although the two distributions do not completely overlap because not all the SCF individuals are used as donors in the procedure, the curves do show very similar patterns, again making sure that we maintained the distributional properties of the variables of interest.

We used these precautions because sample combination methods must be applied with some care, as there are some conditions that have to be met in order not to commit errors. First, the two different surveys must be two samples drawn from the same population (Ridder and Moffitt, 2007). Second, there must be a set of common variables on which to condition the matching procedure, as it is clear from the above description of the procedure. In our case, the first condition seems easy to be met, since CES and SCF should both represent the US population. However, their sample designs are different, since the SCF oversamples households that are likely to be wealthier, while the CES does not. This leads to differences in the distributions of the variables of interest (*in primis*, income). Consequently we had to get rid of the wealthiest households present in the SCF in order to get comparable income distributions between the two surveys (in particular, we dropped a percentage between 20 and 30% of the sample households with the highest income depending on

[7] In particular, we dropped the households that fell into the top 15% of the distribution of the distance variable. We also had to build a different distance function for the groups with one or two individuals only from either one or the other survey, using the normalized logarithmic income and age, and we dropped the top 20% of households matched according to this second, and rougher, algorithm (because with few households in a cell, there was a higher probability to match pairs of households that differ significantly in their values of income and age).

[8] In order to perform a very precise matching, we deliberately decided to treat age as a non-categorical variable (building 5 or 10 year groups, as it has been done in some previous works), something that would have left income as the only variable to be used in the within-cell matching. In particular, suppose we used 10 year age groups, dividing between individuals that are 21-30 years old, 31-40 years old and so on. In this case it would have been possible to match a 30 years old household with a 21 years old control, even if a 31 years old control (with equal income) would have been a better choice. By using age together with income for the propensity score matching, we avoid such possibility and we minimize the distance between potential controls of the SCF and "treated" individuals of the CES (treated in the sense that we imputed to them the wealth variables).

the year of reference).[9] About the second condition, there are many socio-demographic variables that are collected in both surveys, and the only problem here is to recode the variables in order to have them measured in the same scale. This has been carried out making a large use of the documentation that accompanies the public releases of the two surveys. The majority of these operations of recoding were elementary. The most interesting exception has been the recoding of the occupational sector variable for the 1989 and 1992 waves of the CES, where there is an additional category, "self-employed", that in the SCF is not taken into account. In this case we performed a multinomial logit estimation to impute the occupational sector to the CES individuals labeled as "self-employed" in order to proceed with the matching with the SCF. The estimation results were in line with the distributions of the occupational variable both in the SCF and in the subsequent editions of the CES.

3.3 Pseudo-panel: construction and characteristics

Following Browning et al. (1985) and Deaton (1985), we constructed panel data from the time series of cross sections resulting from the sample combination procedure. This method allows us to overcome the major limitation of repeated cross-sectional data, that is the fact that the same individuals are not followed over time. Pseudo-panel data present the additional advantage of dealing with the attrition problem more flexibly with respect to genuine panel data.

In this section we define cohorts based on the year of birth of the household head. Each cohort consists of households whose head was born within four-year period: the oldest cohort is for individuals born between 1906 and 1909, and the youngest for individuals born between 1986 and 1989. The resulting dataset is composed by 21 cohorts and 7 years of data (see Table 2 for more details). Figure 8 plots the evolution of the ratio of net wealth over income over the life cycle. Each line corresponds to a different cohort. It is interesting to notice that the ratio rises somewhat constantly starting from the beginning of the age of majority, until it experiences a decline between 70 and 80 years old. It is important to note that Figure 8 does not control for changes in family composition or other demographic variables. Figure 9 is built in a similar way, and shows the ratio of non durables consumption on income over the life cycle. The profiles are hump-shaped over the life cycle, reflecting the evolution of the income profiles. At the beginning of the age of majority income is typically low, leading to values of the ratio larger than one. Then, as income rises, this

[9] However, we also performed the matching procedure without this preliminary operation and the resulting dataset did not differ dramatically from the one that we used. This is not surprising, because the Mahalanobis procedure discards the SCF households that differ considerably from the CES households in terms of income (and age), so that most of the preliminarily dropped SCF individuals would have been discarded anyway by the matching algorithm.

kind of expenditure represents a declining share of it (reaching a minimum of around 0.5), until the age of retirement, when income decreases due to retirement.

4. Model and results

4.1 The model

Following the literature on life cycle consumption, the basic specification of our model would be the following, if household-level panel data were available:

$$\log(C_{it}) = \alpha_1 \log(Y_{it}) + \alpha_2 \log(wealth_{it}) + \beta' Z_{it} + k_i + \varepsilon_{it} \qquad (1)$$

where C_{it} is consumption (either total, non durables or durables consumption), Y_{it} is current income and $wealth_{it}$ is household wealth in various alternative decompositions (tangible and financial assets – specification 1; housing, other real estate and gross financial wealth – specification 2; housing, other real estate and net financial wealth – specification 3). k_i is a fixed (time-invariant) individual effect; Z_{it} is a vector of additional socio-demographic controls: age, educational level of the household head, and some year dummies (from 1989 to 2004, with 2007 as the reference period). Finally, ε_{it} is a time-varying and individual-specific error term.

However, we estimate a similar model based on a pseudo-panel, thus equation (1) has to be aggregated over all individuals within a specific cohort. We obtain the following model, that refers to cohorts rather than individuals (indexed by *c*, instead of *i*):

$$\log(\bar{C}_{ct}) = \alpha_1 \log(\bar{Y}_{ct}) + \alpha_2 \log(\overline{wealth}_{ct}) + \beta' \bar{Z}_{ct} + \bar{k}_{ct} + \bar{\varepsilon}_{ct} \qquad (2)$$

where the variables are the cohort means. Note that, differently from the individual fixed effect in equation (1), the mean of the cohort effect is no longer necessarily constant over time, since the pseudo-panel is composed by independent cross sections, so that the same individuals are not present in more than one of them. It can be expected that the cohort effect will be correlated with the explanatory variables, leading to inconsistent estimates. Deaton (1985) solves this problem by considering the model in terms of unobserved population cohort means and the actual cohort data as error-ridden measurements of these means, thus suggesting an error-in-variables estimator. We therefore estimate a fixed effects model, correcting for the measurement errors in observed cohort means.

In our analysis we use three different specifications of the model in equation (2), in order to investigate the role of the different components of household wealth. Specification 1 divides wealth between tangible and financial assets; in specification 2 we further decompose tangible wealth in the value of the house of property and other real estate; finally (specification 3), we use net financial wealth instead of gross financial wealth.

Additionally, these three specifications are estimated with three alternative dependent variables: the logarithms of total consumption and of its two main components, durables and non-durable goods expenditure. However, the latter is more appropriate and, also, more closely related to most of the previous literature. On the contrary, the use of expenditure on durable goods poses some problems, since its timing does not match the flow of services coming from the goods. The relationship between consumption, income and wealth applies to the flow of consumption, but durable good expenditure "represents replacements and additions to a stock, rather than the service flow from the existing stock" (Paiella 2007b, 198). This is why we will mainly concentrate on the results for total and, above all, non durable goods consumption.[11]

We also investigate the dynamics pertaining to the older households by estimating the models separately for the subsample of households whose head is older than 64, and for the subsample of the younger than 65 years old. The results are presented in the next subsection.

4.2 Results

The results of the estimation of equation (2) are reported in Tables 3-11. For reasons of expositional clarity, only the coefficients of the main variables of interest are reported (complete results are available on request). We therefore reported the coefficients associated to income and the wealth variables. All the estimations take into account the multiple imputation used in the SCF using the RII (see Montalto and Sung, 1996). Very briefly, every year the SCF consists of five complete data sets because missing data are multiply imputed, going from implication 1 to implication 5. For each survey year, we performed the sample matching with the CES separately for every implication, thus obtaining five different datasets for each year of interest (1989, 1992... and 2007). Then, in order to get the whole time series of cross-sections, we aggregated all the implications 1, then all the implications 2, and so on until the implications number 5, obtaining 5 different implications of the

[11] Additionally, the issue of endogeneity is likely to heavily affect the results in the case of durable goods expenditure, more than when non-durable goods expenditure is used as the dependent variable. Suppose a household buys a car in 2004: we will observe an increase both in tangible wealth and in durables consumption, a fact that will pose some problems in the estimation of the wealth effect (spurious relationship). Using non-durables consumption as the dependent variable mitigates this problem.

same dataset, from which obtaining our pseudo-panel.[12] Thanks to the RII, we use information from all these five data sets in order to make valid inferences, taking into account the extra variability in the data due to imputation.

The results of the estimation of equation (2) for the whole sample (126 non empty cohorts, obtained from 73,329 individual observations) are reported in Tables 2-4, because of the three specifications based on the different decompositions of household wealth. In each table, the results are reported separately for models with a different dependent variable. As said, it is problematic to use durable goods expenditure as the dependent variable in this kind of analysis, therefore, we disregard the models with this dependent variable in the rest of the discussion, even if we report some results in Table 3. Also, due to the importance of the durables part of household consumption (see Romer, 1990), throughout the whole paper we use both total consumption and non-durables consumption as dependent variables, to check if the results hold for the "most proper" measure of consumption (non-durables) as well as for the most comprehensive measure (total consumption).

Tables 3-5 show that current income significantly affected consumption in the period 1989-2007, since its coefficient is always highly significant. The estimated elasticity ranges between 0.41 and 0.57, indicating that current income plays a very important role in determining current consumption. Turning to the household wealth coefficients, it is interesting to notice that its different components do have different effects on consumption. In particular, financial wealth did not positively affect consumption during the period of interest, neither when it enters the analysis in gross terms, or as a net measure. On the contrary, tangible wealth positively affected consumption throughout the whole period of interest, with an estimated elasticity reaching 6 cents per dollar in some cases, namely when the disaggregation of wealth reveals that the house of residence is the main component of wealth to positively affect consumption.

The behavior of the older households is investigated by splitting the sample in two: the results of the estimations carried out with the subsample composed by households whose head is more than 64 years old are reported in tables 6-8. Tables 9-11 contain the results for the younger subsample. The results show that old people experience a lower elasticity of consumption with respect to current income, ranging between 16 and 29 cents per dollar. However, the estimated tangible wealth effect is large (even more than 6 cents per dollar), and it is highly significant thorughout the various specifications and with both the dependent variables used (total and non-durables consumption). In particular, when total consumption is the dependent variable, the results for specifications 2 and 3 show that also the real estate properties other than the house of residence do exert positive effects

[12] This was only one of the 5^5 possible combinations of the various implications. We chose this particular one for the sake of simplicity, and due to the non-impressive differences among the various implications, we find it accurate enough to guarantee the goodness of the results.

on consumption (with a similar elasticity). On the contrary, current income is far more important than wealth in determining consumption when the analysis is limited to the households whose head is less than 65 years old (see tables 9-11 for the details). In this case, the elasticity of consumption to current income ranges between 40 and 50 cents per dollar, while the house of residence is the only component to positively and significantly affect consumption (in particular, non-durables expenditure), with an elasticity slighlty smaller than 3 cents per dollar.

To conclude, wealth surely plays a role in determining consumption and savings patterns of American households during the period 1989-2007. However, the phenomenon is multi-faceted, since various kinds of wealth affect consumption in different ways. In particular, financial wealth does not seem to exert positive effects on it, while tangible wealth does, particularly through the value of the house of residence. Additionally, the direct wealth effect phenomenon is more important for older households, while the younger ones rely more on current income when deciding their expenditure levels.

We investigated the robustness of our findings in several ways. The results hold when we get rid of the 1% of household that are at the top and at the bottom both of the income and of the consumption distributions. As said previously, the results are also robust to variations of the sample combining procedure. This robustness is not surprising, since our sample is very large, and it is unlikely that our results are driven by outliers or by small subsamples of households.

5. Conclusions

This paper analyses the strength of the wealth effect on consumption in the USA with a pseudo-panel dataset specifically built for this scope. We combine data from the CES and the SCF for the years 1989-2007. In particular, the SCF was used as the "donor" survey: its wealth data were given to CES households in order to enrich the data collected in this latter survey and to perform an analysis capable to link consumption and wealth using household-level data. This sample combination produced a large time series of cross sections (more than 70,000 observations) capable to respect the properties of the distributions of the variables of interest present in each of the two original survey. The resulting dataset was then used to build a pseudo-panel dataset aggregating individual observations in cohorts based on the year of birth of the head of the households. Each cohort consists of households whose head was born within four-year period: the oldest cohort is for individuals born between 1906 and 1909, and the youngest for individuals born between 1986 and 1989. The resulting dataset is composed by 21 cohorts and 7 years of data. The effects of wealth were investigated using three different dependent variables: non durables, durables and total consumption. However, the first is the most correct measure of consumption to be used in this kind

of analysis, as widely discussed previously. Also, our dataset permits a high disaggregation of tangible wealth, as well as a differentiation between net and gross financial wealth. We differentiate between financial and tangible wealth, the latter further disaggregated into the value of the house of residence and the other real estate properties; in addition, we investigate the role of debt on consumption decisions by studying both gross and net wealth. We also investigate the consumption determinants of the older households, by performing the analysis separately for the subsample of households whose head is more than 64 years old.

The main result of our study is that tangible wealth is the main type of household wealth to significantly and positively affect consumption during the period of interest, 1989-2007. The estimated elasticity of consumption spending with respect to tangible wealth is around 4 cents per dollar, which is not far from previous estimates. In particular, the house of residence is the part of tangible wealth which is responsible for the highest direct wealth effect, reaching more than 6 cents per dollar in some of the estimates. It seems that households tend to consume both out of their house of residence and out of their other real estate properties, even if the latter matters for older households only. On the other hand, our results suggest that financial wealth does not exert any positive direct effect on household consumption. This piece of evidence adds to the mixed results of the previous literature, where the widest range of results has been found for this kind of wealth. Among the additional results, older households experience a higher tangible wealth effect (that is, extract more liquidity from their assets, as predicted by theory), while they have a lower elasticity of consumption with respect to income. Not only that: it seems that the wealth effect primarily concerns older households, since for the younger ones current income is the main determinant of consumption and the extraction of liquidity from assets seems to be a negligible phenomenon.

Overall, the results seem to suggest that the fears of sizable reverse direct wealth effects due to a sudden declines in housing values could have been overstated previously (one exception being Case and Quigley, 2008), since the values involved are not impressive. Indeed, the dynamics of the recent economic and financial crises (2007-2009) do not reveal any direct linkage between the declining housing prices and household consumption, rather they shed light on the perverse mechanisms of the real estate and credit (mortgages in particular) markets.

Then, since wealth seems to play an important, though not decisive role in determining the consumption dynamics of the households, some other considerations must be at the roots of the impressive decline of saving rates observed in the USA, and in other developed countries as well, in the last twenty years. Policy makers should concentrate on these other determinants if willing to manipulate the consumption and saving patterns of the economy.

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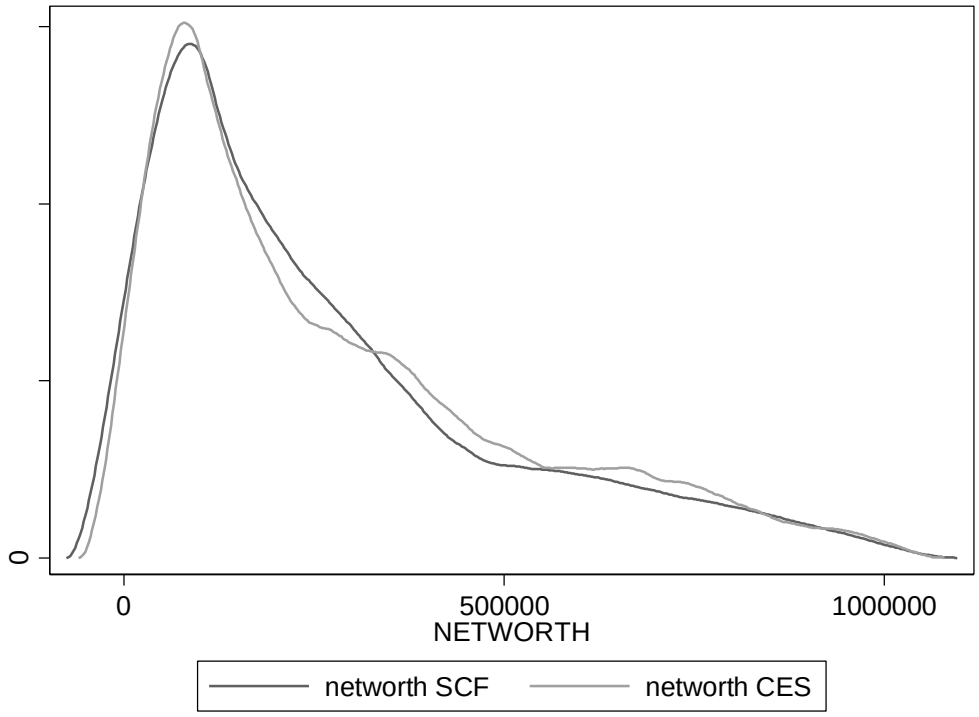
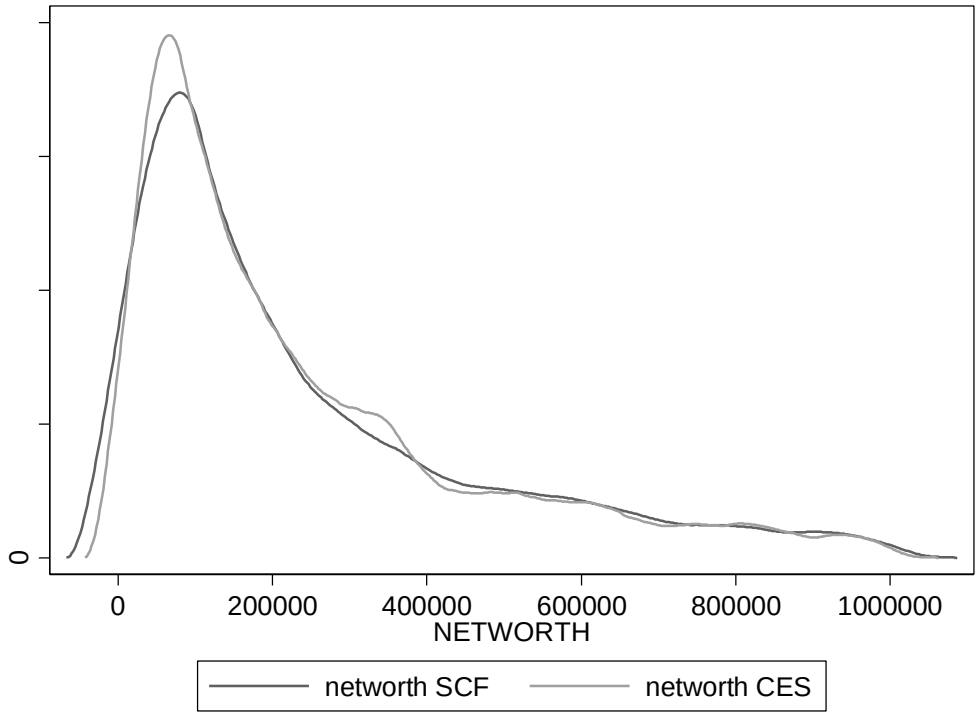
Figures

Figure 1: Household net wealth kernel distribution, 2007



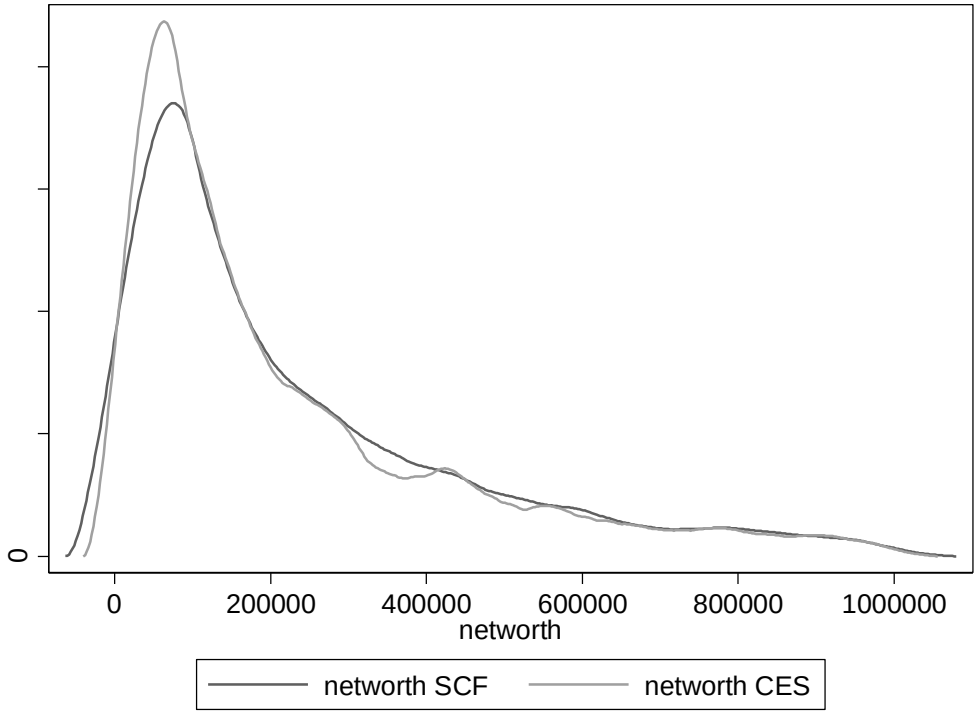
Source: SCF and CES 1989-2007, own computations.

Figure 2: Household net wealth kernel distribution, 2004



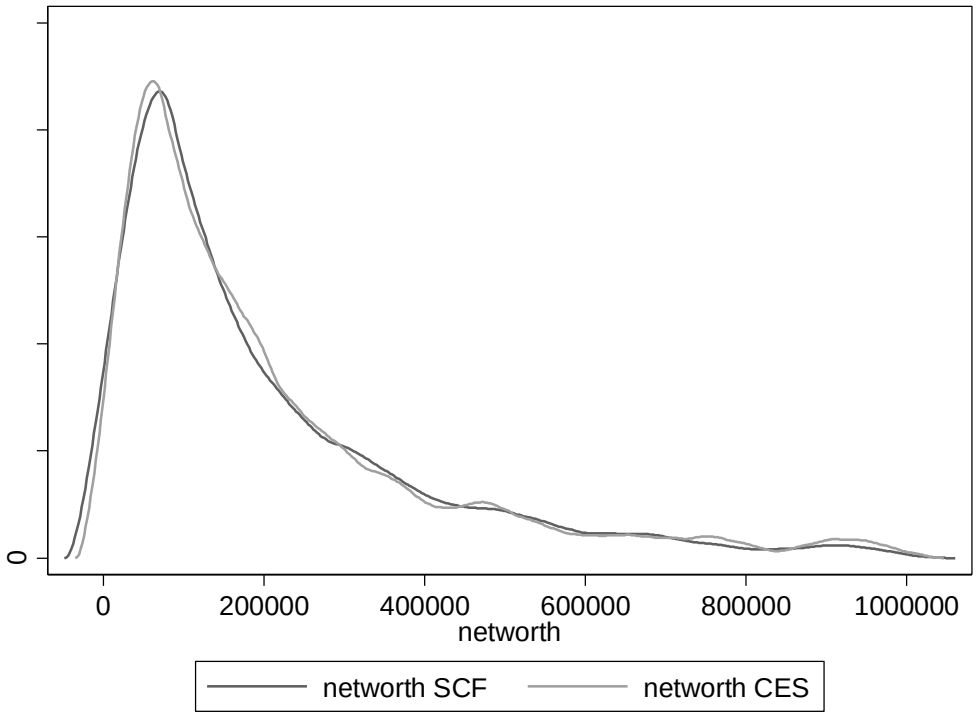
Source: SCF and CES 1989-2007, own computations.

Figure 3: Household net wealth kernel distribution, 2001



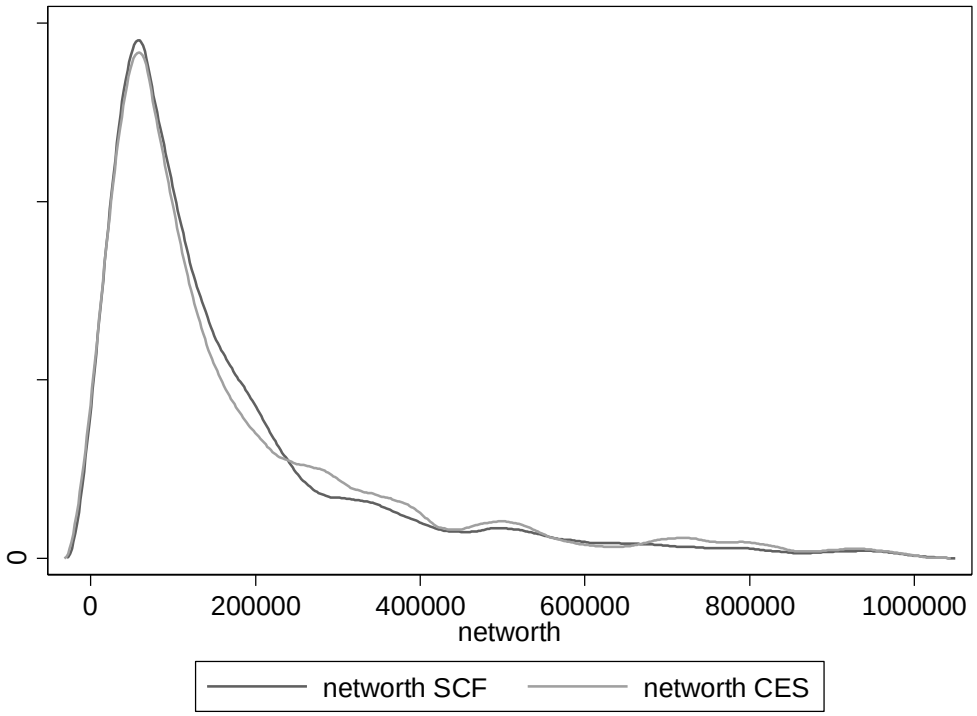
Source: SCF and CES 1989-2007, own computations.

Figure 4: Household net wealth kernel distribution, 1998



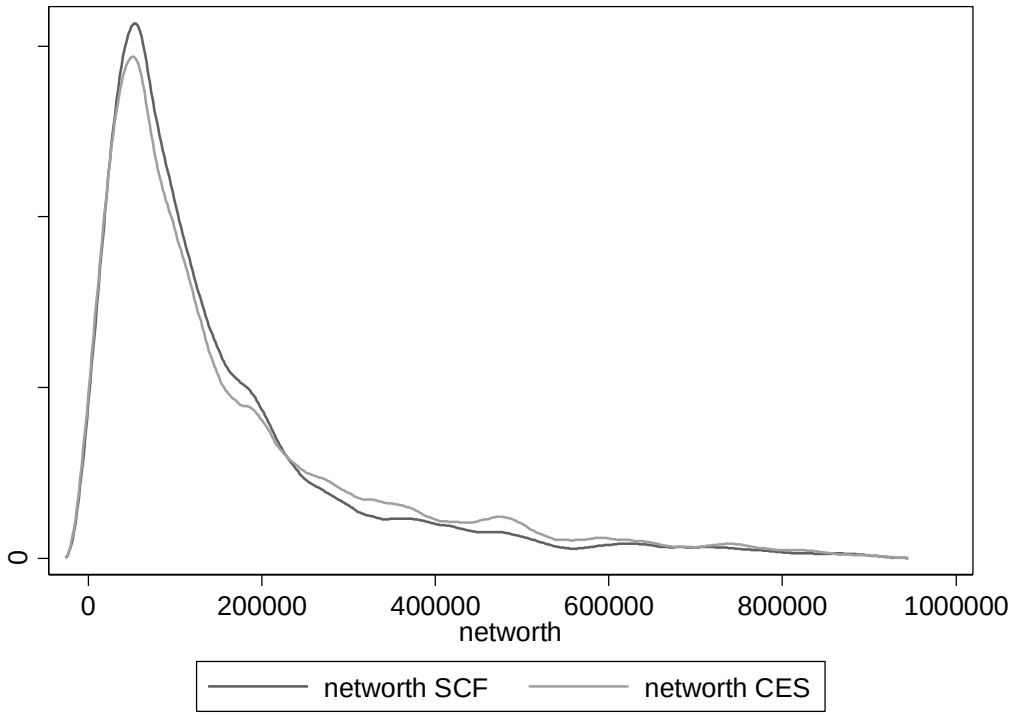
Source: SCF and CES 1989-2007, own computations.

Figure 5: Household net wealth kernel distribution, 1995



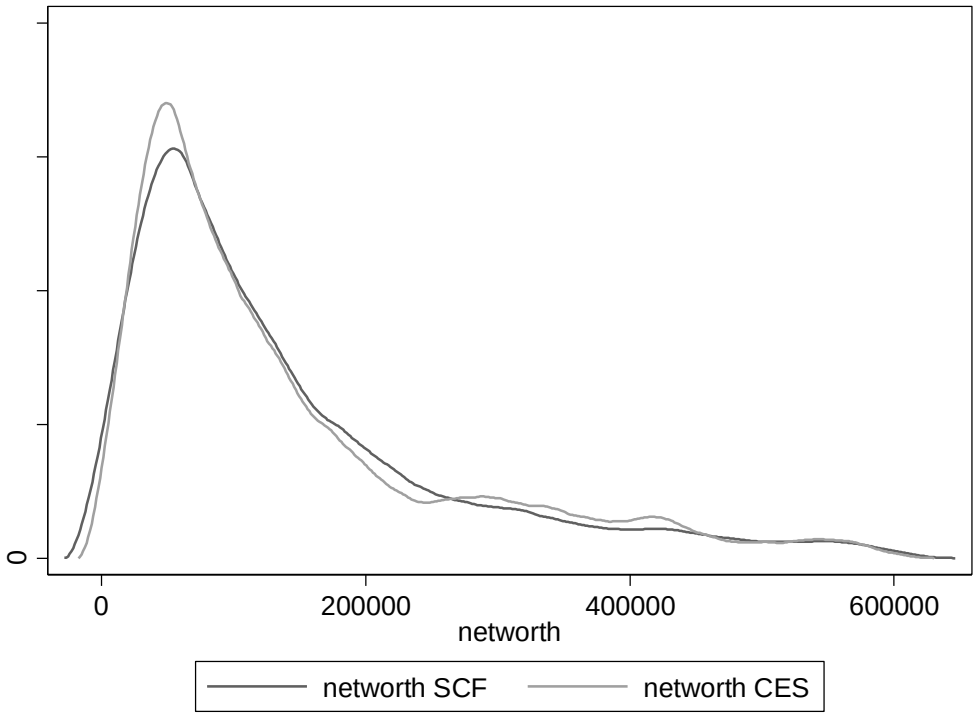
Source: SCF and CES 1989-2007, own computations.

Figure 6: Household net wealth kernel distribution, 1992



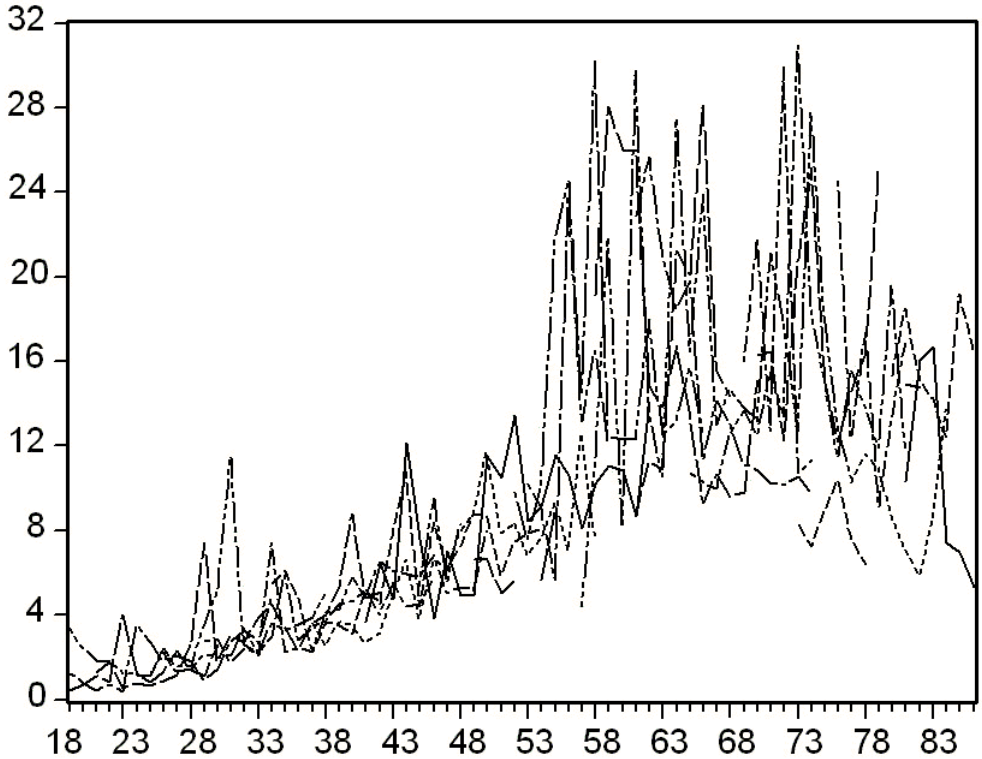
Source: SCF and CES 1989-2007, own computations.

Figure 7: Household net wealth kernel distribution, 1989



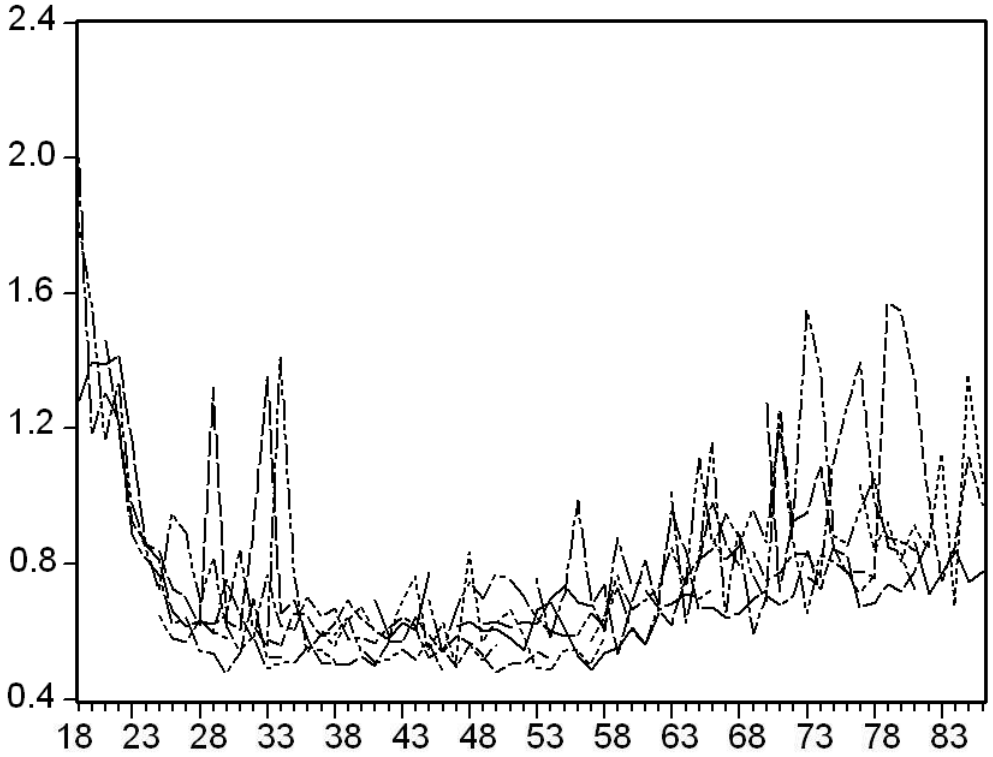
Source: SCF and CES 1989-2007, own computations.

Figure 8. Ratio of net wealth over income over the life cycle – cohort averages. Each line corresponds to a different cohort.



Source: SCF and CES 1989-2007, own computations.

Figure 9. Ratio of non durables consumption over income over the life cycle – cohort averages. Each line corresponds to a different cohort.



Source: SCF and CES 1989-2007, own computations.

Tables

Table 1: correlations between logarithmic income and the wealth (SCF) variables

	2007		2004		2001		1998	
	SCF	CES	SCF	CES	SCF	CES	SCF	CES
fin	0.26***	0.16***	0.26***	0.18***	0.27***	0.14***	0.22***	0.11**
nfin	0.27***	0.30***	0.25***	0.26***	0.24***	0.18***	0.19***	0.17***
asset	0.32***	0.29***	0.30***	0.26***	0.31***	0.20***	0.25***	0.17***
debt	0.46***	0.43***	0.41***	0.40***	0.47***	0.42***	0.38***	0.29***
networth	0.30***	0.26***	0.28***	0.23***	0.29***	0.18***	0.23***	0.16***
kgtotal	0.21***	0.21***	0.18***	0.15***	0.18***	0.09**	0.13***	0.12**

	1995		1992		1989	
	SCF	CES	SCF	CES	SCF	CES
fin	0.18***	0.12**	0.24***	0.19***	0.25***	0.08***
nfin	0.20***	0.09**	0.16***	0.09***	0.21***	0.10***
asset	0.24***	0.12***	0.21***	0.11***	0.27***	0.13***
debt	0.32***	0.29***	0.28***	0.14***	0.39***	0.33***
networth	0.22***	0.10***	0.19***	0.10***	0.25***	0.12***
kgtotal	0.14***	0.04**	0.12***	0.07***	0.15***	0.06***

, * significant at 5 and 1% respectively.

Table 2. Number of households in the dataset, by date of birth and year of survey

	Date of birth of head of household, and cohorts																				
Oldest:																					
19-	06	10	14	18	22	26	30	34	38	42	46	50	54	58	62	66	70	74	78	82	86
Youngest:																					
19-	09	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69	73	77	81	85	89
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1989	181	270	341	416	448	385	364	409	470	522	737	735	776	809	688	405	139	0	0	0	0
1992	147	231	333	390	433	371	343	370	411	562	657	776	834	783	744	577	440	21	0	0	0
1995	92	151	219	364	350	392	332	337	373	482	626	697	696	794	726	584	468	249	0	0	0
1998	48	135	224	297	414	443	479	418	417	519	724	816	842	864	843	787	740	551	268	0	0
2001	0	0	565	99	414	494	511	515	521	653	866	943	983	1111	1080	968	905	723	662	165	0
2004	0	0	0	696	221	512	521	599	692	825	990	1131	1228	1256	1227	1121	1020	890	771	629	82
2007	0	0	0	485	81	396	434	463	521	687	827	893	1031	1094	1032	949	957	852	759	629	371

Table 3: equation (2), whole sample – specification 1

	Total consumption	**Non-durables cons.**	**Durables cons.**
Income	0.569***	0.491***	0.795***
	(0.030)	(0.033)	(0.059)
Financial assets	-0.017	-0.012	-0.095***
	(0.014)	(0.015)	(0.029)
Tangible assets	0.037***	0.044***	0.036
	(0.012)	(0.013)	(0.088)
Obs.	126	126	126

Note: All the estimations were carried out using the Repeated Imputation Inference (RII) , using all the five implications resulting from the CES procedure of imputing missing income values. *** significant at 1%; standard errors in parenthesis.

Table 4: equation (2), whole sample – specification 2

	Total consumption	**Non-durables cons.**
Income	0.533***	0.441***
	(0.028)	(0.029)
Financial assets	-0.023*	-0.020
	(0.013)	(0.013)
House	0.049***	0.060***
	(0.011)	(0.011)
Other real estate	0.014	0.011
	(0.013)	(0.013)
Obs.	126	126

Note: All the estimations were carried out using the Repeated Imputation Inference (RII) , using all the five implications resulting from the CES procedure of imputing missing income values. *** significant at 1%; standard errors in parenthesis.

Table 5: equation (2), whole sample – specification 3

	Total consumption	**Non-durables cons.**
Income	0.507***	0.407***
	(0.030)	(0.031)
Net financial assets	-0.010	-0.017**
	(0.008)	(0.008)
House	0.049***	0.060***
	(0.011)	(0.011)
Other real estate	0.016	0.016
	(0.013)	(0.013)
Obs.	126	126

Note: All the estimations were carried out using the Repeated Imputation Inference (RII) , using all the five implications resulting from the CES procedure of imputing missing income values. **, *** significant at 5 and 1% respectively; standard errors in parenthesis.

Table 6: equation (2), older households' subsample – specification 1

	Total consumption	**Non-durables cons.**
Income	0.162*	0.255***
	(0.009)	(0.089)
Financial assets	-0.012	-0.028*
	(0.015)	(0.016)
Tangible assets	0.062***	0.043**
	(0.019)	(0.017)
Obs.	44	44

Note: All the estimations were carried out using the Repeated Imputation Inference (RII) , using all the five implications resulting from the CES procedure of imputing missing income values. *, **, *** significant at 10, 5 and 1% respectively; standard errors in parenthesis.

Table 7: equation (2), older households' subsample – specification 2

	Total consumption	**Non-durables cons.**
Income	0.168*	0.276***
	(0.087)	(0.089)
Financial assets	-0.012	-0.032**
	(0.015)	(0.016)
House	0.064***	0.055***
	(0.019)	(0.018)
Other real estate	0.058**	0.025
	(0.025)	(0.025)
Obs.	44	44

Note: All the estimations were carried out using the Repeated Imputation Inference (RII) , using all the five implications resulting from the CES procedure of imputing missing income values. *, **, *** significant at 10, 5 and 1% respectively; standard errors in parenthesis.

Table 8: equation (2), older households' subsample – specification 3

	Total consumption	**Non-durables cons.**
Income	0.174**	0.290***
	(0.087)	(0.090)
Net financial assets	-0.011	-0.022**
	(0.008)	(0.009)
House	0.059***	0.043**
	(0.016)	(0.017)
Other real estate	0.054**	0.016
	(0.023)	(0.022)
Obs.	44	44

Note: All the estimations were carried out using the Repeated Imputation Inference (RII) , using all the five implications resulting from the CES procedure of imputing missing income values. **, *** significant at 5 and 1% respectively; standard errors in parenthesis.

Table 9: equation (2), younger households' subsample – specification 1

	Total consumption	**Non-durables cons.**
Income	0.501***	0.406***
	(0.030)	(0.035)
Financial assets	-0.034***	-0.021
	(0.013)	(0.014)
Tangible assets	0.014***	0.016
	(0.012)	(0.013)
Obs.	88	88

Note: All the estimations were carried out using the Repeated Imputation Inference (RII) , using all the five implications resulting from the CES procedure of imputing missing income values. *** significant at 1%; standard errors in parenthesis.

Table 10: equation (2), younger households' subsample – specification 2

	Total consumption	**Non-durables cons.**
Income	0.501***	0.404***
	(0.030)	(0.033)
Financial assets	-0.036***	-0.025*
	(0.010)	(0.014)
House	0.018	0.027**
	(0.011)	(0.012)
Other real estate	0.010	0.007
	(0.013)	(0.014)
Obs.	88	88

Note: All the estimations were carried out using the Repeated Imputation Inference (RII) , using all the five implications resulting from the CES procedure of imputing missing income values. *, **, *** significant at 10, 5 and 1% respectively; standard errors in parenthesis.

Table 11: equation (2), younger households' subsample – specification 3

	Total consumption	**Non-durables cons.**
Income	0.493***	0.395***
	(0.033)	(0.036)
Net financial assets	-0.002	-0.006
	(0.008)	(0.008)
House	0.014	0.026**
	(0.011)	(0.012)
Other real estate	0.010	0.008
	(0.013)	(0.014)
Obs.	88	88

Note: All the estimations were carried out using the Repeated Imputation Inference (RII) , using all the five implications resulting from the CES procedure of imputing missing income values. **, *** significant at 5 and 1% respectively; standard errors in parenthesis.