Wealth effect in the US: evidence from the combination of two surveys

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Abstract. In this article we investigate the role of wealth in household consumption during the period 1989-2007 using a household-level cross sectional dataset. We combine information from the Consumer Expenditure Survey and the Survey of Consumer Finances to build a detailed dataset for the US for this. We adopt a sample combination procedure which differs considerably from that used earlier by other researchers. When comparing our results with previous research, we find a higher elasticity of consumption with respect to income and a lower elasticity of consumption with respect to both housing wealth and, particularly, to financial wealth.

Keywords: *Consumption, Wealth effect, Household wealth, Sample combination.*

JEL classification: D12, E21.

1. Introduction

During the Nineties and up to the 2007 subprime mortgages crisis, increasing stock and house prices coincided with a considerable decline in the US savings rate. This led to a renewed interest in the understanding of the determinants of savings and consumption. In particular, the recent literature has concentrated on the effects of household wealth on consumption through the so called 'wealth effect' channel (Paiella 2009). For example, Greenspan (2003) credited housing wealth, realized capital gains, and home equity borrowing with shoring up the economy in the aftermath of the stock market collapse of 2000 and the recession of 2001, primarily through their effects on consumer spending. Some authors claim that the decline in the personal saving rate is due to the significant capital gains in corporate equities experienced over this period (Juster et al., 2005). Others conclude that there is, at best, weak evidence of a stock market wealth effect, and they underline the importance of housing wealth in determining the households' decisions on consumption and savings (Case et al., 2005). However, the mechanism through which wealth affects consumption is not clearly understood. While the arguments supporting a direct wealth effect are clear (changes in wealth directly cause changes in consumption through their effect on households' contemporaneous budget sets), the empirical evidence from the large literature that investigates the role of wealth shocks on consumption is inconclusive. Moreover, wealth can affect consumption through the indirect channel of providing collateral for obtaining access to credit (Hurst and Stafford, 2004, Carroll et al., 2003).

We investigate the role of wealth in household consumption during the period 1989-2007 using a household-level cross-sectional dataset specifically built for this purpose. Given the absence of a single survey containing detailed data on both variables, we combine information from the Consumer Expenditure Survey (CES) and the Survey of Consumer Finances (SCF). Essentially, we impute the SCF wealth variables to the CES households (i.e. we use the SCF as a donor to enrich the set of CES variables) in order to estimate a consumption equation with wealth, in its various components, as one of the main explanatory variables. To the best of our knowledge, a similar procedure has previously been used only once for similar purposes, by Bostic et al. (BGP) (2009). However, we adopt a sample combination procedure which differs considerably from the one implemented by BGP (2009) by following closely the rigorous guidelines on data matching outlined by Ridder and Moffitt (2007). In their paper, they provide a comprehensive survey that aims at guiding and stimulating research on data combination. The aim of our paper is to set an empirical standard for future sample combination procedures. Thus, we offer a Web Appendix complete with all the codes in order to ensure not only the repeatability of our analysis, but also to make it possible to follow a similar practice for future analyses. In fact, the previous literature on the wealth effect is beset with the problem of low quality data, resulting in mixed empirical evidence (Paiella, 2009). By comparing our results with those of BGP (2009), we show that while some of the previous findings hold, most of them are substantially different. We discuss reasons for these differences in the paper.

In particular, we confirm that housing wealth effects are larger than financial wealth effects. However, the quantitative importance of both types of effects is found to be substantially lower than previously estimated, in line with studies that use aggregate data (e.g. Duca et al. 2011). We then confirm a downward trend in the importance of wealth in determining consumption until 2001, but also document a reversal of this tendency in 2004 and 2007. Finally, we achieve a better understanding of the role played by net wealth, found to positively affect consumption of the older households.

The rest of this paper is organized as follows. Section 2 provides a review of the previous literature. Section 3 describes the data used and how they were combined. The econometric model (taken from BGP, 2009) is also presented. Section 4 presents and discusses the estimates, emphasizing the effects of the improved data construction on the results. Section 5 concludes briefly.

2. The wealth effect in the literature

There is a large literature devoted to the study of the wealth effect. Most of it is based on the life-cycle model originally proposed by Ando and Modigliani (1963), and recently updated by, e.g., Aguiar and Hurst (2007) building on the New Home Economics literature originating with Becker (1965).[1] According to the life-cycle theory, an increase in wealth leads 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, 2007). 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, 2007, 191). Thus, the appraisal of the wealth effect is an empirical matter. Consequently, a wide range of estimates have been produced. For the US 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.

Aggregate data analysis typically finds positive effects of increases in wealth on private consumption (Davis and Palumbo, 2001; Mehra, 2001). In addition, the real estate wealth effect seems to be larger than the stock market wealth effect. This arises from studies that concentrate either on the former (Belski and Prakken, 2004; Catte et al. 2004), the latter (Ludvigson and Steindel, 1999; Poterba 2000; Edison and Sløk, 2002; Case and Quigley 2008), or both (Benjamin et al., 2004; Case et al., 2005). As it is common in the empirical literature, some authors find opposing results on the relative importance of the two types of wealth effects (e.g. Dvornak and Kohler, 2007). There is no consensus on the econometric techniques to adopt, either. In particular, some studies try to isolate the short run effects of wealth changes from the long run effects, due to the belief that wealth shocks must be perceived as permanent in order to affect consumption. While most of these studies adopt cointegration methods to disentangle between the short run and the long run (Lettau and Ludvigson, 2004), some authors choose alternative ways (e.g. Carroll et al., 2006; Morris, 2006).

However, the use of aggregate data has been criticized due to the potential endogeneity arising out of the link between wealth, past savings/consumption decisions, and movements of asset prices. Attanasio and Banks (2001) also advise not to use aggregate data because of aggregation issues and difficulties in decomposing age, cohort and time effects. Generally, household-level data studies tend to confirm the results of the studies that use aggregate data (Levin, 1998, is a notable counterexample, as he concludes that wealth does not affect consumption), but have an enhanced ability to distinguish between different channels through which wealth changes affect consumption. Depending on the data used, some authors have been able to shed light on the role of liquidity constraints and precautionary savings (e.g. Egelhardt, 1996, and Campbell and Cocco, 2007, respectively).

[1] Also, seminal papers by Becker (1981) and Ghez and Becker (1975) have inspired recent empirical studies on consumption and retirement (e.g. Aguiar and Hurst, 2005). See Attanasio and Weber (2010) for a comprehensive survey.

In addition, household-level data may permit distinguishing between durables and non-durables consumption (e.g. Fernandez-Villaverde and Krueger, 2007), and, on the wealth side, among different components of both financial and housing wealth (e.g. Juster et al., 2005). Accordingly, a whole strand of literature uses household-level data to investigate the magnitude of the wealth effect. While there are few studies on economies other than the US (Campbell and Cocco, 2007 on the UK; Paiella, 2007 on Italy), most authors concentrate on the US economy (Engelhardt, 1996; Skinner, 1996; Parker, 1999; Dynan and Maki, 2001; Lehnert, 2004). This is due to the availability of many US survey and panel datasets, such as the CES, the Panel Study of Income Dynamics (PSID), or the SCF. However, each of those, taken in isolation, has drawbacks for the type of analysis considered here. The PSID contains data on food consumption only, and data on household wealth have been collected only every five years since 1984. The CES has detailed consumption data, but the quality of its wealth data is low due to limitations both in scope and precision. It is now also widely agreed that it substantially underestimates consumption, particularly at the higher income levels (this could imply smaller apparent wealth effects). On the other hand, the SCF does not contain detailed consumption variables, but information on wealth is collected very accurately. Some authors (e.g. Maki and Palumbo 2001) tried to overcome these problems by using cohort-level analysis based on the original ideas by Browning et al. (1985) and Deaton (1985) by combining aggregate and household level data. An interesting alternative is the one adopted in the paper more closely related to ours (BGP, 2009), where a sample combination technique has been used to obtain a dataset suitable for an analysis of the wealth effect.

The focus of our paper lies in the careful construction of a new household-level dataset combining information from the CES and the SCF in order to check if the data construction process significantly affects the wealth effect estimates. A sample combination procedure is used to impute missing values of wealth variables to households for which detailed consumption data have been collected. We make sure to satisfy the conditions needed for such a procedure, i.e. the fact that both samples must be drawn from the same population, and that there are sufficient common socio-demographic variables on which to base the combination procedure. The process generates a dataset which contains a large amount of information, which helps in dealing with the problem of omitted variables, and therefore moderates the issue of endogeneity. Similar methods of integrating different sources of information have been recently used by some national institutes of statistics as a convenient way of obtaining detailed datasets without having to incur the costs of producing brand new surveys (Rosati, 1998; Del Boca et al., 2005). We closely follow the guidelines established in the literature (Ridder and Moffitt, 2007; D'Orazio et al., 2006). The next section deals with the various steps of the sample combination procedure. We then perform an econometric estimation close to the one performed by BGP (2009) in order to compare the results arising from the two different datasets.

3. Data and model

3.1 CES and SCF data

Our analysis utilizes wealth data from the SCF in order to enrich the information contained in the CES for the period 1989-2007.[2] The dataset resulting from the combination of these two surveys contains data on both consumption and wealth, making it the appropriate source for the analysis of the wealth effect. It also contains a rich set of additional socio-economic variables that attenuate the problem of endogeneity arising from omitted variables.

The CES is collected by the Bureau of Labor Statistics (BLS) to compute the Consumer Price Index (CPI), and contains data on a large proportion of total household expenditures (see Garner et al., 2006). 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 is replaced by new households. As the survey contains quarterly data, we had to extrapolate data on yearly consumption to perform the combination with the SCF. 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 as 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 task of estimating annual consumption in many dimensions. First, the year 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, and therefore don't report all the expenditures made in one year. What follows is a detailed explanation of the procedure used to obtain annual data from the CES.

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 for three periods or fewer. First, we harmonized the expenditure variables using the CPI in order to have all expenditures expressed in the prices of June of the reference year. Second, we seasonally adjusted 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 computed the sum across quarters. We believe that this procedure does not produce distorted measures according to the number of quarters for which there are data in the CES, due both to the CPI harmonization and, more importantly, the seasonal adjustment. We also 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, and found no significant differences. For each household, in addition

[2] The CES contains both the Diary Survey and the quarterly Interview Survey. We used the latter, which constitutes the bulk of the survey, containing all kinds of expenditure, while the Diary Survey only serves as a supplement for different details.

to the consumption variables, both for total and non-durables expenditure, we kept socio-demographic variables and annual income.[3]

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 contains socio-demographic information that proved valuable for the statistical matching procedure. 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, because the SCF question frame was different in earlier periods, and ends in 2007, with 7 periods in total. In addition, we used the information contained in all the five implications of the SCF (five different versions of the dataset that derive from the multiple imputation procedure used to approximate the distribution of missing data, as explained by Kennickell, 1998), by performing the sample combination with the CES separately for each implication. To accurately account for multiple imputation, the estimation of the consumption models has been carried out using Repeated Imputation Inference (RII, see Rubin 1987, Montalto and Sung 1996). Briefly, this method exploits all the five implications of the SCF dataset and combines the resulting estimates in order to produce the best point estimates and estimates of variance for the parameters of interest in the case of imputed missing values. The resulting dataset is different from that of BGP (2009) in many respects. First, we end up with both a higher number of observations and a larger number of variables. Second, we do not constrain the analysis to home owners only. Third, we are able to keep households whose head is older than 65 years old. Fourth, our analysis includes the years 2004 and 2007, while BGP (2009) include data up to 2001 only.

3.2 The matching 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. The resulting "augmented" CES 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 the principles and suggestions outlined by Ridder and Moffitt (2007). The details of the procedure are the following.

We first partitioned both samples into cells based on six categorical variables in order to avoid matching individuals that differ in important characteristics. For the year 2007, and similarly for the other years, more than 700 cells were created, compared to 72 cells made by BGP (2009). Using a higher number of cells should lead to a more accurate match, ensuring a higher similarity between matched households. However, there could be relatively "poor" matches in cells containing a low number of households, and this is the reason why we refined the matching using the distance variable (that summarizes the differences between households) as explained below. The variables used to create the cells are the following:

* Race - white, black or other;

[3] We had to decide how to proceed with the households for which socio-demographic variables changed from one quarter to another. For example, when the educational status changed from one quarter to another, we used the educational status of the quarter closer to the central quarter of the year (this turned out not to be crucial for the analysis, as using the first value available resulted in an almost identical dataset). We decided not to use the average of these variables, since most of them are categorical.

* 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.

Due to this detailed partition which makes use of 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. Within every cell, we looked for the most similar households across the two surveys according to income and age, building a unique distance function able to measure the differences in these two variables. We did this by performing a bivariate (income and age) propensity score matching based on Mahalanobis distance. In order to perform a 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 included BGP, 2009), 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 a possibility and we minimize the distance between potential controls of the SCF and similar individuals of the CES.

The wealth values of the SCF households were assigned to the most similar CES households within the cell. We also refined the matching by dropping the households for which the values displayed by the distance function were too high, i.e. the matched households had non-deniable differences in age and/or income to be paired together. Specifically, we set a threshold so that the households that lie in the top 15% of the distribution of the distance variable are dropped. We also had to build a different distance function for the cells with one or two individuals only from either one or the other survey, using the normalized logarithmic income and age. We dropped the top 20% of households matched according to this second, and rougher, algorithm (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). We assess the sensitivity of results to the choice of the thresholds.[4] The matching process yielded a dataset with more than 14000 observations in 2007.

We checked the results 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 (post-matching). Table 1 shows that the similarity is very high, suggesting that the procedure did not alter the distribution of the imputed variables, a signal of good quality of the overall sample combination. Furthermore, we compared the probability density functions of the matched variables (SCF original wealth values versus wealth values post-sample combination) obtained with a kernel density estimation, finding reassuringly similar curves.

insert Table 1 about here

[4] For a detailed robustness check see the end of Section 4 that discusses the evidence presented in Table 8.

insert Figures 1-7 about here

Figures 1-7 report the graphs for household net wealth: we have chosen to report this variable because it includes both assets and debt, and therefore summarizes better 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 matching procedure, the curves do show very similar patterns, again making sure that the matching procedure maintained the distributional properties of the variables of interest.

We took these precautions because there are some conditions that have to be met in order not to commit errors when using sample combination methods. First, the two different surveys must be two samples drawn from the same population. Second, there must be a set of common variables on which to condition the matching procedure, as is clear from the above description of the procedure. Third, the conditional independence assumption must hold. As for the first condition, both the CES and the SCF are samples representing the US population. Their sample designs are different, since the SCF oversamples households that are likely to be wealthier, while the CES does not. However, we decided to proceed with the sample combination procedure without correcting for this difference, since any correction (that is, dropping a certain percentage of the wealthier SCF households) would have involved a high degree of subjectivity. Despite this fact, the resulting dataset is robust to the alternative modus operandi where the wealthiest SCF households are dropped before the sample combination. Actually, we also performed the combination procedure after having got rid of the wealthiest households present in the SCF in order to get comparable income distributions between the two surveys (in particular, dropping a percentage between 20 and 30% of the sample households with the highest income depending on the survey year). The resulting dataset did not differ noticeably 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.

In terms of 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 expressed in the same way. This has been carried out making a large use of the documentation that accompanies the public releases of the two surveys. Most recoding operations turned out to be straightforward. 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", which is not taken into account in the SCF. 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. As for the third condition, we must ensure that we are not creating an artificial correlation between the consumption and the wealth variables by using the common socio-demographic variables to perform the combination. Because of the exogenous nature of most of these variables, we believe that this is not the case.

3.3 The model

As a check of the relevance of the data handling process that we performed, we present the results of the estimation of an econometric model close to the one used by BGP (2009).[5]

$$\log(C_{i,t}) = \beta_1 \log(Y_{i,t}) + \beta_2 \log(fin_{i,t}) + \beta_3 \log(house_{i,t}) + \beta_3 \log(ore_{i,t}) + \alpha' Z_{i,t} + \varepsilon_{i,t}, \quad (1)$$

where *C* is consumption (either non-durables or total consumption), *Y* is current income, *fin* is gross financial assets, *house* is the value of the house of residence (if any), *ore* is the value of the rest of the housing/real estate assets.[6] Finally, *Z* is a vector of socio-demographic controls: age, educational level, a dummy for the marital status (married or with a partner/single), two dummies for the race (one for African Americans, the other for non-Whites) and a dummy for the occupational status (working/not working) of the household head; the number of persons in the household; a dummy for the homeownership status; and three different dummies for the US geographical area (Northeast, Midwest and South, with West being the reference region). As our dataset contains observations for households where the head is over 65 years old, we also include some interaction terms to control for their different wealth and consumption dynamics of the old people. In particular, a dummy that takes the value of 1 if the household head is over 65 years old is multiplied by income and by the relevant (according to the various model specifications, see below) wealth variables. Table 2 summarizes the variables used in the econometric analysis.

In order to investigate the importance of net compared to gross wealth we also estimate two additional specifications similar to the one of equation (1): one in which financial wealth is diminished by total household debt (for the home-owners, this mainly comprises mortgages), and one in which we use the value of the household housing/real estate assets (*house* + *ore*) diminished by total household debt. The two net wealth variables are, respectively, *netfin* and *nethre*. Table 3 presents some descriptive statistics of the consumption, income and wealth variables expressed in thousands of dollars to give an idea of the ranges and average values of these important variables.

insert Table 3 about here

We estimate the models using two alternative dependent variables: the logarithm of total consumption and the logarithm of non-durable goods expenditure. We disregard the expenditure on durable goods because its timing does not match the flow of services coming from the goods. In particular, the relationship between consumption, income and wealth applies to the flow of consumption, but durable goods expenditure "represents replacements and additions to a stock, rather than the service flow from the existing stock" (Paiella 2007, 198). This may be one of the reasons why BGP (2009) find results that highly differ between the specifications with total consumption and those with durables consumption. Therefore, we mainly concentrate on the results for total and non durable goods consumption, showing that the use of the latter yields interesting additional insights.[7]

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[5] Similar models have also been used by Mehra (2001), Juster et al. (2004), and Paiella (2007b).

[6] Note that we do not drop the households with wealth amounting to 0-0.99 dollars. Rather, we treat them as if their wealth amounts to 1 dollar, so that taking the logarithm yields a value of zero.

[7] Additionally, the issue of endogeneity is likely to heavily affect the results in the case of durable goods expenditure. Suppose a household buys a house in 2004: we would observe an increase both in housing/real estate wealth and in durables consumption. This complicates the estimation of the wealth effect due to the presence of a spurious relationship. Using non-durables consumption as the dependent variable mitigates this problem.

The models are estimated cross-sectionally (using data on 1989, 1992, 1995, 1998, 2001, 2004 and 2007) and by pooling data over the seven surveys. In the latter case, year dummies are added as additional controls.

4. Results

The results of the estimation of equation (1) are reported in tables 4 and 5 (with total and non durables consumption as the dependent variable, respectively). CES sample weights have been used in all the estimates. The discussion below will highlight the differences with the BGP (2009) results and will suggest some possible reasons behind them.

insert Tables 4 and 5 about here

Current income plays a very important role in determining current consumption, with an estimated elasticity ranging between .32 and .53, significantly higher than the BGP (2009) estimates and in line with estimates made using aggregate data (Duca et al. 2011). Turning to the wealth-related coefficients, different components have different effects on consumption. In particular, gross financial wealth *-fin-* positively affected both types of consumption during the Nineties only (during the stock market boom), while its estimated coefficients are not significantly different from zero for the rest of the sample period. However, when significantly different from zero, the estimated elasticity of consumption to financial wealth is very low, being it close to .01, less than half the point estimates of BGP (2009).

On the other hand, housing/real estate wealth positively affected consumption during the whole period of interest. In particular, the estimated house of residence *-house-* elasticity is higher than the one related to the rest of real estate assets *-ore-* (with total consumption as the dependent variable, the former lies between .01 and .03, while the latter never reaches .01). Even if the magnitudes are once again different (and lower) than those estimated by BGP (2009), this result conforms to their findings. Also, we confirm the downward trend of these elasticities up to 2001. In this respect, we are able to show a new result, due to our longer time span. In particular, we find that the downward trend is reversed in 2004 and 2007, since the estimated elasticities are considerably larger for these two periods. As in the case of the financial wealth coefficients of the Nineties, this does not come as a complete surprise, because of the well known housing prices bubble that started in 2000 and abruptly ended with the recent financial crisis in the second half of 2007. This suggests that housing/real estate wealth accounted for at least part of the continued rise in consumption after the burst of the financial wealth bubble in 2001. It is also worth noting that these estimated elasticities may be viewed as a lower bound for the actual wealth effects, since the model cannot take into account the increases in consumption of the two years for which wealth has not been measured (since the SCF is a triennial survey), and also because of the well-known underestimated consumption levels in the CES. The low estimated coefficients could also result from measurement error issues leading to some kind of attenuation bias. However, the reassuring robustness checks on the distributions of the wealth variables pre and post-sample combination lead us to believe that no attenuation bias is at work here. As for the differences with BGP (2009), the reasons must lie either in the different sample combination procedure or in the construction of the sample, or in both. The higher number of cells, the propensity score matching based on both income and age (as opposed to income alone), and the inclusion of both non-home owners and older households in the sample must be at the

roots of the different estimates.[8] Finally, the larger number of observations and explanatory variables result in the larger portion of the variability of consumption explained by our model. Our R squared ranges between .60 and .67, while in BGP (2009) it is substantially lower, ranging between .34 and .43.

The behavior of the older households is investigated through the interaction terms between the "old" dummy and the income and wealth variables. We see the inclusion of this set of controls as crucial, since both theory and previous empirical evidence suggest that older households behave differently from younger ones (e.g. Miniaci et al. 2010). The estimates show that older households experience a higher wealth effect from the value of the house of residence, reaching four cents per dollar of housing wealth with non-durables consumption as the dependent variable. The pooled cross-section estimates confirm that consumption patterns are sensitive to macroeconomic conditions, as all year dummies have highly significant coefficients.

Tables 6 and 7 report our estimates of the net wealth models, again for both dependent variables of interest.[9] The number of observations is lower than in the previous estimates due to the fact that we have to drop the households with negative net wealth values (the net financial wealth specification has the lowest number of observations). It could also be expected that this modification may bias the wealth coefficient, since only the richer households are considered in this part of the analysis. It is hard to predict the direction of the bias, since richer households may be either more or less sensitive to the value of their wealth when taking their consumption decisions.

insert Tables 6-7 about here

Table 6 (displaying the estimates of the net financial wealth specification) confirms the above findings for gross housing/real estate wealth, while the results for the net financial wealth effects are less clear-cut. Most estimated coefficients for the net financial wealth variable -*netfin*- are not statistically significant at standard levels (as in BGP, 2009). This is also the case when non-durables consumption is used as the dependent variable (Table 6b). However, the pooled cross-section estimates suggest that there is a small but positive net financial wealth effect. Similarly, in the model with net housing/real estate wealth -*nethre*- (see Table 7) the estimated coefficients are lower than those associated to its gross measures. However, a non-negligible wealth effect is estimated for the older households, as shown by the significance of the interaction term -*old*nethre*- (see Table 7b). This confirms once again that the inclusion of older households permits a better understanding of consumption dynamics. All in all, these results suggest the possibility of some myopia on the part of households, since consumption seems more sensitive to gross wealth than net wealth (regardless of whether we calculate it out of financial or housing/real estate wealth).

We investigated the robustness of our findings in several ways. Results hold when we restrict our sample to urban households only (they are almost 90% of the sample). The same is true 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. Results are also robust to several variations of the sample combination procedure, as stated in the previous sections. One particular point deserves attention: using a high number of cells should in principle lead to a more accurate sample combination, provided that small cells do not force matches of households with extremely different values of income and age (i.e., relatively poor matches). The distance functions created during the sample combination procedure allow us to identify the households that are poorly matched for removal. Table 8 reports the

[8] Actually, an additional reason may lie in the use of the CES sample weights that are not mentioned by BGP (2009).

[9] We report the estimated coefficients of the income and wealth variables only, as results for the other variables are similar to the previous estimates despite the lower number of observations.

estimated wealth coefficients (of the gross wealth model) when we drop households at the top of the distribution of the distance variables using a number of different thresholds. While the first line displays the benchmark results, the rest of the Table reports results for different values of the thresholds. Overall, the results are insensitive to the levels chosen. Table 8 presents evidence for the 1995 data, but the same robustness is found for the rest of the data as well (not reported for the sake of brevity). 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

In this article we investigate the role of wealth in household consumption during the period 1989-2007 using a household-level cross-sectional dataset specifically built for this purpose. Following closely the rigorous guidelines on data matching outlined by Ridder and Moffitt (2007), we adopt a sample combination procedure which differs considerably from that used earlier. We combined US data from the CES and the SCF to get a series of cross-sections for the period 1989-2007 (in three years intervals). In particular, the SCF was used as the donor survey: its wealth data were assigned to the CES households in order to build a household-level dataset containing data for both consumption and wealth, as well as a substantial number of additional socio-economic variables. This sample combination produced a large dataset (more than 70,000 observations) that preserved the properties of the distributions of the variables of interest present in each of the two original surveys. We provide all the codes that we used in order to perform the analysis (see the Web Appendix) in order to ensure its replication.

We performed an econometric exercise in order to assess the importance of the improved dataset construction procedures in shaping the results of a wealth effect investigation, taking BGP (2009) as the reference point because they used a dataset derived from the same two original surveys. By estimating a similar model, we showed that while some of the previous BGP (2009) findings hold, most of them are considerably different. In particular, while we confirm that housing wealth effects are larger than financial wealth effects, the quantitative importance of both types of effects is found to be substantially lower than previously estimated (between .01 and .04 per dollar of housing/real estate wealth, even lower for financial wealth). We also confirm a downward trend of the importance of wealth in determining consumption until 2001, but also document an inversion of this tendency in 2004 and in 2007. Finally, the presence of households with head older than 65 years old in our sample permits a better understanding of the wealth effect dynamics when net wealth is considered.

As for the implications of the estimated positive effects of wealth on consumption (ranging between 1 and 4 cents per dollar of wealth), it would certainly be tempting to use our results to comment on the economic and financial crisis that originated from the subprime mortgage market in 2007. However, we believe it to be impossible to extend our results to the interpretation of the consumption and saving dynamics from the beginning of the crisis onwards, not only because our sample ends in 2007, but also because it would be implausible to assume that wealth effects of the same magnitude are at work during both booms and recessions. Indeed, some studies investigated the asymmetry of consumption responses to increases and decreases in wealth (Shirvani and Wilbratte, 2000; Bertaut, 2002; Disney et al. 2002). The rationale behind the unequal wealth effects relates to the assumption of diminishing marginal utility of wealth, where preferences are represented by convex utility functions (reflecting risk aversion) such that consumers would value increases in wealth less highly than equivalent decreases. In addition, whereas

consumers can readily reduce consumption in response to a wealth reduction, some consumers may find it difficult to borrow to increase consumption. Thus, our analysis is unable to shed light on the mechanisms at work during the recent financial crisis.

This paper calls for further studies. Our findings highlight the importance of the type of wealth in shaping the link between wealth and consumption. However, further and formal investigations on the nature of the wealth effects are needed to gain the whole picture of the consumption-wealth nexus. Considering both the direct and indirect effects of wealth on consumption would render a more complete understanding of the phenomenon.

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Figures

Figure 1: Household net wealth kernel distribution, 2007

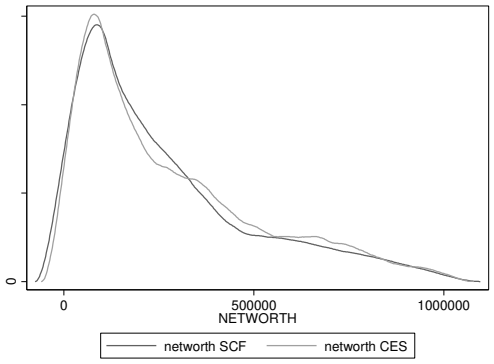


Figure 2: Household net wealth kernel distribution, 2004

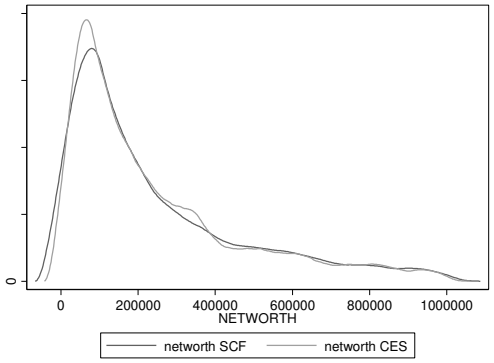


Figure 3: Household net wealth kernel distribution, 2001

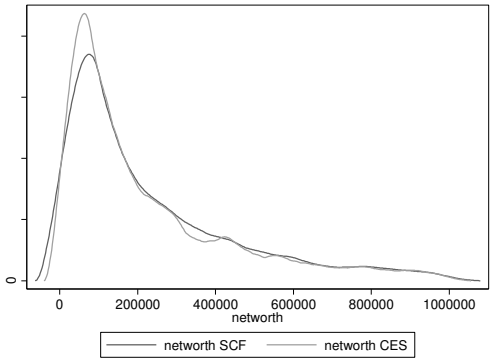


Figure 4: Household net wealth kernel distribution, 1998

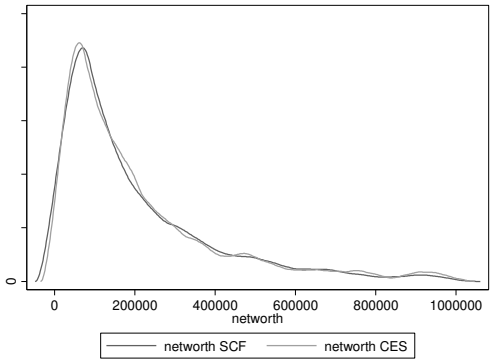


Figure 5: Household net wealth kernel distribution, 1995

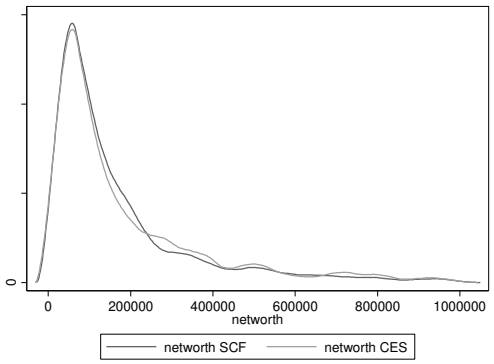


Figure 6: Household net wealth kernel distribution, 1992

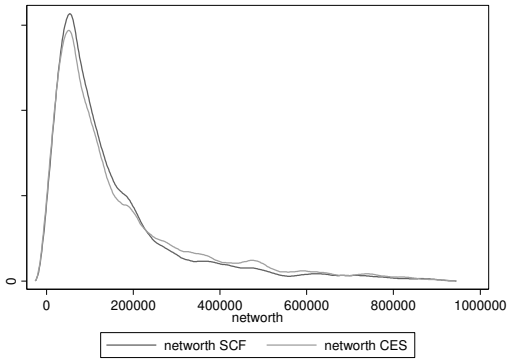
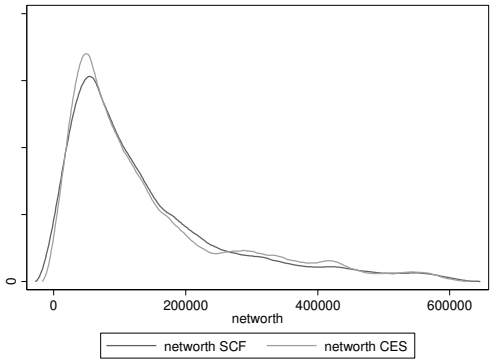


Figure 7: Household net wealth kernel distribution, 1989



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*
hre	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**
	1995		1992		1989			
	SCF	CES	SCF	CES	SCF	CES		
fin	0.18**	0.12*	0.24**	0.19**	0.25**	0.08**		
hre	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**		

Notes: *fin* (gross financial wealth), *hre* (housing/real estate wealth), *asset* (financial + housing/real estate wealth), *debt* (household debt), *networth* (*asset* - *debt*). *, ** significant at 5 and 1% respectively.

Table 2. List of variables used in the regressions

Variable	Description	Variable	Description
cons	Total consumption	*North East*	Dummy - area of residence, North East
nondur	Non durables consumption	*Midwest*	Dummy - area of residence, Midwest
fin	Gross financial wealth	*South*	Dummy - area of residence, South
house	Value of the house of residence	*educ*	Education of the household head
ore	Value of the rest of the real estate	*famsize*	Family size
netfin	Net financial wealth	*single*	Dummy - single household head
nethre	Net housing/real estate wealth	*not working*	Dummy - household head without a job
income	Annual income	*race - black*	Dummy - African American household head
old	Dummy - household head older than 65	*race - other*	Dummy - not white/Afr. American h. head
age	Age of the household head	*house renter*	Dummy - rented house of residence

Table 3. Descriptive statistics of consumption, income and wealth variables (thousands of $)

		1989	1992	1995	1998	2001	2004	2007
cons	mean	27.2	29.4	31.6	32.9	40.1	42.8	49.5
	std. dev.	21.3	23.6	23.6	26.5	30.7	37.4	41.3
	min.	0.9	1.4	1.1	0.7	0.8	0.0	0.1
	max.	384.1	551.9	334.6	487.4	434.1	1018.1	867.5
nondur	mean	15.9	17.5	18.5	19.0	24.0	26.4	30.9
	std. dev.	12.3	14.6	13.4	15.0	18.6	24.9	28.7
	min.	0.5	0.5	0.8	0.7	0.1	0.0	0.1
	max.	212.0	532.8	149.8	274.3	246.1	936.8	835.1
income	mean	31.0	34.0	35.9	41.3	48.3	57.5	66.6
	std. dev.	25.9	28.3	29.5	39.7	45.6	51.4	62.6
	min.	0.3	0.1	0.0	0.0	0.0	0.5	0.3
	max.	415.7	225.4	280.0	590.2	600.1	567.5	549.7
fin	mean	83.5	75.7	91.3	143.0	185.9	177.5	216.3
	std. dev.	795.8	400.2	519.1	1587.1	1271.3	1030.7	1090.6
	min.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	max.	28100.0	25200.0	19600.0	142000.0	77200.0	42700.0	37500.0
houses	mean	72.9	76.2	80.3	99.7	124.3	179.1	225.3
	std. dev.	135.5	152.4	126.7	191.5	235.0	346.2	408.4
	min.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	max.	2000.0	6000.0	2850.0	6000.0	5000.0	10500.0	10400.0
ore	mean	124.1	234.7	183.6	212.9	174.9	189.5	245.9
	std. dev.	1686.9	2866.1	2342.2	1529.6	1422.5	966.8	1167.9
	min.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	max.	92400.0	93200.0	150000.0	50200.0	65700.0	23100.0	37500.0
debt	mean	26.3	38.5	41.3	52.9	54.5	85.0	105.9
	std. dev.	67.7	198.4	103.1	164.1	102.0	173.4	205.1
	min.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	max.	3155.0	16500.0	2717.0	11700.0	1830.0	5336.3	4659.0
All	Obs.	8216	8494	7963	9865	12170	14405	12451

Notes: all descriptive statistics are taken from implications no. 1.

Table 4. Equation (2), dependent variable: total consumption

	1989	1992	1995	1998	2001	2004	2007	Pooled
income	0.429***	0.389***	0.322***	0.369***	0.398***	0.528***	0.475***	0.410***
	(0.013)	(0.015)	(0.013)	(0.012)	(0.010)	(0.010)	(0.010)	(0.005)
fin	0.003	0.000	0.007**	0.006**	0.004*	-0.003	-0.002	0.003***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.001)
ore	0.004	0.008***	0.006**	0.005**	0.003	0.003	0.003	0.005***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
house	0.008	0.018***	0.015*	0.009	0.011*	0.028***	0.026***	0.015***
	(0.005)	(0.007)	(0.008)	(0.006)	(0.006)	(0.007)	(0.007)	(0.003)
old*income	0.003	0.000	-0.003	-0.001	-0.003	0.001	-0.004	-0.002
	(0.007)	(0.006)	(0.007)	(0.007)	(0.006)	(0.005)	(0.005)	(0.002)
old*fin	-0.007	0.001	0.002	-0.005	-0.005	0.005	0.008	0.001
	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.002)
old*ore	0.003	-0.006	0.002	0.001	0.007	0.004	-0.000	0.002
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.002)
old*house	-0.001	-0.007**	-0.001	0.003	0.000	-0.008***	-0.001	-0.001
	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.001)
age	0.018***	0.012***	0.017***	0.017***	0.013***	0.010***	0.007***	0.013***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
agesq	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
North East	-0.017	-0.027	0.020	0.010	-0.043***	-0.099***	-0.070***	-0.031***
	(0.018)	(0.016)	(0.017)	(0.016)	(0.014)	(0.013)	(0.014)	(0.006)
Midwest	-0.077***	-0.101***	-0.027	-0.065***	-0.061***	-0.091***	-0.090***	-0.074***
	(0.016)	(0.016)	(0.017)	(0.014)	(0.013)	(0.012)	(0.013)	(0.005)
South	-0.056***	-0.052***	-0.009	-0062***	-0.088***	-0.132***	-0.095***	-0.073***
	(0.017)	(0.016)	(0.018)	(0.014)	(0.012)	(0.012)	(0.012)	(0.005)
educ	0.101***	0.095***	0.107***	0.094***	0.095***	0.065***	0.082***	0.093***
	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.004)	(0.005)	(0.002)
famsize	0.054***	0.063***	0.067***	0.067***	0.069***	0.051***	0.046***	0.062***
	(0.005)	(0.006)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.002)
single	-0.155***	-0.124***	-0.163***	-0.146***	-0.128***	-0.078***	-0.100***	-0.130***
	(0.018)	(0.017)	(0.017)	(0.015)	(0.013)	(0.011)	(0.011)	(0.005)

not working	-0.105***	-0.113***	-0.085***	-0.083***	-0.034**	-0.011	-0.001	-0.061***
	(0.021)	(0.022)	(0.022)	(0.018)	(0.016)	(0.016)	(0.014)	(0.007)
race-black	-0.103***	-0.087***	-0.054**	-0.057***	-0.061***	-0.053***	-0.070***	-0.067***
	(0.024)	(0.022)	(0.022)	(0.019)	(0.017)	(0.015)	(0.016)	(0.007)
race-other	-0.054	-0.0312	-0.062*	-0.036	-0.021	-0.020	-0.029	-0.031***
	(0.042)	(0.037)	(0.036)	(0.032)	(0.027)	(0.022)	(0.024)	(0.011)
home renter	0.027	0.082	0.052	0.037	0.014	0.269***	0.231***	0.087***
	(0.061)	(0.074)	(0.091)	(0.073)	(0.069)	(0.081)	(0.086)	(0.030)
constant	4.952***	5.428***	6.018***	5.586***	5.524***	4.117***	4.861***	5.177***
	(0.131)	(0.150)	(0.151)	(0.118)	(0.115)	(0.113)	(0.113)	(0.050)
y1992								0.049***
								(0.008)
y1995								0.105***
								(0.008)
y1998								0.068***
								(0.008)
y2001								0.171***
								(0.008)
y2004								0.125***
								(0.008)
y2007								0.238***
								(0.008)
Obs.	7322	7596	7154	9865	12170	14405	12387	70899
R-squared	0.67	0.66	0.63	0.60	0.60	0.64	0.65	0.65

Notes: All the estimations were carried out using the Repeated Imputation Inference (RII) using all the five implications resulting from the SCF procedure of imputing missing income values. CES sample weights have been used. Standard errors in parenthesis. *, **, *** significant at 10, 5 and 1% respectively.

Table 5. Equation (2), dependent variable: non durables consumption

	1989	1992	1995	1998	2001	2004	2007	Pooled
income	0.400***	0.368***	0.317***	0.366***	0.393***	0.513***	0.488***	0.400***
	(0.013)	(0.014)	(0.013)	(0.011)	(0.009)	(0.011)	(0.010)	(0.005)
fin	0.003	0.007**	0.008***	0.005**	0.007***	0.001	0.003	0.006***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
ore	0.005	0.006**	0.007**	0.004**	0.002	0.003	0.004**	0.004***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
house	0.012**	0.014**	0.016*	0.014**	0.013**	0.029***	0.025***	0.019***
	(0.005)	(0.006)	(0.008)	(0.006)	(0.006)	(0.006)	(0.007)	(0.001)
old*income	-0.006	-0.014**	-0.014**	-0.012*	-0.010*	-0.008	-0.012**	-0.012***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.005)	(0.006)	(0.003)
old*fin	-0.015**	-0.005	-0.002	-0.010*	-0.12**	-0.008*	-0.004	-0.008***
	(0.007)	(0.007)	(0.006)	(0.005)	(0.006)	(0.005)	(0.007)	(0002)
old*ore	0.000	-0.008	-0.001	0.001	0.006	0.003	0.002	0.001
	(0.006)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.002)
old*house	0.016***	0.016***	0.017***	0.020***	0.017***	0.013***	0.017***	0.017***
	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.001)
age	0.013***	0.012***	0.014***	0.013***	0.011***	0.005**	0.005***	0.011***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
agesq	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000	-0.000**	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
North East	0.045***	0.046***	0.075***	0.052***	-0.029**	-0.069***	-0.047***	0.011*
	(0.017)	(0.017)	(0.017)	(0015)	(0.014)	(0.013)	(0.014)	(0.006)
Midwest	-0.023	-0.031***	0.051***	0.005	-0.020	-0.039***	-0.018	-0.011**
	(0.015)	(0.016)	(0.017)	(0.013)	(0.013)	(0.012)	(0.013)	(0.005)
South	0.000	0.010	0.052***	0.010	-0.058***	-0.082***	-0.032***	-0.017***
	(0.015)	(0.016)	(0.017)	(0.013)	(0.012)	(0.012)	(0.012)	(0.005)
educ	0.093***	0.089***	0.102***	0.088***	0.098***	0.068***	0.080***	0.089***
	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.004)	(0.005)	(0.002)
famsize	0.069***	0.075***	0.077***	0.074***	0.067***	0.055***	0.044***	0.068***
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.002)
single	-0.141***	-0.128***	-0.143***	-0.123***	-0.131***	-0.105***	-0.114***	-0.130***
	(0.016)	(0.016)	(0.016)	(0.013)	(0.012)	(0.011)	(0.012)	(0.005)

not working	-0.099***	-0.100***	-0.095***	-0.085***	-0.040**	-0.028*	-0.016	-0.066***
	(0.020)	(0.021)	(0.022)	(0.018)	(0.016)	(0.016)	(0.014)	(0.007)
race-black	-0.073***	-0.046**	-0.022	-0.054***	-0.050***	-0.058***	-0.064***	-0.051***
	(0.023)	(0.022)	(0.021)	(0.017)	(0.016)	(0.015)	(0.016)	(0.007)
race-other	-0.075*	-0.036	-0.037	-0.032	-0.060**	-0.050**	-0.076***	-0.050***
	(0.044)	(0.046)	(0.035)	(0.033)	(0.027)	(0.021)	(0.024)	(0.011)
home renter	0.036	0.024	0.024	0.048	0.009	0.235***	0.205**	0.095***
	(0.057)	(0.062)	(0.093)	(0.065)	(0.065)	(0.073)	(0.085)	(0.027)
constant	4.679***	5.023***	5.475***	5.059***	4.987***	3.768***	4.142***	4.670***
	(0.125)	(0.139)	(0.145)	(0.112)	(0.106)	(0.110)	(0.117)	(0.047)
y1992								0.057***
								(0.008)
y1995								0.097***
								(0.007)
y1998								0.056***
								(0.007)
y2001								0.181***
								(0.007)
y2004								0.148***
								(0.007)
y2007								0.258***
								(0.007)
Obs.	7322	7596	7154	9865	12170	14405	12387	70899
R-squared	0.68	0.67	0.65	0.63	0.63	0.65	0.65	0.67

Notes: All the estimations were carried out using the Repeated Imputation Inference (RII) using all the five implications resulting from the SCF procedure of imputing missing income values. CES sample weights have been used. Standard errors in parenthesis. *, **, *** significant at 10, 5 and 1% respectively.

Table 6. Equation (3), two different dependent variables

6a. Dependent variable: total consumption

	1989	1992	1995	1998	2001	2004	2007	Pooled
income	0.431***	0.375***	0.296***	0.365***	0.392***	0.502***	0.485***	0.398***
	(0.016)	(0.022)	(0.018)	(0.017)	(0.013)	(0.014)	(0.013)	(0.007)
netfin	0.002	0.004	0.008	0.005	0.009**	-0.007*	-0.001	0.004***
	(0.004)	(0.005)	(0.005)	(0.003)	(0.004)	(0.004)	(0.003)	(0.001)
ore	0.004*	0.007*	0.006	0.004	0.004	0.004	0.000	0.005***
	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.001)
house	0.016**	0.018	0.008	0.018**	0.010	0.045***	0.030***	0.020***
	(0.008)	(0.013)	(0.012)	(0.009)	(0.007)	(0.010)	(0.010)	(0.003)
old*income	0.003	-0.002	0.003	0.000	0.001	0.006	0.002	0.000
	(0.009)	(0.007)	(0.009)	(0.008)	(0.008)	(0.006)	(0.007)	(0.003)
old*netfin	-0.004	0.002	0.002	-0.006	-0.010	0.004	0.004	-0.000
	(0.009)	(0.008)	(0.008)	(0.006)	(0.008)	(0.006)	(0.007)	(0.003)
old*ore	-0.000	-0.008	-0.001	0.005	0.007	0.003	0.003	0.002
	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.002)
old*house	-0.002	-0.007*	-0.002	0.002	0.002	-0.011***	-0.004	-0.003*
	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)	(0.001)
Obs.	4491	4268	3982	5555	7091	7360	6495	39242
R-squared	0.68	0.67	0.64	0.61	0.62	0.65	0.69	0.67

6b. Dependent variable: non durables consumption

	1989	1992	1995	1998	2001	2004	2007	Pooled
income	0.393***	0.363***	0.285***	0.365***	0.386***	0.483***	0.494***	0.386***
	(0.016)	(0.021)	(0.018)	(0.017)	(0.012)	(0.015)	(0.014)	(0.007)
netfin	0.002	0.007	0.007	0.004	0.006*	-0.002	0.004	0.005***
	(0.005)	(0.005)	(0.005)	(0.003)	(0.004)	(0.004)	(0.003)	(0.001)
ore	0.003	0.005	0.008**	0.004	0.004	0.005	0.002	0.005***
	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.001)
house	0.020***	0.014	0.008	0.023***	0.015**	0.045***	0.028***	0.025***
	(0.007)	(0.012)	(0.012)	(0.008)	(0.007)	(0.009)	(0.010)	(0.003)
old*income	-0.002	-0.013	-0.006	-0.006	-0.006	0.003	0.001	-0.006*
	(0.010)	(0.008)	(0.009)	(0.008)	(0.007)	(0.006)	(0.009)	(0.003)
old*netfin	-0.014	-0.001	0.002	-0.011*	-0.012*	-0.010	-0.007	-0.006**

	(0.012)	(0.009)	(0.008)	(0.006)	(0.007)	(0.006)	(0.008)	(0.003)
old*ore	-0.002	-0.009	-0.006	0.002	0.004	0.002	0.004	-0.000
	(0.007)	(0.006)	(0.007)	(0.006)	(0.005)	(0.005)	(0.004)	(0.002)
old*house	0.013***	0.011***	0.013***	0.017***	0.016***	0.007*	0.011***	0.013***
	(0.004)	(0.004)	(0.005)	(0.004)	(0.003)	(0.004)	(0.004)	(0.002)
Obs.	4491	4268	3982	5555	7091	7360	6495	39242
R-squared	0.68	0.67	0.65	0.64	0.64	0.65	0.68	0.67

Notes: All the estimations were carried out using the Repeated Imputation Inference (RII) using all the five implications resulting from the SCF procedure of imputing missing income values. CES sample weights have been used. Standard errors in parenthesis. *, **, *** significant at 10, 5 and 1% respectively.

Table 7. Equation (4), two different dependent variables

7a. Dependent variable: total consumption

	1989	1992	1995	1998	2001	2004	2007	Pooled
income	0.429***	0.388***	0.316***	0.372***	0.391***	0.535***	0.494***	0.411***
	(0.013)	(0.017)	(0.014)	(0.013)	(0.010)	(0.010)	(0.010)	(0.005)
fin	0.003	0.000	0.009**	0.006**	0.004	-0.002	-0.002	0.003***
	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.001)
nethre	0.004	0.012***	0.007	0.004	0.009***	0.005	0.006**	0.007***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.001)
old*income	0.003	0.003	-0.008	-0.004	-0.002	0.006	-0.001	-0.002
	(0.008)	(0.006)	(0.008)	(0.008)	(0.007)	(0.006)	(0.006)	(0.003)
old*fin	-0.005	0.001	-0.001	-0.007	-0.004	0.005	0.008	0.000
	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.002)
old*nethre	-0.000	0.012***	0.009	0.009	0.005	-0.008*	-0.003	-0.000
	(0.006)	(0.003)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.002)
Obs.	6811	6687	6302	8331	10770	12575	10904	62380
R-squared	0.68	0.66	0.63	0.60	0.61	0.65	0.67	0.66

7a. Dependent variable: non durables consumption

	1989	1992	1995	1998	2001	2004	2007	Pooled
income	0.397***	0.374***	0.313***	0.374***	0.389***	0.522***	0.507***	0.404***
	(0.013)	(0.016)	(0.014)	(0.013)	(0.010)	(0.011)	(0.011)	(0.005)
fin	0.003	0.005	0.010***	0.003	0.008***	0.002	0.002	0.006***
	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)	(0.003)	(0.001)
nethre	0.005	0.010***	0.007	0.006*	0.005*	0.006**	0.009***	0.007***
	(0.003)	(0.004)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.001)
old*income	-0.007	-0.014*	-0.022***	-0.016**	-0.014**	-0.011*	-0.009	-0.015***
	(0.008)	(0.007)	(0.008)	(0.008)	(0.006)	(0.006)	(0.007)	(0.003)
old*fin	-0.012	-0.002	-0.005	-0.009	-0.012**	-0.005	-0.003	-0.006**
	(0.008)	(0.007)	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)	(0.002)
old*nethre	0.012*	0.004	0.025***	0.022***	0.023***	0.014***	0.015***	0.017***
	(0.007)	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)	(0.005)	(0.002)
Obs.	6811	6687	6302	8331	10770	12575	10904	62380
R-squared	0.68	0.67	0.66	0.63	0.64	0.65	0.67	0.68

Notes: All the estimations were carried out using the Repeated Imputation Inference (RII) using all the five implications resulting from the SCF procedure of imputing missing income values. CES sample weights have been used. Standard errors in parenthesis. *, **, *** significant at 10, 5 and 1% respectively.

Table 8. Robustness check on the sample combination procedure: different thresholds of the distance variables

fin		ore		house		Threshold 1	Threshold 2	
Dep var:		Dep var:		Dep var:		Top x%	Top x%	No. of
tot. cons.	non dur.	tot. cons.	non dur.	tot. cons.	non dur.	dropped	dropped	observations
0.007**	0.008***	0.006**	0.007**	0.015*	0.016*	15%	20%	7154
0.007**	0.008***	0.005**	0.006**	0.014*	0.015*	15%	25%	7097
0.008**	0.008***	0.005*	0.006**	0.014*	0.014*	15%	30%	7040
0.007**	0.008**	0.006**	0.007**	0.018**	0.017**	20%	25%	6726
0.007**	0.008**	0.006**	0.007**	0.017**	0.016*	20%	30%	6669
0.007**	0.007**	0.006**	0.007**	0.017**	0.015*	20%	35%	6612
0.006*	0.007**	0.006**	0.007**	0.017**	0.015*	25%	30%	6297
0.005*	0.007**	0.006**	0.007**	0.016*	0.013	25%	35%	6240
0.006*	0.007**	0.005*	0.007**	0.015*	0.013	25%	40%	6183

Notes: Results refer to the 1995 data only, but a similar robustness is found for the other years as well. Threshold 2 refers to the distance function calculated for the small cells (containing either one or two households), Threshold 1 refers to the rest (and vast majority) of the cells. The first line contains the benchmark results. All the estimations were carried out using the Repeated Imputation Inference (RII) using all the five implications resulting from the SCF procedure of imputing missing income values. CES sample weights have been used. *, **, *** significant at 10, 5 and 1% respectively.