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University of Naples Federico II

University of Salerno

Bocconi University, Milan

CSEF - Centre for Studies in Economics and Finance
DEPARTMENT OF ECONOMICS – UNIVERSITY OF NAPLES
80126 NAPLES - ITALY
Tel. and fax +39 081 675372 – e-mail: csef@unisa.it

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Wealth Shocks, Unemployment Shocks and Consumption in the Wake of the Great Recession

Dimitris Christelis[*], Dimitris Georgarakos[**] and Tullio Jappelli[***]

Abstract

We use data from the 2009 Internet Survey of the Health and Retirement Study to examine the consumption impact of wealth shocks and unemployment during the Great Recession in the US. We find that many households experienced large capital losses in housing and in their financial portfolios, and that a non-trivial fraction of respondents have lost their job. As a consequence of these shocks, many households reduced substantially their expenditures. We estimate that the marginal propensities to consume with respect to housing and financial wealth are 1 and 3.3 percentage points, respectively. In addition, those who became unemployed reduced spending by 10 percent. We also distinguish the effect of perceived transitory and permanent wealth shocks, splitting the sample between households who think that the stock market is likely to recover in a year's time, and those who do not. In line with the predictions of standard models of intertemporal choice, we find that the latter group adjusted much more than the former its spending in response to financial wealth shocks.

Keywords: Wealth Shocks; Unemployment; Consumption; Great Recession.

JEL Classification Codes: E21, D91.

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* CSEF, CFS and CEPAR. E-mail address: dimitris [dot] christelis [at] gmail [dot] com

** Goethe University Frankfurt, CFS and University of Leicester. E-mail address: dimitris [dot] georgarakos [at] hof [dot] uni-frankfurt [dot] de

*** University of Naples Federico II, CSEF and CEPR. E-mail address: tullio [dot] jappelli [at] unina [dot] it

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1. Introduction

In 2008, American households experienced a loss of 13.6 trillion in wealth, compared to a disposable income of 11 trillion. Between October 2007 and October 2008 the stock market declined by almost 40 percent, and house prices by almost 20 percent. The unemployment rate, which throughout 2007 averaged 4.8 percent, doubled in less than two years, from 5 percent in January 2008 to 10.1 percent in November 2009. Many analysts link this large, unexpected and unprecedented fall in the market value of household wealth and the dramatic increase in unemployment to the drop in consumption that took place in the second half of 2008 and 2009. Indeed, real consumption expenditures dropped from 10.078 trillion dollars (in constant 2009 prices, seasonally adjusted at an annual rate) in the second quarter of 2008 to 9.806 trillion dollars in the second quarter of 2009, i.e., a decline of about 2.7 percent. All these figures suggest that a special feature of the Great Recession is that households were hit by three different shocks: a large drop in house prices, a strong decline in the stock market, and a dramatic worsening of the labor market conditions.

This paper attempts to estimate the separate impact of these three shocks on households' expenditures, using recently available micro data. In particular, the paper makes three contributions. First, we take advantage of the first (to the best of our knowledge) household dataset that provides at the same time information on consumption, capital gains on financial assets and housing, and labor force status, and use it in order to assess the impact of wealth losses and unemployment on consumption. The use of directly elicited information on stock capital gains/losses in particular is an important breakthrough in the literature on wealth effects. This is the case because typically in micro data surveys one has information on the level of stock holdings in two or more waves, and thus a change in the value of such holdings can be due not only to changes in stock prices but also to purchases or sales of stocks, mutual funds, etc. As a result, measures of stock capital gains/losses typically found in the literature are contaminated by the effect of transactions, while our measure is not. Having in our dataset information on housing capital gains/losses is also fundamental, given that the house is the main component of most households' wealth.

Second, we take into account household heterogeneity in exposure to each of the three shocks in order to show the fundamental role that capital losses on stocks and housing, as well

as unemployment shocks played for the reduced consumption of older Americans during the Great Recession, which is the most serious economic crisis affecting the US economy since the 1930s.

Third, we use available information on household expectations on the persistence of stock losses in order to show how these expectations affect households' consumption response to such losses. After documenting the considerable heterogeneity in these expectations, we show that households that perceive wealth losses to be more long-lasting reduce their consumption by a greater percentage than their counterparts that expect a rebound in the stock market. This finding is in line with predictions from standard economic theory, and points to the importance of household expectations for consumption adjustments during the Great Recession.

The micro data that we use in this paper come from the 2009 Internet Survey of the Health and Retirement Study (HRS), and refer to the population aged 50 or older. Hence, they are particularly well suited to analyze the impact of wealth shocks on consumption. Indeed, older households have accumulated significant amounts of wealth over the lifecycle and therefore control a large fraction of society's resources;[1] thus their decisions have pronounced aggregate implications. Those aged fifty and above typically have higher stock market participation rates than the rest of the population, and a higher fraction of their wealth is invested in risky financial assets. Furthermore, over 90 percent of households in the sample own their home. Hence, our analyses are less likely to suffer from the endogeneity bias that arises when one examines consumption responses to housing wealth losses over homeowners, and the heterogeneity of responses with respect to wealth losses experienced by owners and renters. Finally, recent studies (e.g., Attanasio et al., 2009) emphasize that co-movements in consumption and house prices may be driven by a common factor such as income expectations. Given that the elderly typically face a relatively flat future income profile, this problem may be less severe in our sample.[2] On the other hand, the unemployment rate and the probability of job loss tend to be lower among older households.

[1] Using information from the 2007 and 2010 waves of the US Survey of Consumer Finances, we calculate that households in which the head is aged 50 and above have about 62% of total gross housing wealth, 78% of all equity wealth, and 75% of total net worth.

[2] Indeed, Attanasio et al. (2009) find that younger households (most of which are renters) have higher wealth-consumption correlations than older households, and take this as evidence that the co-movement between consumption and house prices is driven by income expectations, rather than a genuine wealth effect.

We find that capital losses on housing and financial assets, as well as the income loss from becoming unemployed, do indeed lead households to reduce their spending, and that these effects are net of the influence of a number of important socio-economic characteristics including family size, health deterioration, and change in working and retirement status. When we examine disaggregated financial assets we find that the effects of financial losses come primarily through losses experienced from directly held stocks and individual retirement accounts (IRAs).

More specifically, we estimate that the elasticity of consumption to financial wealth losses experienced in 2008-2009 is about 0.09, implying a marginal propensity to consume with respect to financial wealth equal to 3.3 percentage points. In addition, households in which at least one of the two partners in the main couple (or the single head) became unemployed in 2008 and early 2009 reduced consumption by 10 percent in 2009. Finally, we find that the fall in house prices between the summer of 2006 and the first half of 2009 also has an important impact on consumption (the estimated elasticity is about 0.06 and the associated marginal propensity to consume reaches 1 percentage point). Furthermore, we generate artificial data from both a buffer stock and a permanent income model, and use them to calculate the implied elasticities of consumption to wealth. We find that our empirical estimates of the elasticities are in line with those generated by these two standard intertemporal consumption models.

It should be noted that, while we study the consumption response to capital losses using data from 2008-2009, the economic relevance of this issue is more general, given that large asset price movements have by now become the norm in the U.S. economy. In Figure 1, we plot capital gains and active saving accruing to the US household sector (both are measured as a share of personal disposable income) from 1990 to 2010. As the graph makes it clear, during this period capital gains and losses form a much larger part of households' year-to-year asset accumulation than active saving; in fact, the median yearly absolute ratio of capital gains to active saving is equal to 5.43. Furthermore, the accumulated real (in 2009 prices) capital gains, after subtracting real losses, are equal to about 35.99 trillion dollars during this period, while the accumulated real household saving is equal to about 8.14 trillion dollars. As we shall see in Section 3 below, very large capital losses will show up also in the micro data that we will use for our analyses.

According to several models of intertemporal choice, the impact of wealth shocks on consumption depends on the nature of the shocks (permanent or transitory) and the opportunities to smooth them through credit and insurance markets. We attempt to distinguish between permanent and transitory shocks to financial wealth by relying on subjective expectations elicited in the fall of 2008 about stock market gains or losses expected one year ahead. We split the sample between households that expected the stock market to recover in a year's time, and those who did not. We expect the consumption response to wealth shocks to be larger for the latter group, who are likely to perceive the negative shock to their financial wealth as permanent. Indeed, we find that the response of consumption to this shock is very strong for this group of households, while it is insignificant for the other group. Finally, we investigate the separate role that increased income uncertainty plays in the drop in consumption. We find that our measures of income risk based on subjective expectations do not have a statistically significant effect on consumption.

The remaining of the paper is organized as follows. Section 2 reviews previous literature on the effect of wealth and unemployment shocks on consumption. Section 3 presents the data. Section 4 presents estimates of the effect of wealth shocks and unemployment on consumption. In Section 5 we compare our results to those obtained from two standard models of intertemporal choice (the permanent income model and the buffer stock model) in which we introduce shocks to the return on capital. Section 6 takes into account heterogeneity in stock market expectations and presents estimates of the response of consumption to transitory and permanent wealth shocks. Section 7 presents various robustness checks to corroborate the empirical findings. Section 8 presents results from an additional source, namely the Panel Survey of Income Dynamics. Section 9 concludes.

2. Wealth and unemployment shocks

Standard models of intertemporal choice suggest that unexpected and permanent drops in wealth reduce consumption, and that this reduction equals the annuity value of the drop in wealth. There is, however, much disagreement about the magnitude of the impact of wealth shocks on consumption. Most of the literature attempting to estimate this impact is based on two implicit assumptions: (i) wealth shocks (whether due to house price changes or

movements in stock prices) are not predictable, and therefore not anticipated by consumers; (ii) current prices are the best predictors of future asset prices, and therefore changes in asset prices constitute a permanent wealth shock. According to the permanent income hypothesis, it follows from (i) and (ii) that wealth shocks should have a relatively large impact on consumption, equivalent to the annuity value of the wealth shock (in the order of 2 to 5 percent, depending on the assumed real interest rate).

Several studies, relying on macroeconomic or regional data, regress the logarithm of consumption, consumption growth or saving on shocks to housing or financial wealth, but no consensus has yet emerged on the link between house prices and consumption.[3] Studies using microeconomic data allow researchers to dig deeper into this link. While changes in stock prices imply unambiguous wealth effects on consumption, as discussed in Sinai and Souleles (2005), Campbell and Cocco (2007) and Attanasio et al. (2009), the consumption response to a house price decline is quite heterogeneous across the population. Most empirical analyses using micro-data refer to the U.S. and the U.K. Engelhardt (1996) estimated an MPC of 0.03 or higher for the U.S. in the 1980s, and Juster et al. (2001) found an even higher MPC out of stock price changes. On the other hand, Hoynes and McFadden (1997) found that households who had experienced housing capital gains increased their saving rather than their spending, and Hryshko et al. (2010) find that after a job loss homeowners can smooth consumption easier than renters in times of higher house prices. In the UK Disney et al. (2010) find a relatively low MPC out of housing wealth (of the order of 0.01), while Campbell and Cocco (2007) a relatively strong response for older households that own their home. Attanasio et al. (2009) conclude that the co-movements in consumption and house prices are not generated by a causal link running from the latter to the former, but by common factors, contradicting the findings in Campbell and Cocco (2007).

On balance, results based on micro-data are also mixed, with some papers finding large responses of expenditure to house and stock prices shocks, while others find smaller effects. This literature generally suffers from some limitations. First and foremost, house and stock price changes are likely correlated with other economic events, and therefore have an impact

[3] Davis and Palumbo (2001) estimate that the MPC out of total wealth is in the range of 0.04-0.06. Case et al. (2003) provide estimates from a panel of developed countries and a panel of U.S. states. In both datasets, they find an MPC out of housing wealth of around 0.03-0.04 and a small and insignificant MPC out of stock market wealth. Ludwig and Sløk (2004) found a larger effect of stock wealth than housing wealth in a panel of OECD countries. In a recent study, however, Carroll et al. (2011) estimate the longer run effects on consumption from housing wealth changes, as opposed to the immediate ones (e.g., those of the next quarter), to be larger than the effects of financial wealth shocks.

on expectations of future income. A second limitation is that most studies rely on aggregate measures of house price changes (either at the national, regional or county level), while house price risk has also an idiosyncratic component specific to each dwelling. A third limitation of current studies is that they usually don't distinguish between transitory and permanent wealth shocks, which should have different impact on consumption. As we shall see, our survey provides information that allows us to provide some evidence on this issue. Furthermore, most evidence refers to house price booms (as in the UK in the 1990s), while the present paper focuses on wealth losses during the Great Recession, which allows us to estimate the impact of very large losses in both housing and financial wealth on consumption. As noted in Browning and Collado (2001), consumers may tend to smooth consumption when income or wealth changes are large, but are less likely to do so when the changes are small and the cost of adjusting consumption is not trivial. Indeed, it is quite possible that the literature has not been able to obtain more precise estimates of the MPC out of wealth shocks because some of the shocks are small, and consumers might react mostly to large shocks.[4]

During the Great Recession households also experienced negative income shocks, particularly those who became unemployed. The consumption response to unemployment shocks depends on the extent to which the shock is anticipated, on the persistence of the shock, and on the degree of imperfections of credit and insurance markets (Jappelli and Pistaferri, 2010). According to the permanent income hypothesis, the impact should be strongest when the shock is not anticipated (as is most likely the case for those who became unemployed in 2007-08), when the shock is perceived to be permanent, and when consumers are liquidity constrained. One should also bear in mind that unemployment shocks may be partially insured through unemployment insurance. Therefore, a complete analysis of the impact of unemployment requires explicit modeling of the type of insurance available to individuals as well as of the possible interactions between public and private insurance.[5]

[4] In quite different contexts, this "magnitude hypothesis" has been tested by Coulibaly and Li (2006) and Scholnick (2013), who argue that the final mortgage payment represents a large expected disposable income shock (that is, income net of pre-committed debt service payments). The test of the magnitude hypothesis looks at whether the response of consumption to expected income increases depends on the relative amount of mortgage payments. Stephens (2008) studies consumption adjustments due to an expected rise in income following the last repayment of a vehicle loan. Shapiro and Slemrod (2003) and Agarwal et al. (2007) examine consumption responses to the receipt of a tax rebate.

[5] Some of these interactions stem from the fact that most welfare programs are means- and asset-tested. For example, in the US individuals with more than $2,000 in liquid assets are not eligible to receive Food Stamps, Medicaid and other popular welfare programs even if they have no income. The disincentives to save (self-insure) induced by the presence of public insurance (which in most cases are not subject to time limits) have been studied by Hubbard et al. (1995).

One of the earlier attempts to look at the effect of unemployment shocks on consumption is Gruber (1997). Using the PSID, he constructs a sample of workers who lose their job between period *t–1* and period *t*, and regresses the change in food spending over the same time span against the unemployment insurance (UI) replacement rate an individual is eligible for. Gruber finds a large smoothing effect of UI, in particular that a rise in the replacement rate by 10 percentage points reduces the fall in consumption upon unemployment by about 3 percent. He also finds that the fall in consumption at a zero replacement rate is about 20 percent, suggesting that consumers face liquidity constraints. Browning and Crossley estimate a small elasticity of expenditures with respect to UI benefit (equal to 0.05) in Canada. But this small effect masks substantial heterogeneity, with low wealth households at the time of job loss exhibiting elasticities as high as 0.2. This finding is also consistent with the presence of liquidity constraints.

Some recent papers study the implications of unemployment shocks and changes in wealth on consumption during the Great Recession. Shapiro (2010) uses data from the Cognitive Economics Study (CogEcon), conducted via Internet, in order to assess the effect of the financial crisis on the well-being of older Americans. The initial wave of CogEcon was fielded shortly before the financial crisis that began in the fall of 2008, and provides baseline wealth measurements and information about the structure of households' portfolios for a representative sample of almost 1,000 US individuals aged 50 years and older. The second wave was completed in summer 2009. Shapiro finds that financial wealth fell by about 15 percent for the median household, and that financial losses were concentrated among households with high levels of wealth, who tend to have higher exposure to the stock market. Nonetheless, households with little financial wealth suffered declines in consumption as large as households with substantial exposure to the stock market. Tight credit market conditions and adverse labor market outcomes account for much of the effect of the financial crisis on the consumption of these low-wealth households.

Hurd and Rowhedder (2010b) use the American Life Panel, an ongoing Internet survey of about 2,500 respondents, which was fielded at the beginning of November 2008, immediately following the large declines in the stock market associated with the collapse of Lehman Brothers. They find that between November 2008 and April 2010 almost 40 percent of American households have been affected either by unemployment, negative home equity, arrears on their mortgage payments, or foreclosure. A third study, also by Hurd and

Rowhedder (2010a) combines longitudinal data from the Health and Retirement Study (HRS) with the 2009 HRS Internet Survey to provide an overview of the effects of the financial crisis on the population aged 50 or older. According to the descriptive statistics reported by Hurd and Rowhedder, the majority of older households have suffered substantial losses in stocks and/or housing wealth, while some of them have extracted home equity (and, as a result, increased their indebtedness). They also find that almost 30 percent of households reduced spending between 2007 and 2009, and that the average decline was larger than 8 percentage points.

Using the 2007–09 Survey of Consumer Finance panel, Bricker et al (2011), find substantial heterogeneity in changes in wealth among households. Furthermore, these changes appear to reflect changes in asset values (particularly the value of homes, stocks, and businesses) rather than changes in the level of ownership of assets and debts or in the amount of debt held. The study also finds that families appear more cautious in 2009 than in 2007, as most families reported greater desired buffer savings, and many of them expressed concern over future income and employment. Petev et al. (2011) point out that the consumption of the wealthy fell more than that of the less wealthy during the recession. Using the typical estimates of the wealth effect available in the literature, they show that this factor can explain a significant fraction of the fall in consumption experienced by the wealthy.

A related issue is that the recession increased insecurity about the future. Indeed, the Consumer Sentiment Index declined dramatically in the second half of 2007. Petev et al. (2011) suggest that increased uncertainty may have reduced spending through precautionary saving, and that the credit crunch that followed the financial crisis may have prevented some households from purchasing goods that are typically acquired through borrowing. Deaton (2011) analyzes self-reported well-being questions collected by the Gallup Organization. Between the fall of 2008 and the spring of 2009 (at which point the stock market hit bottom), Americans became much more negative when evaluating their lives, were much more worried and stressed, and exhibited declines in positive affect. As we shall see, in our robustness analysis we address these issues by looking at the consumption response to household liabilities and to measures of income risk.

3. The data

In our investigation we use information from two micro-data surveys. Our first data source is the HRS, which is a longitudinal, nationally representative micro survey interviewing those aged fifty and above in the US. The survey, conducted on a biannual basis since 1992, provides extensive information on households' socioeconomic characteristics, income, and assets holdings (for a detailed description of the survey see Hauser and Willis, 2005).

Wave 9 of the HRS, which was conducted between February 2008 and February 2009, interviewed 16,477 individuals belonging to 11,187 different households. In 2009, the HRS asked a subset of the Wave 9 respondents to participate in an Internet survey (our second data source), with the aim to collect information on households' experiences and circumstances during the ongoing recession. Most of the sampled individuals had participated in wave 9 of the HRS and had reported having Internet access, while the few who had not appeared in wave 9 had participated in previous waves of the Internet Survey (2003, 2006, or 2007). The 2009 Internet Survey was conducted from March 2009 through August 2009, and its sample consists of 4,415 respondents belonging to 3,438 households (the sample response rate was about 77 percent).[6] The survey provides information on the wealth losses that respondents have experienced, on the adjustments they have made in their consumption, on changes in their labor status, and on how they cope with financial difficulties. In our analysis we merge the 2009 Internet Survey with the 2008 main survey, thus ending up with a sample of 3,328 households.

For our purposes, a most important feature of the Internet Survey is that respondents are asked about changes in their total spending compared to the previous year (i.e., 2008). They are first asked to indicate whether their current spending is lower, higher, or has stayed the same. Subsequently, they are asked to report the percentage change in their total spending. In our analysis, we are going to examine both the continuous (percentage) and the qualitative (categorical) change in expenditure as our outcomes of interest.[7]

[6] In order to reduce the possibility that our estimates are affected by outliers, we do not use any observations for which the absolute value of the percentage change in consumption is larger than 0.8, and thus we drop 26 households from our sample.

[7] The Internet Survey also asks about current spending on some basic consumption items. Furthermore, one can recover information on spending in 2008 by using information from the Consumption and Activities Mail Survey (CAMS), which is a supplemental mail survey conducted in 2009, and in which a sub-sample of 2008

Furthermore, the Internet Survey asks a series of questions aiming to measure the wealth losses that households have suffered. Specifically, households are asked whether their own home is worth more, less or about the same compared to its value in the summer of 2006, which is the year in which house prices peaked in the US. Then, they are also asked to report the change in the value of their house, both as an amount and as a percentage. We will use as a forcing variable in our specifications the answer to the percentage change question, given that the questions on changes in spending and, as we will see below, in the value of financial assets are also asked in percentage terms.[8]

Finally, the Internet Survey also asks a series of questions regarding the percentage losses in the value of the following financial assets: employer retirement saving plans (incl. 401k's); individual retirement accounts (IRAs) or Keogh plans; investment trusts; mutual funds; directly held stocks; and stocks held through other assets.[9] For each of these assets owners are asked to report the percentage decline of the asset value since September 2008, which was the month in which Lehman Brothers collapsed, resulting in a major upheaval in financial markets worldwide. Unlike the questions on the change in the value of the house, the questions on changes in the value of financial assets ask only about losses, and hence the values of the corresponding variables are censored at zero. However, given the fact that financial markets went in a tailspin in the fall of 2008, and that the US stock market in particular hit bottom in March 2009 (i.e., one month before the Internet Survey began), we think that very few, if any, households in the survey may have experienced any financial gains. In any case, in order to test the sensitivity of our results to this feature of the data, we also tried as an alternative to the continuous percentage change variable a four-level categorical variable, the top level of which denotes no losses (or gains), while the other three

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HRS respondents were asked about their expenditures over the past 12 months. In principle, one could examine changes in consumption by also using this additional information. In practice, however, it is very difficult to use either of these additional sources of data on expenditure. First, there are very few observations (less than 400 households) for which the information needed from all three surveys (i.e., 2008 HRS, 2009 CAMS and the Internet Survey) exists. This is the case because the vast majority of households participating in 2009 CAMS do not participate in the Internet Survey. Second, the Internet Survey does not provide any information on a number of major expenditure items (e.g., housing expenses, recreation, personal care).

[8] For cases in which the percentage change in the value of the home is missing we calculate it by using information from the amount change in the home value, and the current value, which are related to the percentage change by the equation $p=DV/(V-DV)$, where p denotes the percentage change, DV the change in value, and V the current value.

[9] There are no questions in the Internet Survey about less risky financial assets like checking or savings accounts and bonds.

levels the terciles of financial losses. As we discuss below, using this alternative categorical variable did not change our results in any significant way.

One may wonder to what extent the reported capital losses accurately reflect the actual losses households suffered on their assets. However, our empirical results are unlikely to be due to such a measurement error. First, households report the gain/loss that they perceive to have incurred on their house and on their equity holdings. These perceived price changes might be different from the ones that would be recorded if, say, there were an actual auction of the households' main home or if they sold their equity holdings. However, what should matter for households' consumption response is precisely this perceived loss and not the hypothetical accurately recorded one. After all, it is reasonable to assume that households act on what they think has occurred. On the other hand, measurement error would be an issue in our case if a respondent knowingly misreports to the interviewer the value of the gain/loss, as in this case the household would act based on a value of the relevant variable that is different from the one observed by the econometrician. However, we know of no evidence that such deliberate misreporting is common in the HRS.

Second, in the linear models we estimate, measurement error in the regressors has an attenuating effect on the associated coefficients, and thus the bias that it potentially induces goes against us. On the other hand, measurement error in the dependent variable does not affect the consistency of the estimates; rather, it increases their standard errors. Third, as already mentioned, we estimate a number of models that use functional forms and variable formats (e.g., models with a categorical dependent variable and/or dummies denoting quartiles of housing and financial wealth gains/losses) that are much more robust to possible measurement error. The results from these models, as discussed in sections 4 and 6 below, are entirely consistent with those from our baseline specification.

As an additional check of the quality of our data, we compared our measures of housing and capital losses to those recorded in other sources, namely the 2007-2009 panel of the Survey of Consumer Finances and the Flow of Funds. As reported in detail in Appendix A, results from these two external sources are reasonably close to those obtained from our data.

Our primary objective is to examine the relationship between, on the one hand, changes in consumption and, on the other hand, capital losses in housing and financial assets, as well as unemployment. Losses in financial assets will be expressed either as a weighted average of the percentage change in the aforementioned six financial assets, or as six separate percentage

change variables. We construct the weighted average of the percentage change in the value of financial assets, by weighing the percentage change in each of the six asset categories with the financial portfolio share of the respective asset, as recorded in the Internet Survey. As we will discuss below, we have also tried an unweighted average of the changes in the value of the individual financial assets, and this change left our results unaffected.[10] In order to avoid problems with sample selection, we will include in our estimation sample also households that do not own a house and/or financial assets. As expected, the value of the capital gains variables will be equal to zero for those households.

Table 1 summarizes changes in consumption, both in percentages and in categorical form (lower, same, or higher compared to the previous year), by quartiles of percentage changes in asset values. Descriptive statistics suggest a negative association between asset capital losses and spending. While the median household has not reduced its consumption, households that have suffered the largest losses in housing have reduced their spending by 5.2 percent on average, while the corresponding drop for those with the largest losses in financial assets is 7.2 percent. On the other hand, households with the smallest losses (i.e., those in the 4^{th} quartile), reduce on average their spending by 2.8 percent and 3.3 percent due housing and financial losses, respectively. The results on qualitative consumption changes suggest a similar picture, as the fraction of those reporting a decline (increase) in consumption increases (decreases) when losses are higher (i.e., at the lower quartiles).

In Table 2 we show statistics on losses on housing and total (weighted) financial assets, as well as for each financial asset separately. It is immediately clear that a significant fraction of households have suffered losses in housing (54 percent) and in their financial assets (94 percent), conditional on ownership. The prevalence of losses is also very severe (between 73 percent and 92 percent) in all six financial assets.

About half of the households that have experienced a drop in their housing wealth have lost at least 18 percent of the value of their main home between the summer of 2006 and the spring of 2009. This implies a considerable hit to household net worth, given that the house is

[10] We should note that the Internet Survey asks households to give an estimate of the current value of the six financial assets in question. It is not possible, however, to combine this information with asset values reported in the 2008 HRS in order to calculate percentage losses for each financial asset. This is the case because changes in asset values do not distinguish between active saving and changes in market prices. Furthermore, there is not an exact correspondence between financial assets about which questions are asked in HRS 2008, and those in the Internet Survey (e.g., there is no information on employer provided plans and trusts in the 2008 HRS). As a result, we have to use the Internet Survey question on percentage changes in asset values in order to measure asset losses.

typically the dominant asset in household portfolios. The drop in households' financial wealth has also been very striking. Among those who have suffered losses the median percentage loss with respect to the four major asset categories (i.e., employer-based pension plans, IRAs, mutual funds, and direct stocks) is about 28 percent since September 2008. Furthermore, one out of four households with losses has witnessed a decline of at least 36 percent in the value of its investments in the aforementioned four assets.

We then calculate what the percentage losses shown in Table 2 imply in dollar terms by applying the reported losses in percentages to the values of the assets as reported in the HRS Internet Panel. We find that the median amount of the sum of losses from housing and financial assets was about 50,300 dollars (in 2009 prices) for the whole sample. These large capital losses recorded in our micro data are congruent with the aggregate capital losses during the Great Recession that are shown in Figure 1. The magnitude of the capital losses suffered by the households in our data is likely to have a negative impact on their spending.

Apart from changes in housing and financial wealth, we will use in some of our specifications variables denoting a variety of socio-economic characteristics, information on which is taken from the 2008 HRS. These include age, household size, marital status, being in fair/poor health, working status, education, and race. Moreover, we use the number of correct answers to a numeracy test (five successive subtractions of the same number) as an indicator of cognitive ability.[11] Furthermore, we take into account households' resources in 2008 by controlling for total household income, and net worth.[12] Finally, we include dummy variables representing a transition into unemployment, an exit into retirement, and a deterioration in health status between HRS 2008 and the Internet Survey.[13]

Table 3 provides summary statistics on the aforementioned socioeconomic characteristics. The mean age is about 63 years, while households in which there are two

[11] Shapiro (2010) also associates cognition with changes in consumption.

[12] We control for net income and net wealth, which both have highly skewed distributions, by using the inverse hyperbolic sine transformation (hereafter IHS): $\log(x+(x^2+1)^{1/2})$, which allows for nonlinear effects and is defined for zero and negative values. The IHS function is asymptotic to the logarithmic one (with a difference equal to the logarithm of two) starting from values of x that are very close to zero (Burbidge et al, 1988). Hence an estimated coefficient of an IHS-transformed variable can be interpreted essentially in the same way as a coefficient of a variable in logarithms.

[13] In the case of couples characteristics represent a combination of the information from the two partners. In particular we use average age, worse reported health status, and the maximum of educational level and of the numeracy score. Furthermore, the couple is determined to be in the labor force if any of the two partners is working and retired if both are retired. With reference to changes in occupation, a couple with at least one newly unemployed or newly retired member between HRS 2008 and the Internet Survey is classified as becoming unemployed or retired, respectively.

partners form 75 percent of the sample. In about half of the households at least one member was employed full time, hence facing a potential risk of unemployment. On the other hand, in 34 percent of cases both partners were retired. In a non-trivial fraction of older households (5 percent) at least one of the two partners (or the single head) became newly unemployed between the 2008 HRS and the Internet Survey (as opposed to almost 6 percent for the population at large in the same period). In the same period, the rate of exit into retirement was 11 percent. Roughly 7 percent of households have at least one member declaring deterioration in health status in comparison to 2008, while one out of four households declares health problems in 2008. The median household income was about 70,000 dollars, while the corresponding numbers for financial and net real assets are 81,800 and 193,100 dollars, respectively (the latter figure is mainly due to the high home ownership rate and relatively low amounts of outstanding mortgages observed in our sample).

Figure 2 highlights graphically our main results. It plots the change in the value of financial assets and the home against consumption growth, with the data aggregated in bins. Both relations are positive, suggesting sizeable wealth effects. The response of consumption to financial losses appears, however, to be much stronger. In particular, the left panel of Figure 2 shows that a drop in the value of housing wealth of 25 percent is associated with a decrease in expenditure of about 2 percent. On the other hand, the right panel of Figure 2 shows that financial wealth losses of 25 percent are associated with a reduction in consumption of about 4 percent.

4. Model specification and empirical results

We will study the effect that capital gains on housing and financial assets have on consumption by using a linear specification, in which the percentage change in consumption C will be associated to the percentage changes in the values of housing and financial wealth (denoted by HW and FW, respectively)[14], to becoming unemployed (denoted by ΔU) as well as to various changes over time in a vector of demographic and economic variables X. Thus, we estimate the following equation:

[14] In the variables denoting percentage changes, negative values will denote capital losses; in other words, these variables will effectively denote capital gains.

$$\frac{\Delta C_{it}}{C_{it-1}} = \alpha + \beta \frac{\Delta HW_{it}}{HW_{it-1}} + \gamma \frac{\Delta FW_{it}}{FW_{it-1}} + \delta \Delta U_{it} + \zeta \Delta X_{it} + \varepsilon_{it} \quad (1)$$

where i denotes the household and ε_{it} an error term. This specification has been often used in the literature in order to capture the effect of various impulses on the growth rate of consumption. As Souleles (1999) notes, equation (1) nests the linearized Euler equation of Zeldes (1989) and Lusardi (1986) when β and γ are equal to zero.[15] Due to differencing, estimation is not affected by any household fixed effects that could influence the expenditure in levels (Parker, 1999).

In this framework, the coefficients of the variables denoting percentage changes in the values of the two assets (i.e., β and γ) have a straightforward economic interpretation: they represent the elasticity of consumption with respect to those assets. Similarly, δ represents the semi-elasticity of consumption to becoming unemployed. As we will discuss in Section 6 below, we check the robustness of our results to the assumption of linearity by re-estimating all our specifications using the fractional variable framework of Papke and Wooldridge (1996, henceforth PW).

We always include a constant α in our specification, which captures the effects of aggregate shocks to consumption growth. Hence, our estimates of β, γ and δ reflect the response of household consumption to idiosyncratic shocks to their wealth and employment status.

We will estimate four different variants of each model that will include four different sets of covariates, in addition to those denoting capital gains. The first set includes age and household size, i.e., we have a basic specification as used in Zeldes (1989). The second set includes in addition variables that capture changes in the households' circumstances between the main HRS survey of 2008 and the 2009 Internet Survey: whether at least one of the two partners (or the single head) becomes unemployed, retires, or reports a deterioration in their health. In the third set we additionally control for economic resources by adding net real and financial assets, as recorded in the main HRS survey in 2008. Finally, in the fourth set we add further controls from the 2008 survey in order to check the sensitivity of our results and capture potential heterogeneous consumption responses of different population groups. These

[15] Other papers that use the same framework include Parker (1999), Johnson et al. (2006), Agarwal et al. (2007), and Disney et al. (2010).

controls include: being in a couple, educational attainment, the score in a numeracy test, being in fair or bad health, working status, and race.[16]

We first show in Panel A of Table 4 the elasticities derived from associating the percentage change in consumption to the percentage changes in the values of the house and in the weighted percentage change in financial assets. We observe that the elasticity of consumption with respect to the value of the house is roughly equal to 0.056 across all four specifications and significant at the 10 percent level. Gains on financial assets appear to have a strong positive association with the change in consumption, as the estimated elasticity equals 0.089 and is also significant at the 1 percent level. Obviously, a constant elasticity does not imply that rich and poor households change their expenditure by the same amount in response to a given percentage drop in their wealth. In fact, as rich households generally spend more than poor ones, a constant elasticity implies that they will reduce their consumption by a greater amount.[17] We should note, however, that the estimated elasticities of consumption to housing and financial wealth are not strictly comparable, given that the associated capital gains variables reflect asset price changes taking place over different time periods (i.e., since the summer of 2006 for housing and since September 2008 for financial assets); we will return to this issue below.

When we look at the remaining variables in our specification we find very strong associations of the percentage change in consumption with the transitions into unemployment and into retirement (the semi-elasticities are equal to 0.1 and 0.026, respectively).[18] The strong effect of unemployment suggests that it represents a shock that is at least partly unanticipated and against which the household can only partially insure. The negative association of consumption with retirement points to the lack of perfect consumption smoothing, as well as to the possible existence of consumption items that are complementary to working (Banks et al., 1996).

Having thus calculated the elasticity of consumption with respect to the values of the house and of financial assets, we can subsequently calculate the marginal propensity to

[16] We use two dummies denoting unemployment in the 2008 HRS, as well as becoming unemployed between that time and the 2009 Internet Survey interview, given that if one is already unemployed in 2008, then the transition to unemployment dummy will be equal to zero. Therefore, using both variables gives us more information on the effects of unemployment on spending. Analogous arguments apply for the transitions into bad health and into retirement.

[17] This is consistent with the evidence presented by Petev et al. (2011), who, using CEX data, find that during the recession the consumption of the rich fell more than that of the poor.

[18] We also find a positive association of the growth rate of consumption with age. We cannot distinguish, however, between age and cohort effects in our framework.

consume out of those two assets (shown in Table 4, Panel B), which is equal to the elasticity divided by the ratio of the value of the associated asset to consumption expenditure. For housing, we use the value of the house as recorded in the 2006 HRS, as the question is about changes in the price of the house since the summer of 2006. For financial assets, we use the value of risky financial assets as recorded in the 2008 HRS, as respondents in the Internet Survey are asked about their losses since September 2008. For the associated consumption expenditure, we use the values of total expenditure recorded in the 2007 and 2009 CAMS surveys, which also partly cover the previous calendar year. As already discussed, however, when we merge the CAMS surveys with the Internet Survey we have information on total expenditure only for relatively few households (367 for CAMS 2007, and 386 for CAMS 2009). The values of the marginal propensities to consume that we obtain (shown Panel B of Table 4) using the asset to consumption ratios recorded for households in the Internet Survey are equal to 0.009 for housing and to 0.033 for financial assets.[19] As is the case for the underlying elasticities, the two MPC estimates are not strictly comparable due to the different time frames in reported gains, yet they both fall within the range of estimates found in previous literature (reviewed in Section 2).

The small magnitude of our estimated MPC out of housing could be due to the fact that not all homeowners may reduce their consumption in response to a house-price decrease. For example, homeowners who expect to remain in their current dwelling for a very long time are hedged against fluctuations in rents and house prices. Furthermore, in the absence of any substitution effects or credit constraints, a change in house prices is less likely to affect their consumption. On the other hand, a decline in house prices might induce a decline in consumption for homeowners planning to trade down, or stay in the same home and access their housing wealth through an equity release scheme.[20] For homeowners wishing to trade up in the future, however, the effect is ambiguous, as the value of both their current property and of any future dwelling will have unexpectedly declined. One should also keep in mind the

[19] For the calculation of the MPC out of financial assets we included bond holdings recorded in the 2008 HRS because: (i) the single question on them therein also includes bond holdings in mutual funds; (ii) in the Internet Survey, we have information on the capital losses on mutual funds only for all of them combined. When we repeated our calculations excluding bond holdings, the calculated MPC out of financial assets was only slightly higher at 0.034.

[20] As suggested by Aoki et al. (2001) a fall in house prices might also affect access to credit in the form of equity withdrawal. In fact, a reduction in house prices reduces collateral available to homeowners, discouraging them to borrow.

possibility that the long-term effect of housing losses on consumption could be larger than the short-term one (Carroll et al., 2011).

In order to check whether our results on the MPCs are affected by the relatively small number of observations used in their calculation, we applied the estimated elasticities (i.e., the regression coefficients) not only to the households in the Internet Survey that also appear in the main HRS surveys in 2006 and 2008, but rather to all households in the 2008 (2006) HRS for which expenditure information exists from the 2009 (2007) CAMS. We can do this because the elasticities are fixed numbers, i.e., they don't depend on any of our independent variables on which information can be found in the Internet Survey but not in the 2006 and 2008 HRS. The advantage of using these alternative samples is that we end up with much larger numbers of households on which we can calculate the MPCs (1,846 households for the MPC out of housing, and 1,294 households for the MPC out of financial assets). We found that the calculated MPC out of housing remained the same at 0.009, while the MPC out of financial assets was slightly lower at 0.03. Therefore, we conclude that our MPC estimates from the Internet Survey are not significantly affected by the relatively small number of observations used for their calculation.

As already discussed, the estimated MPCs out of financial assets and housing are not directly comparable to each other, given that the underlying reported gains used in their calculation refer to different periods. One way to address this issue is to change the period of reference of housing capital gains so that it starts from September 2008, as is the case with financial asset gains. In order to do this one would need to calculate the part of the total reported housing capital gain (i.e., from the summer of 2006 to the time of the interview) that occurred from September 2008 to the time of the interview. In order to do this apportioning we have to make an assumption about the rate of change in housing prices from the summer 2006 on. It turns out that the different housing price indices give conflicting results for this rate. The Case-Shiller US house price index implies that the drop in housing prices slowed down from September 2008 on compared to the interval between the summer of 2006 and September 2008. On the other hand, the US house price index produced by the Federal Housing Finance Administration (FHFA) leads to the opposite conclusion.[21] Hence, we

[21] The FHFA index declined, on a seasonally adjusted basis, by 9.6% in 9 quarters (i.e., from 221.98 in the second quarter of 2006 to 202.88 in the third quarter of 2008). The same index fell by 4.5% between the third quarter of 2008 and the second quarter of 2009 (=193.67), which represents an accelerated pace compared to the previous period. On the other hand, the Case-Shiller index for the US declined from 189.93 to 139.41, i.e., by

proceed with our calculations by assuming that the rate of change of housing prices was roughly constant from the summer of 2006 to the time of the interview. It is important to note that our apportioned housing capital gain/loss varies across households because the latter are interviewed at different points (chosen randomly) in the first half of 2009.

We use this calendar time-based apportioning scheme both for households reporting housing gains and for those reporting losses. It turns out that the so-apportioned (i.e., since September 2008) housing price change is, on average, about one fourth of the actual reported one, although, as already mentioned, this proportion varies across households. As a result, when we substitute this apportioned housing price change for the actual one in our empirical specifications, the associated regression coefficient is about four times larger, i.e. the elasticity changes from about 0.055 to about 0.23. This is to be expected, given that the dependent variable and all other regressors retain their original values; hence, dividing one regressor by a factor of four on average results in an inverse adjustment of its estimated impact.

Given that the MPC out of housing is equal to the estimated elasticity multiplied by the ratio of consumption to the housing value, it also becomes roughly four times larger. Hence, it is approximately equal to 0.04, i.e. a bit larger than the MPC out of stock capital gains, but still within the range of estimates usually found in the literature. The same reasoning obviously implies that if the apportioned housing capital loss since September 2008 is smaller on average than one fourth of the actually reported total loss since the summer of 2006, then the upward adjustment of its associated coefficient will be larger. Notably, the estimated elasticity of consumption to stock wealth remained essentially unchanged when the modified measure of housing capital gains was used.

In order to check whether our results are sensitive to any outliers in the variable denoting consumption growth, we re-estimated our model using as a dependent variable the categorical change in consumption relative to the previous year instead of the continuous percentage change. As there are three possible values (lower, the same, higher) to this categorical variable, we show in Table 5 the marginal effects on the three associated probabilities, derived from an ordered probit (more details about the calculation of marginal effects are given in Appendix B). We note that a capital gain of 15 percent (our assumed perturbation of the capital gains variables) lowers the probability of reducing consumption by

about 27%, during the first period, while it declined by 4.5% in the second period (its value was equal to 133.18 in the second quarter of 2009).

about 1.5 percentage points and 2.2 percentage points in the case of housing and financial assets, respectively. Analogously, this capital gain makes the probability of increased spending higher by 1.6 percentage points and 2.4 percentage points. Importantly, the housing capital gain is statistically significant at the 5 percent level in most cases, while the p-value of the financial capital gain is always below 1 percent. Becoming unemployed has a large negative impact on consumption, as it increases that probability of smaller spending by roughly 21 percentage points, while it decreases the probability of higher spending by roughly 14 percentage points. Therefore, we conclude that our results obtained by using the continuous consumption growth as the dependent variable are robust to the presence of outliers.

As we have detailed information on the composition of financial assets, we repeat our analysis using as separate controls the percentage changes in the asset values of the six financial assets found in the Internet Survey (as before, positive values of these six variables denote financial gains). This allows us to estimate to which financial assets in particular we should attribute the strong effect of changes in total financial wealth on consumption displayed in Table 4. The results of this disaggregated analysis are shown in Table 6, and it is clear that the association of financial wealth shocks to consumption is to a large extent due to directly held stocks (the estimated elasticity is 0.088). It is also worth noting that in this specification the estimated elasticity of changes in housing wealth (0.068) is slightly larger than the one estimated from the specification that uses changes in the value of aggregated financial wealth. Importantly, this elasticity is now statistically significant at the 5 percent level, which indicates that the value of the home quite likely has a considerable effect on consumption expenditure. Losing one's job during the crisis has essentially the same large negative impact as before.

One notable feature of the results shown in Tables 4 and 6 is that the household's net worth as recorded in the main HRS survey in 2008 is not associated with the subsequent change in consumption, after controlling for capital gains. Households' indebtedness could, however, affect the response of consumption to capital losses; a household with large debts might have more difficulties in adjusting consumption smoothly to any changed circumstances due to the financial crisis. Therefore, instead of using total net worth in the third and fourth specifications shown in Tables 4-6 above, we disaggregated in these two specifications net worth into its three components: gross real assets, gross financial assets, and

total debt. Our results our shown in Appendix Table A.1 for the specifications corresponding to Tables 4 (columns (1)-(4)) and 6 (columns (5)-(8)), and in Table A.2 for the specifications corresponding to Table 5. We find that larger debts are indeed negatively associated with the change in consumption, with an elasticity of about -0.002 in the specifications shown in Table A.1. In addition, the results in Table A.2 imply that an increase of 10,000 dollars in total debt increases the probability of lower consumption by about 1.1 percentage point. One possible interpretation of this effect is that households with more debt were more affected by tightening credit conditions, and therefore cut back on their consumption more strongly.[22] The results for changes in the values of the home and financial assets are affected very little by the disaggregation of net worth into its components.

5. Simulation results from two models of intertemporal choice

To gain insights about the potential size of wealth effects on consumption and to motivate our empirical specification, we simulate the consumption elasticity with respect to a wealth shocks in two standard models of intertemporal choice, namely the Permanent Income Hypothesis (PIH) one and the Buffer Stock Model (BSM) one. In both models households maximize the expected value of an intertemporally additive constant relative risk aversion utility function over a finite time horizon. The labor income process is standard, with a permanent and a transitory component that are distributed lognormally. The rate of return on wealth is the sum of a deterministic component and a stochastic component, which is meant to capture shocks to wealth. In our context, these shocks represent capital gains/losses. The crucial condition that differentiates the BSM from the PIH is the existence of a non-negativity constraint on wealth, which generates buffer stock saving (Deaton, 1991).

We calibrate the stochastic process for capital gains using data from the US Flow of Funds. All details about the models' specification, calibration and solution methods are reported in Appendix C.

We run the simulations for both the BSM and PIH models for three periods for approximately 10,000 households, taking as an initial condition for wealth the cross-sectional

[22] This result is qualitatively consistent with the findings of Mian et al. (2013), who find that in zip codes with poorer and more levered households have a significantly higher MPC out of housing wealth.

distribution of wealth of the households in the HRS Internet Survey. The youngest age in our sample at the beginning of the simulation is 50 and the oldest one 90. In each period we generate for every household the values of consumption, capital gains, wealth and labor income and then estimate the same empirical model that we run in our HRS sample. In particular, we estimate the following equation:

$$\frac{\Delta C_{it}}{C_{it-1}} = \alpha + \beta l_{it} + \varepsilon_{it}, \tag{2}$$

where l_{it} denotes capital gains/losses as a percentage of the value of the underlying asset. Hence the coefficient β in equation (2) can be interpreted as the elasticity of consumption to wealth.

Given that both the BSM and the PIH models imply a nonlinear relationship between percentage changes in consumption and wealth (or cash-on-hand) we also estimate a version of equation (2) in which our capital gains variable is interacted with wealth and income, while including in our specification those two variables also as independent terms.[23] Given that now capital gains are interacted with income and wealth, we calculate again the elasticity of consumption to wealth, which is now equal to the total derivative of percentage consumption growth with respect to percentage capital gains, taking into account both the uninteracted and the interacted terms in which these gains appear. This derivative varies across observations, as it now depends on the values of income and wealth; hence, we calculate its average across the sample, i.e., we calculate the average marginal effect of capital gains on percentage consumption growth.

Our results are shown in Table 7, for both the BFS and PIH model, with and without interactions with income and wealth, and for both definitions of the capital gains variable discussed above. When there are no interactions, the elasticity from the BSM is 0.098 when capital gains are calibrated to match data only from equities, and 0.084 when using a weighted average of capital gains on housing and equities. The corresponding magnitudes from the PIH model are 0.080 and 0.079, respectively. In all cases the elasticity is very precisely estimated. We also experiment with a version of the PIH model in which both the permanent income shock and the transitory income shock are switched off, and thus labor income evolves deterministically. We find that the elasticity is 0.077 for both cases of capital

[23] We transform both variables using the inverse hyperbolic sine transformation, given that in levels they are both very skewed.

gains. Therefore, it seems that in our simulation the presence of income shocks in the PIH model does not affect the estimated elasticity of consumption to wealth.

When using interactions of capital gains with income and wealth, it turns out that the interaction terms are statistically significant in all cases. As can be seen from Table 7, however, the magnitude of the elasticity remains essentially identical to the one from the uninteracted models. Therefore, interaction terms in both simulated models, while individually statistically significant, do not affect the overall estimated impact of capital gains on consumption growth.

To summarize, the simulations reveal that the implied elasticities are somewhat higher in the BSM than in the PIH model, and that our estimated response of consumption to wealth in the data fall in between this range. This suggests that our empirical estimates of the sensitivity of consumption to wealth shocks are broadly consistent with standard intertemporal consumption models.

6. Permanent vs. transitory wealth shocks

One of the core predictions of the life-cycle theory of consumption is that, when hit by unexpected wealth or income shocks, households should adjust their consumption much more when they consider the shock to be permanent rather than transitory.[24] In order to determine whether shocks are transitory or permanent, one can estimate the process generating the shocks, or rely on subjective expectations. Contreras and Nichols (2010) follow the first approach. They exploit regional variability in house price dynamics and estimate that the consumption responses to permanent shocks to housing wealth is between 3.5 and 9.2 percentage points, while in the case of responses to transitory shocks the MPC is between 0.5 and 3.7 percentage points. The second strategy, forcefully endorsed by Manski (2004), is to use subjective expectations as recorded in survey data in order to elicit information on the

[24] Several studies have examined this prediction using aggregate or regional data (Lettau and Ludvigson, 2004; Luengo-Prado and Sorensen, 2008). There are also studies that use survey data in order to examine consumption responses to income shocks, and to distinguish between the effect of permanent and transitory shocks (Blundell et al., 2008). Recently, Campbell and Cocco (2007) have used survey data to investigate the impact of housing wealth fluctuations on consumption, distinguishing between anticipated and unanticipated changes in housing prices.

distribution of future shocks.[25] In the case of stock market expectations this is actually the only feasible approach, because stock market prices do not vary among individuals or geographical districts.

We follow the latter approach, and thus examine households' expectations about the course of the stock market in the near future in order to understand whether they consider the financial losses experienced during the crisis as permanent.[26] These expectations, even if not fulfilled, can induce substantial consumption adjustments. We would expect financial wealth losses to have a stronger effect on consumption for households that perceive the stock market decline to be permanent, compared to those that anticipate stock prices to recover relatively fast.

This heterogeneity in expectation formation among households can be properly studied only by using micro survey data. To that effect, we exploit the fact that in both the 2008 main survey and the Internet Survey households are asked to report the probability that blue chips shares (like those in the Dow Jones Industrial Average) will be higher in a year's time. The distribution of answers to this question in the 2008 HRS is as follows: the first quartile is equal to 30 percent, the median is 50 percent, and the third quartile equal 70 percent (the mean is 49 percent). The corresponding quartiles computed from the 2009 Internet Survey are 10, 30, and 60 percent (the mean is 37 percent). The shift of the distribution to the left suggests that many households became more pessimistic in the second interview about the future course of stock prices. On the other hand, a non-trivial fraction of households in our sample (32 percent) become more positive about the stock market between the two surveys, in the sense that they reported a larger probability of a rise in the stock market in 2009 than in 2008. This upward revision in the reported probabilities likely indicates that these households consider the decline in stock prices to be temporary. Hence, their spending should be less affected by financial capital losses compared to that of households with a more pessimistic outlook on the stock market (i.e., those that report the same or a smaller probability in 2009 compared to 2008).

[25] Other papers that rely on subjective expectations to distinguish between transitory and permanent income shocks include Hayashi (1985), who used a four-quarter panel of Japanese households containing respondents' expectations about expenditure and income in the following quarter, and Pistaferri (2001), who combined income realizations and quantitative subjective income expectations contained in the Italian Survey of Household Income and Wealth (SHIW).

[26] There are no questions in the 2008 HRS on households' expectations about housing prices.

To check our intuition, we re-estimate our baseline model after splitting our sample between these two types of households. The results are shown in Table 8, Panels A.1 and A.2. We find that, in line with our expectations, households that consider the stock market decline as non-transitory respond quite strongly to financial capital losses. Indeed, the estimated elasticity equals 0.12, substantially higher than the one found in our basic specification for the whole sample (shown in Table 4), which was about 0.09. On the other hand, we estimate much weaker and statistically insignificant consumption adjustments by households that in 2009 revise their expectations about stock prices upwards compared to 2008.

An alternative way to check the effect of permanent and transitory wealth shocks is to split the sample based only on the expectation about higher stock prices reported in the main HRS survey in 2008. We consider households that reported a probability larger than 50 percent as likely to believe that the drop in stock prices is temporary, whereas those that reported a probability less or equal to 50 percent were considered as more likely to think of the drop as a lasting one. Once more, our estimates (shown in Panels B.1 and B.2 of Table 8) strongly suggest that households that view the stock market slump as more likely to persist respond strongly to financial capital losses (the elasticity is equal to 0.134), whereas the response of those that expect a rebound in stock prices is again weak and not significant.

It is well documented (see, e.g., Fischhoff and Bruine de Bruin, 1999) that respondents in household surveys who cannot answer a question about the probability of a future event sometimes give an answer of 50 percent instead of admitting their inability to answer. In order to check the robustness of the results discussed in this Section to this pattern of answers, we repeated all our analyses after excluding all households who gave an answer equal to 50 percent. None of our results were affected by this exclusion.

7. Robustness checks

To check the robustness of the results presented in Sections 4 and 5 we performed a number of robustness checks. Due to space constraints, we show only some of the results discussed in this Section. All results are available from the authors upon request.

First, given that the values of the percentage change in consumption lie between minus one and plus one, we redo our estimation using the PW fractional variable model (discussed

in further detail in Appendix D), which features a conditional mean that is nonlinear in the regressors. This nonlinearity could be important because the closer this mean gets to the variable bounds, the less it should be influenced by changes in the regressors. In contrast, a linear model produces a constant effect of the regressors across all ranges of the conditional mean, hence potentially leading to an overestimation of the effect for sample units with predicted means close to the bounds. In addition, nothing prevents a linear model from predicting out of range. The results from the PW model, however, prove to be essentially identical both in sign and in magnitude to those obtained from the linear model. We conclude, therefore, that the linearity of our main statistical model is unlikely to lead to any bias in our results.

Second, in order to check the sensitivity of our findings to possible outliers we perform robust regressions using Huber's (1973) M-estimator. The estimated impact of the variables denoting becoming unemployed and stock capital gains remains unchanged, while that of the variable denoting housing capital gains was slightly reduced from about 0.055 to 0.045. This latter effect, however, is much more precisely estimated; its p-value was below 0.02 in all specifications.

Third, instead of using as forcing variables the percentage changes in the values of the home and of financial assets, we use: (i) the quartiles of the capital gains in housing; (ii) the four levels of capital gains in total financial assets, which we described in Section 2 above. Using a categorical variable is a natural way to check whether our estimates are affected by the fact that in our data the financial capital gains variables are censored at zero. The results of our estimation are shown in Table 9, and we observe that the association of housing capital gains with the percentage change in consumption is strong and statistically significant at the top quartile: households that experience the largest capital gains (or smallest losses) increase their spending by roughly 2.4 percentage points compared to those with the lowest gains (or largest losses). The fact that we find a statistically significant association only for the top quartile of gains is indeed an indication of a non-linearity in the effect of housing capital gains. On the other hand, all levels of financial gains have a positive effect on the change in consumption (e.g., the effect of the highest level of financial gains is roughly equal to 3.4 percentage points across the four specifications). The effects of all remaining variables (including the transition into unemployment) are essentially identical to those shown in Table 4. In Appendix Table A.3 the analysis is repeated with the categorical change in consumption

as the dependent variable, and the results are essentially the same as those shown in Table 5: housing gains again matter at the highest quartile, while financial gains matter at all levels. As a result, we conclude that expressing our gains variables as categorical variables largely confirms our findings up to now; in particular, the censoring of the financial gains variable at zero has no apparent effect on our estimates.

We also estimate a specification with the categorical change in consumption as the dependent variable that includes disaggregated financial assets. Our results (shown in Appendix Table A.4) confirm those shown in Table 6 for the continuous variable denoting change in consumption, i.e., gains on both housing and direct stocks are associated with increases in consumption, while the opposite is true for becoming unemployed. Importantly, we find in three out of four specifications an additional positive and economically significant association of changes in consumption with capital gains in IRAs: a 15 percent increase in the latter raises by more than 1.5 percentage points the probability that households spend more. Given that the prevalence of IRA ownership is larger than that of stocks, capital losses in IRAs are likely to be an important transmission channel of the effect of the financial crisis on household spending.

The 2009 HRS Internet Panel does not collect information on income. This is the reason why in our baseline regressions we control for income from 2008 HRS in levels and changes in employment status, instead of including change in income between the 2009 survey and the 2008 HRS wave as a separate covariate. The only other measure of income that is available to us is the income reported in the 2010 HRS main wave, which refers to calendar year 2009. We have thus matched households in the 2010 HRS that report their incomes from 2009 with our data.[27] This allows us to compute the percentage change in income between the 2009 and 2008 waves, and use it as a regressor in our specification. This measure of income change is not ideal, given that it covers the whole calendar year 2009, while the interviews in our sample take place in the first half of that year. It also represents a change over two years, i.e. from 2007 to 2009. In any case, when we include this regressor, it is statistically significant and the associated elasticity is about 0.028. Importantly, the estimated elasticities with respect to both housing and stock wealth remain unaffected by the inclusion of the percentage income change.

[27] This is the case for almost 74% of households in the 2010 HRS that were interviewed in 2010, while the rest were interviewed in 2011.

We then want to check whether the associations of capital gains with consumption differs by whether household members were retired or not. As already discussed, while households with members that still work might feel a stronger drop in their permanent income because of the recession, older households have less time to adjust their spending to any negative shocks; therefore, which of the two effects prevails is an empirical issue. When we interact our retirement dummy with our variables denoting gains, the interaction term is insignificant, and the same is true for a dummy denoting that both partners (or the single household head) are less than 65 years old. In all cases, our results are unaffected by the inclusion of these interacted terms.

One factor that could possibly affect our results could be the perception (especially by the younger households in our sample) that permanent income has taken a negative hit during the Great Recession. This negative development could be reflected at the local level (e.g., due to the closing of a factory), and thus could affect the value of one's home. In order to control for perceived changes in permanent income, we use a question that asks the persons in our sample who work to report the probability that they will become unemployed in the next year.[28] Our results remain unaffected by the inclusion of this additional variable, which has a negative sign as expected but is not statistically significant.

The same probability p, when added in the specification in the form $p(1-p)$, could be used as a measure of uncertainty that households face about their future income prospects (Guiso et al., 1999). Such uncertainty has been proposed as one of the reasons for the drop in consumption in the US. We find that the coefficient of our proxy for uncertainty is statistically insignificant and does not change the estimated effect of the financial capital gains on consumption. As for housing capital losses, their effect now becomes insignificant in our baseline specification, but it remains highly significant when expressed in quartiles and also when financial capital losses are disaggregated. This is true when consumption growth is expressed both as a continuous variable and as a categorical one. As a result, we still think that the weight of the evidence indicates that housing capital gains have an economically and statistically significant effect on consumption growth.

[28] We set this probability equal to zero for retirees. We tried two approaches to deal with the value of this probability for the unemployed: (i) given that they are asked about the probability that they will find a job next year, we used one minus this probability; (ii) we took the unemployed out of our sample. In neither case did our results change.

We also try to account for negative permanent income developments and increased uncertainty by including information at the regional level. To that effect, we use the change in the GDP per capita and in the unemployment rate from the 2nd quarter of 2008 to the corresponding quarter in 2009 for each Census Division, which is the most disaggregated regional level for which information is available in the data. We find that a negative change in the regional GDP per capita has a strong negative effect on the growth in household consumption (a 1 percent decrease in regional GDP per capital implies a 0.4 percent decrease in consumption), while we find a negative but statistically insignificant effect of an increase in regional unemployment (possibly because we already control for unemployment at the household level). In any case, the inclusion of these two regional-level variables leaves our main results unchanged.

We also check whether the elasticity of consumption with respect to assets varies by the level of the assets that the household possesses (as already noted, the MPC does so because it is equal to the elasticity multiplied by the consumption to asset ratio). When we interact, however, our variables denoting capital gains with the corresponding assets, the interaction terms are not significant. The same is true of the interaction of the gains with the amount of household debt, although, as already mentioned, the coefficient of the uninteracted debt term is negative and statistically significant. The inclusion of these interaction terms does not change the coefficients of the uninteracted capital losses terms.

We then check whether our results are affected by time effects. For example, there were considerable fluctuations in asset prices during our sample period (the S&P 500 Index increased by about 22 percent from between March and June 2009). When we include dummies for the interview month, however, our results do not change.

Given that consumption could be affected not only by financial capital gains and losses, but also by any buying or selling of financial assets, we include in our specification both dummies that denoted buying and dummies that denote selling of each of the financial assets recorded in the survey.[29] Once more, our results are not affected by taking into account these financial transactions.

Finally, we check the sensitivity of our results to the weighting procedure that we use to calculate the weighted percentage financial gain, as described in Section 3. To that effect, we calculate the unweighted percentage capital gain on financial assets for any given household

[29] There are trivially few households in our sample who changed their home between the 2008 HRS main survey and the 2009 Internet Survey. Furthermore, the precise amounts of financial assets bought or sold are not known.

by taking the simple arithmetic average of the percentage gains in all the financial assets owned by that household. The estimation results obtained from using this unweighted magnitude are essentially identical to those shown in Table 4. We thus conclude that the particular weighting we use to derive the overall financial capital gain variable does not affect our results.

8. Results from the Panel Study of Income Dynamics

Given that our dataset consists of individuals aged 50 and above we want to repeat our analysis in a sample representative of the whole US population. For that purpose, we choose the Panel Study of Income Dynamics (hereafter PSID), which is a panel survey that has started in 1968, and since 1997 is conducted every two years. The recent PSID waves contain detailed information on consumption expenditures, as well as on the value of the house and risky financial assets.[30] Unfortunately, the survey provides no information on capital gains or losses on financial assets. Hence, the change in the value of those assets from one wave to the next is the result of both asset price changes and active saving. On the other hand, we can deduce home capital gains or losses by calculating the cross-wave difference in the reported housing value for respondents who do not move between waves. We choose the 2007, 2009 and 2011 waves for our estimation in order to cover the period corresponding to the Great Recession, and keep those households who either own the home they live in and do not move between waves or households who rent in all waves. Hence, we end up with a sample size of about 10,600 households.

We proceed to estimate equation (1) in this sample using the same four specifications reported in Table 4 above. Our results are shown in Table 10, and we note that the elasticity of consumption with respect to capital gains on housing wealth is about 0.051, which results in an MPC of about 0.009. Both these estimates are very close to the ones obtained from the HRS Internet Panel and shown in Table 4. The estimated elasticity with respect to risky financial assets is about 0.024, and the resulting MPC about 0.01. Hence, these estimates are

[30] Our measure of consumption consists of the sum of all expenditures that households report in the 2007-2011 waves, after excluding those expenditures that would not be considered as part of consumption, namely property taxes paid, and mortgage and car loan repayments. Risky financial assets refer to stocks in publicly held corporations, mutual funds, or investment trusts, and any money in private annuities or IRAs. For a detailed overview of the PSID, see McGonagle et al. (2012).

smaller than those obtained from the HRS data, but as we already discussed the variable denoting changes in financial assets is not comparable in the two surveys. Finally, the semi-elasticity of consumption with respect to a transition to unemployment is estimated to be about -0.0935, which is very close to the results obtained in the HRS.

All in all, we find the results from PSID to be comparable to those from the HRS for the variables whose definitions can be matched between the two surveys. As a result, it seems that our results obtained for the population aged 50 and above could be applicable to the whole US population.

9. Conclusions

We have examined the effects of the recent crises in the US housing, stock and labor markets on household spending, using recently available HRS data for the population aged fifty and above. The dataset records capital losses, employment transitions, and consumption changes at the household level, as well as stock market expectations between 2008 and 2009. We find that housing and financial wealth losses have a substantial negative effect on household consumption, and the same is true if someone in the household loses his/her job. In particular, we estimate that the marginal propensities to consume with respect to housing wealth and financial wealth are 1 and 3.3 percentage points, respectively. The effects of financial losses stem primarily from directly held stocks, while there is some evidence that losses on IRAs matter as well. Our results are very robust to numerous variations in specifications, outcome variables, and forcing variables. Importantly the derived marginal propensities to consume out of both housing and financial assets are economically significant and fall within the range of estimates previously found in the literature on the effects of housing and financial wealth on consumption. Moreover, our estimated elasticities are in line with the corresponding elasticities implied by standard intertemporal consumption models. We also find that results from the PSID are broadly comparable to those from the HRS for the variables whose definitions can be matched between the two surveys.

Our results imply that as long as the US housing and stock markets remain at depressed levels, and as long as the employment situation does not improve, it will not be easy to obtain a rebound in household expenditure, given that households will need to rebuild their assets

position by saving. This process is unlikely to be brief because households have lost such a large chunk of their wealth, while still being saddled with considerable debt and experiencing very modest income growth.

Finally, given that the effect of financial losses was found to depend on whether they are perceived as temporary or permanent, a key factor that could help the US economy recover would be the confidence that households have in the economy's prospects in the near future. As we have found, optimistic expectations about the stock market are likely to increase spending, thus helping the economy and the stock market, to recover. In turn, this could make households even more optimistic, leading to further increases in spending. All this implies that if policy makers could steer households' expectations about asset prices into a more positive direction, then this could generate a virtuous circle that could help the US economy get back on track faster.

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Appendix

A. Comparison of housing and equity wealth losses recorded in HRS and in other data sources

With respect to housing gains/losses, we consider households in the Survey of Consumer Finances (2007-2009 panel) who owned their home in both waves and did not move in-between, and in which the financial respondent was aged 50 and above. In our dataset the weighted mean (median) housing loss for such households is equal to -19.7% (-18%), while in the SCF the corresponding magnitudes are equal to -13.3 (-12.2). However, there is a difference in timing between the two datasets: ours records housing losses since the summer of 2006, while the SCF since mid-2007 on average. If one takes into account the fact that according to the Case-Shiller US housing price index there was a drop in home prices of about 3.4% between the second quarter of 2006 and the corresponding quarter in 2007, and assuming that this aggregate number would have been reflected in the SCF data had they covered 2006, then the reported housing losses match reasonably well between the HRS Internet Survey and the SCF panel.

As regards losses on equity, there is no variable in the SCF panel that corresponds to the one found in our dataset. In the SCF there is a question (named P5712) only on realized capital gains/losses on mutual funds combined with net gains/ losses from the possible sale of stocks, bonds and other real estate and without any reference to when these assets were bought or sold. On the other hand, the questions in our dataset are about capital losses since September 2008 in various kinds of equity holdings only. Therefore, and in order to assess the quality of our measure of stock capital losses, we turned to aggregate data. Hence, we used data from the US Flow of Funds to calculate the losses on all forms of equity incurred between the third quarter of 2008 and the second quarter of 2009 by the US household sector and non-profit institutions (the latter cannot be separated from the former in the Flow of Funds). These losses were equal to -14.1%. Given that the Flow Funds records aggregate data, this number represents an average loss not conditional on ownership. In addition, the losses recorded in the Flow of Funds are incurred by the whole population rather by only those aged over 50, as is the case in the HRS. In any case, the measure of stock capital losses in our dataset that most closely corresponds to the one from the Flow of Funds is the unconditional weighted mean loss, which is equal to about -18%. Hence, we again conclude that the variable denoting stock capital losses in our data records these losses reasonably well.

B. Calculation of magnitudes of interest via Monte Carlo simulation

Given that marginal effects, elasticities, and marginal propensities to consume are nonlinear functions of the estimated parameters $\hat{\beta}$, we compute their point estimates and standard errors via Monte Carlo simulation (Train, 2003) by using the formula:

$$E(g(\beta)) = \int g(\beta) f(\beta) d\beta \quad \text{(B.1)}$$

where $g(\beta)$ denotes the magnitude of interest and $f(\beta)$ the joint distribution of all the elements in β. We implement this simulation estimator by drawing 1,000 times from the joint distribution of the estimated vector of parameters $\hat{\beta}$ under the assumption that it is

asymptotically normal with mean and variance-covariance matrix equal to the maximum likelihood estimates. Then, for a given parameter draw *j* we generate the magnitude of interest $g(\hat{\beta}^j)$. We first calculate the this magnitude for each household in our sample, and then calculate the average (median) marginal effect as the average (median) of the effect across all households in our sample. We then estimate $E(g(\beta))$ and its standard error as the mean and standard deviation, respectively, of the distribution of $g(\hat{\beta}^j)$ over all parameter draws.

C. Simulations from a Permanent Income (PIH) and a Buffer Stock (BSM) Model

In both models households maximize the expected value of a standard intertemporally additive CRRA utility function over a finite time horizon, i.e.

$$E_0 \sum_{t=0}^{T} \beta^t \frac{C_t^{1-\sigma}}{1-\sigma} \tag{C.1}$$

where β denotes the discount rate and σ the coefficient of relative risk aversion (assumed to be equal to 0.96 and 2, respectively). Households survive with probability 1 till period *T*, and then all perish. In our simulations we will assume *T*=100.
End-of-period wealth *W* evolves according to the law of motion

$$W_t = \tilde{R} W_{t-1} + Y_t - C_t \tag{C.2}$$

where *Y* denotes labor income and *C* denotes consumption. The rate of return on wealth $\tilde{R}$ is the sum of a deterministic component $\overline{R}$ and a stochastic component l_t, i.e.

$$\tilde{R}_t = \overline{R}_t + l_t \tag{C.3}$$

The stochastic component is meant to capture shocks to wealth, which, in our case, would mean capital gains/losses. We calibrate stochastic process for l_t using data from the US Flow of Funds. More specifically, we calculate the real capital gains on all forms of equity as a percentage of the value of such equity, and it turns out that for the period 1952-2010 this series has a mean of 0.0243 and a standard deviation of 0.08. As an alternative, we calculate for the same period the weighted average of the capital gains on equity and residential real estate, with the weights being equal to the share of each asset in the sum of equity and housing wealth. This second series has a mean of 0.0185 and a standard deviation of 0.0653. Both series exhibit very little autocorrelation, and thus we model both of them as normal i.i.d. variables.We assume that the deterministic component of the rate of return $\overline{R}$ is equal to 1.02.
Labor income *Y* is equal to a permanent component *P* multiplied by a transitory shock ξ, i.e.

$$Y_t = P_t \xi_t \tag{C.4}$$

and the permanent component *P* grows deterministically at the rate *G* and is also subject to a permanent shock η , i.e.

$$P_t = G_t P_{t-1} \eta_t \tag{C.5}$$

We assume that both ξ and η are distributed lognormally, and the parameters of their distribution are calibrated as in Coco, Gomez and Maenhout (2005). The deterministic rate of income growth G is modeled as a step function depending on age, as in Carroll (1997).
The crucial condition that differentiates a BSM after Deaton (1991) from the PIH is the existence of a non-negativity constraint on wealth, i.e.

$$W_t \geq 0 \ \ \forall \text{t} \tag{C.6}$$

In Deaton's (1991) this non-negativity constraint generates buffer stock saving. In our baseline simulations the only difference between the BSM and the PIH will be this non-negativity constraint.

After defining cash-on-hand X as the sum of end-of-previous-period wealth, its associated capital income and labor income, i.e.

$$X_t = \tilde{R}_t W_{t-1} + Y_t \tag{C.7}$$

one can write the Bellman equation of the household's optimization problem as

$$V_t(X_t, P_t) = \max_{C_t} \left[\frac{C_t^{1-\sigma}}{1-\sigma} + \beta E_t V_{t+1}(X_{t+1}, P_{t+1}) \right] \tag{C.8}$$

subject to

$$X_{t+1} = \tilde{R}_{t+1}(X_t - C_t) + Y_{t+1} \tag{C.9}$$

and, for the BSM model,

$$X_t - C_t \geq 0 \ \ \forall \text{t} \tag{C.10}$$

Following Carroll (2006), and in order to reduce the number of state variables, we reformulate the household's optimization problem by normalizing various variables by the permanent income *P* and then solve the dynamic problem using the endogenous grid method as suggested by Carroll.

D. The Papke-Wooldridge fractional variable model

In the PW model the mean of the dependent variable conditional on the regressors X is assumed to be equal to $G(X\beta)$, where *G* denotes a function the range of which matches that of the dependent variable, and β a vector of parameters. The usual practice for variables that lie in [0,1] is to use the cumulative statistical distribution as the form of *G*. In our case, and since our dependent variable denoting percentage changes in consumption lies in [-1,1], we rescale it to lie in [0,1] by adding one to it and then multiplying it by one half. This linear transformation of the dependent variable simply results in a rescaling of the estimated coefficients and does not affect the results in any way. Having thus transformed our dependent variable, we choose the cumulative standard normal function to model G.

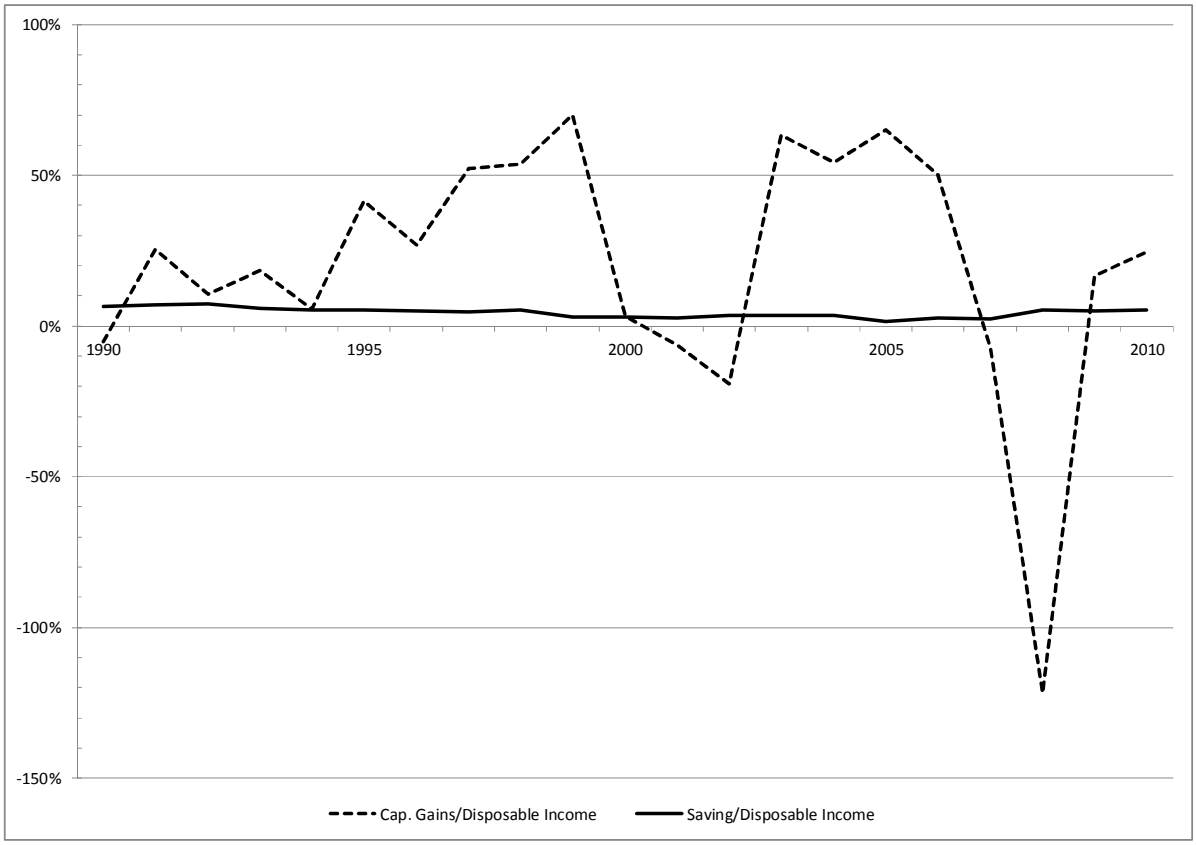
PW use a quasi-maximum likelihood estimation strategy that, under the assumption that the dependent variable has $G(X\beta)$ as a conditional mean, results in consistent estimates (Gourieroux, Monfort and Trognon, 1984). The quasi ML estimation needs to be performed by using a member of the linear exponential family of distributions, and we follow PW in choosing the Bernoulli distribution. Hence, the log likelihood of a household *i* reporting a percentage change y_t is given by:

$$l(y_i) = y_i \ln[G(X_i\beta)] + (1 - y_i) \ln[1 - G(X_i\beta)] \tag{D.1}$$

The quasi ML approach proposed by PW has been found to perform very well in estimation problems involving fractional variables (Kieschnick and McCullough, 2003) and requires no additional assumptions about other features of the data generating process (e.g. about the variance of the errors, which are heteroskedastic as the conditional mean approaches zero or one). Therefore, standard errors of the estimates need to be corrected for possible

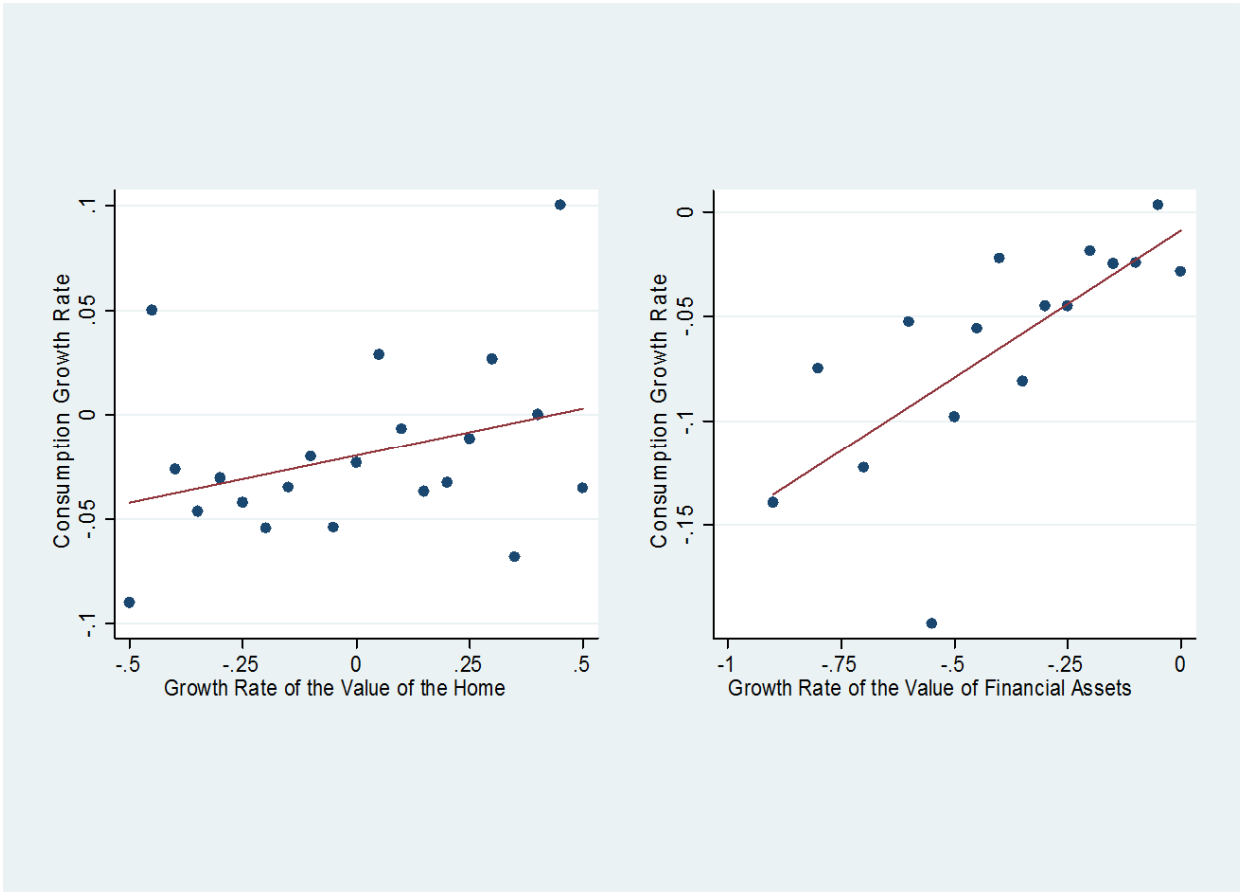
misspecifications of the likelihood, and hence we obtain them by using 500 bootstrap replications. As the PW model is a nonlinear one, we calculate the marginal effects and their standard errors as described in Appendix B above.

Figure 1. Capital gains and saving, 1990-2010



Notes: Saving and disposable income as measured in the National Income and Product Accounts. The values of capital gains/losses in housing and risky financial assets are taken from the Flow of Funds of the United States. In order to compute capital gains on housing, we use data on capital gains on real estate owned by households and non-profit institutions (Table R.100, line 10). Table R.100 does not break down these capital gains/losses by residential and non-residential real estate, and the Flow of Funds does not provide separate data on capital gains for non-profit institutions. Therefore, our calculations rest on the assumptions that percentage capital gains/losses on residential real estate are similar to those on non-residential real estate, and that non-profit institutions experienced roughly the same capital losses on real estate (in percentage terms) as households. In order to compute the percentage capital losses in housing we divide the accumulated capital losses from 2006Q3 to 2009Q2 with the value of real estate owned by households and non-profit institutions at the end of 2006Q2 (Table B.100, line 3).
Our data on financial capital gains and losses come from the capital gains on corporate equities, mutual fund shares, equity in non-corporate business and life insurance and pension fund reserves as recorded in Table R.100 (lines 11-14). In order to compute the percentage capital losses in risky financial assets we cumulate the changes in asset values from 2008Q3 to 2009Q2, and then divide them by the sum of the values of corporate equities, mutual fund shares, life insurance reserves, pension fund reserves, and equity in non-corporate business at the end of 2008Q2, as recorded in Table B.100 (lines 24, 25, 27-29).
Source: Board of Governors of the Federal Reserve System (2011), BEA (2011).

Figures 2. Growth rates of consumption and of the value of assets



Note: The bins are constructed by first dividing the range of values of the capital gains into intervals with a width of 5 percentage points, except for values denoting very heavy stock capital losses (worse than -50%), for which the interval width was 10 percentage points due to the low number of observations exhibiting such values. Subsequently, we calculated the mean capital gain and consumption growth over all observations in each interval, and plotted the latter against the former.

Table 1. Changes in consumption and capital gains

Gains in Assets	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Percentage Change in Consumption (Unconditional)				Qualitative Change in Consumption		
	25th quantile	50th quantile	75th quantile	Mean	Lower	Same	Higher
				Panel A. Housing			
1st quartile	-0.150	0.000	0.000	-0.052	0.298	0.482	0.220
2nd quartile	-0.150	0.000	0.000	-0.060	0.314	0.523	0.163
3d quartile	-0.100	0.000	0.000	-0.043	0.239	0.579	0.182
4th quartile	-0.050	0.000	0.000	-0.028	0.209	0.575	0.217
				Panel B. Total Financial Assets			
1st level	-0.150	0.000	0.000	-0.072	0.288	0.554	0.157
2nd level	-0.100	0.000	0.000	-0.053	0.256	0.557	0.188
3d level	-0.100	0.000	0.000	-0.045	0.234	0.557	0.208
4th level	-0.050	0.000	0.000	-0.033	0.215	0.544	0.240

Notes: The 4th level of gains in financial assets denotes zero or positive appreciation. The remaining three levels denote the terciles of financial losses (e.g., the 1st level denotes the largest losses). All figures are calculated using sampling weights from the 2008 HRS main survey (the 2009 Internet Survey does not contain any sampling weights).
Source: 2009 HRS Internet survey, 2008 HRS main survey.

Table 2. Capital losses in housing and financial assets

Asset	(1)	(2)	(3)	(4)	(5)	(6)
	Ownership Prevalence	Prevalence of Losses, Conditional on Ownership	Quantiles of Losses, Conditional on Having Any Losses			
			25th quantile	50th quantile	75th quantile	Mean
Panel A. Main Residence and All Financial Assets						
Main Residence	0.893	0.537	-0.250	-0.180	-0.111	-0.197
Financial Assets	0.692	0.944	-0.357	-0.275	-0.176	-0.275
Panel B. Financial Assets in Detail						
Employer-Provided Pension Plans	0.402	0.878	-0.400	-0.300	-0.200	-0.304
Individual Retirement Accounts	0.406	0.921	-0.400	-0.300	-0.200	-0.310
Mutual Funds	0.443	0.917	-0.400	-0.300	-0.200	-0.297
Directly Held Stocks	0.321	0.839	-0.400	-0.250	-0.175	-0.308
Trusts	0.104	0.807	-0.330	-0.250	-0.150	-0.256
Other Assets Invested in Stocks	0.245	0.730	-0.330	-0.205	-0.125	-0.254

Note: Lower quantiles of losses denote larger losses (more negative gains). All figures are calculated using sampling weights from the 2008 HRS main survey (the 2009 Internet survey does not contain any sampling weights).

Source: 2009 HRS Internet survey, 2008 HRS main survey.

Table 3. Demographics and economic characteristics in the sample

Variable	Statistic
Age	62.60
Household Size	2.20
Becomes Unemployed Between 2008 and 2009	0.05
Becomes Retired Between 2008 and 2009	0.11
Health Deterioration Between 2008 and 2009	0.07
Couple	0.75
High School Education	0.50
More than High School	0.49
Self-reported Health Fair or Bad	0.25
Numeracy Score (max. 5)	4.56
Working	0.61
Retired	0.34
White	0.90
Household net real assets (median)	193,108
Household net financial assets (median)	81,799
Household income (median)	70,034

Notes: Figures reflect average age, household size, numeracy score, and median net real and financial assets and household income. The remaining figures denote prevalence. All figures are calculated using sampling weights from the 2008 HRS main survey (the 2009 Internet Survey does not contain any sampling weights).All magnitudes are measured at the household level as discussed in the text.
Source: 2009 HRS Internet Survey, 2008 HRS main survey.

Table 4. Elasticities and marginal propensities to consume

Variable	Model 1		Model 2		Model 3		Model 4	
	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error
Panel A. Regression Estimates								
Age/100	0.3515	0.0540 ***	0.3302	0.0550 ***	0.3160	0.0569 ***	0.2416	0.0713 ***
Household Size	0.0084	0.0049 *	0.0094	0.0050 *	0.0091	0.0050 *	0.0065	0.0053
Becomes Unemployed			-0.1014	0.0277 ***	-0.1018	0.0277 ***	-0.0990	0.0277 ***
Becomes Retired			-0.0267	0.0123 **	-0.0278	0.0124 **	-0.0241	0.0128 *
Health Deterioration			-0.0123	0.0174	-0.0113	0.0175	-0.0143	0.0176
Household Net Worth (IHS)					0.0019	0.0013	0.0020	0.0014
Household Income (IHS)					0.0025	0.0048	0.0057	0.0050
Couple							0.0189	0.0137
High School Education							-0.0215	0.0443
More than High School							-0.0359	0.0446
Bad Health							-0.0008	0.0112
Numeracy Score							-0.0105	0.0063 *
Working							-0.0077	0.0253
Retired							0.0148	0.0245
White							-0.0127	0.0180
Percentage Change in Value of the Main Residence	0.0578	0.0305 *	0.0537	0.0307 *	0.0572	0.0309 *	0.0541	0.0308 *
Percentage Change in Value of Financial Assets	0.0887	0.0277 ***	0.0862	0.0279 ***	0.0997	0.0290 ***	0.0838	0.0294 ***
Constant	-0.2564	0.0410 ***	-0.2363	0.0412 ***	-0.2761	0.0727 ***	-0.1939	0.0895 **
Number of Observations	1,915		1,883		1,883		1,881	
Panel B. Marginal Propensities to Consume								
Implied Marginal Propensity to Consume with Respect to the Value of the Main Residence	0.0094	0.0050 *	0.0090	0.0051 *	0.0094	0.0052 *	0.0091	0.0050 *
Implied Marginal Propensity to Consume with Respect to the Value of Financial Assets	0.0323	0.0102 ***	0.0319	0.0107 ***	0.0370	0.0110 ***	0.0321	0.0112 ***

Notes: The implied marginal propensity to consume out of the value of the main residence and out of financial assets is computed as the corresponding elasticity (which is equal to the regression coefficient) divided by the ratio of the associated asset to total expenditure. This ratio is computed using information recorded in the main HRS surveys of 2006 and 2008, and in the CAMS surveys of 2007 and 2009.*,**,*** denote statistical significance at 10%, 5% and 1%, respectively. We calculate robust standard errors.

Table 5. Categorical change in consumption

Variable	Model 1		Model 2		Model 3		Model 4	
	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error
				Probability that Consumption is lower				
Becomes Unemployed	-..-	-..-	0.2107	0.0531 ***	0.2128	0.0534 ***	0.2063	0.0525 ***
Percentage Change in Value of the Main Residence	-0.0153	0.0068 **	-0.0149	0.0069 **	-0.0151	0.0070 *	-0.0146	0.0067 *
Percentage Change in Value of Financial Assets	-0.0240	0.0063 ***	-0.0227	0.0064 ***	-0.0246	0.0066 ***	-0.0204	0.0066 ***
				Probability that Consumption is the same				
Becomes Unemployed	-..-	-..-	-0.0720	0.0303 **	-0.0732	0.0309 **	-0.0691	0.0295 **
Percentage Change in Value of the Main Residence	-0.0006	0.0008	-0.0008	0.0008	-0.0008	0.0009	-0.0008	0.0008
Percentage Change in Value of Financial Assets	-0.0015	0.0013	-0.0017	0.0013	-0.0020	0.0014	-0.0014	0.0012
				Probability that Consumption is higher				
Becomes Unemployed	-..-	-..-	-0.1387	0.0241 ***	-0.1396	0.0238 ***	-0.1373	0.0243 ***
Percentage Change in Value of the Main Residence	0.0159	0.0073 **	0.0156	0.0075 **	0.0159	0.0075 **	0.0153	0.0072 **
Percentage Change in Value of Financial Assets	0.0255	0.0072 ***	0.0244	0.0073 ***	0.0266	0.0075 ***	0.0218	0.0073 ***
Number of Observations	1,940		1,907		1,907		1,905	

Notes: Marginal effects of the percentage changes in the values of the main residence and of financial assets are computed after assuming a change of 15 pp in the two underlying variables. *,**,*** denote statistical significance at 10%, 5% and 1%, respectively. We calculate robust standard errors.

Table 6. Elasticities of consumption obtained using disaggregated financial assets

Variable	Model 1		Model 2		Model 3		Model 4	
	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error
Age/100	0.3255	0.0514 ***	0.3049	0.0523 ***	0.2882	0.0535 ***	0.2378	0.0670 ***
Household Size	0.0065	0.0047	0.0077	0.0048	0.0073	0.0048	0.0051	0.0051
Becomes Unemployed			-0.1005	0.0263 ***	-0.1008	0.0263 ***	-0.0994	0.0263 ***
Becomes Retired			-0.0161	0.0116	-0.0172	0.0116	-0.0145	0.0121
Health Deterioration			-0.0041	0.0170	-0.0028	0.0170	-0.0037	0.0172
Household Net Worth (IHS)					0.0022	0.0013 *	0.0024	0.0013 *
Household Income (IHS)					0.0028	0.0046	0.0060	0.0049
Couple							0.0142	0.0129
High School Education							-0.0177	0.0435
More than High School							-0.0321	0.0439
Bad Health							0.0052	0.0103
Numeracy Score							-0.0107	0.0058 *
Working							-0.0029	0.0242
Retired							0.0127	0.0235
White							-0.0163	0.0167
Percentage Change in Value of the Main Residence	0.0704	0.0285 **	0.0665	0.0289 **	0.0692	0.0290 **	0.0668	0.0288 **
Percentage Change in Value of Employer-Provided Pension Plans	0.0107	0.0274	0.0126	0.0277	0.0171	0.0282	0.0119	0.0283
Percentage Change in Value of IRAs	0.0372	0.0277	0.0329	0.0275	0.0417	0.0276	0.0316	0.0274
Percentage Change in Value of Mutual Funds	0.0208	0.0288	0.0136	0.0286	0.0218	0.0288	0.0179	0.0289
Percentage Change in Value of Stocks Directly Held	0.0880	0.0252 ***	0.0776	0.0251 ***	0.0830	0.0252 ***	0.0785	0.0254 ***
Percentage Change in Value of Trusts	-0.0181	0.0403	-0.0029	0.0413	-0.0008	0.0414	-0.0014	0.0421
Percentage Change in Value of Other Assets Invested in Stocks	0.0052	0.0345	0.0100	0.0352	0.0103	0.0353	0.0044	0.0349
Constant	-0.2319	0.0387 ***	-0.2158	0.0391 ***	-0.2608	0.0680 ***	-0.1959	0.0837 **
Number of Observations	2,235		2,193		2,193		2,191	

Notes: *,**,*** denote statistical significance at 10%, 5% and 1%, respectively. We calculate robust standard errors.

Table 7. Elasticity of consumption to wealth, estimated using simulated data from the buffer-stock and permanent income models

Specification	Capital Gains in Equity		Weighted Average of Capital Gains in Residential Real Estate and Equity	
	Elasticity	Std. Error	Elasticity	Std. Error
Buffer-stock Model				
Without interactions of capital gains with wealth and income	0.0986	0.0085 ***	0.0838	0.0123 ***
With interactions of capital gains with wealth and income	0.0963	0.0075 ***	0.0840	0.0108 ***
Permanent Income Model				
Without interactions of capital gains with wealth and income	0.0804	0.0016 ***	0.0787	0.0020 ***
With interactions of capital gains with wealth and income	0.0822	0.0009 ***	0.0786	0.0015 ***

Note: With no interactions of capital gains with income and wealth, the elasticity is equal to the regression coefficient of the capital gains variable. With interactions, the elasticity is equal to the average marginal effect of the capital gains variable, which is equal to the the total derivative of the percentage growth in consumption with respect to capital gains, taking into account all interaction terms and averaging across all sample units. *,**,*** denote statistical significance at 10%, 5% and 1%, respectively.

Table 8. Consumption and changes in expectations about the stock market between the 2008 and 2009 surveys

Variable	Model 1		Model 2		Model 3		Model 4	
	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error
Panel A1. Negative or zero change in the reported probability of a rise in stock prices								
Percentage Change in Value of Financial Assets	0.1192	0.0359 ***	0.1129	0.0357 ***	0.1291	0.0363 ***	0.1214	0.0367 ***
Number of Observations	1,015		1,001		1,001		1,000	
Panel A2. Positive change in the reported probability of a rise in stock prices								
Percentage Change in Value of Financial Assets	0.0739	0.0537	0.0799	0.0546	0.0643	0.0576	0.0665	0.0555
Number of Observations	483		473		473		472	
Panel B1. Reported probability in 2008 of a rise in stock prices equal to .5 or lower								
Percentage Change in Value of Financial Assets	0.1390	0.0394 ***	0.1403	0.0394 ***	0.1369	0.0414 ***	0.1195	0.0414 ***
Number of Observations	916		904		904		903	
Panel B2. Reported probability in 2008 of a rise in stock prices higher than .5								
Percentage Change in Value of Financial Assets	0.0378	0.0398	0.0335	0.0399	0.0536	0.0406	0.0496	0.0414
Number of Observations	765		748		748		747	

Notes: *,**,*** denote statistical significance at 10%, 5% and 1%, respectively. We calculate robust standard errors.

Table 9. Changes in consumption using quartiles of changes in asset values

Variable	Model 1		Model 2		Model 3		Model 4	
	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error
Age/100	0.3525	0.0543 ***	0.3311	0.0554 ***	0.3136	0.0572 ***	0.2386	0.0716 ***
Household Size	0.0082	0.0049 *	0.0093	0.0050 *	0.0089	0.0050 *	0.0065	0.0053
Becomes Unemployed			-0.1008	0.0277 ***	-0.1017	0.0278 ***	-0.0982	0.0278 ***
Becomes Retired			-0.0263	0.0124 **	-0.0273	0.0124 **	-0.0232	0.0129 *
Health Deterioration			-0.0134	0.0174	-0.0123	0.0174	-0.0151	0.0175
Household Income (IHS)					0.0020	0.0014	0.0021	0.0014
Household Net Worth (IHS)					0.0026	0.0048	0.0058	0.0050
Couple							0.0177	0.0137
High School Education							-0.0227	0.0442
More than High School							-0.0388	0.0446
Bad Health							0.0011	0.0114
Numeracy Score							-0.0105	0.0064
Working							-0.0076	0.0254
Retired							0.0159	0.0245
White							-0.0141	0.0181
2nd Quartile of Percentage Change in Value of the Main Residence	0.0023	0.0154	0.0032	0.0155	0.0023	0.0156	0.0039	0.0155
3d Quartile of Percentage Change in Value of the Main Residence	0.0216	0.0152	0.0212	0.0155	0.0214	0.0155	0.0234	0.0155
4th Quartile of Percentage Change in Value of the Main Residence	0.0307	0.0138 **	0.0305	0.0138 **	0.0327	0.0138 **	0.0329	0.0137 **
2nd Level of Percentage Change in Value of Financial Assets	0.0260	0.0118 **	0.0254	0.0118 **	0.0247	0.0118 **	0.0234	0.0119 **
3d Level of Percentage Change in Value of Financial Assets	0.0378	0.0117 ***	0.0373	0.0117 ***	0.0371	0.0117 ***	0.0358	0.0117 ***
4th Level of Percentage Change in Value of Financial Assets	0.0346	0.0126 ***	0.0331	0.0126 ***	0.0401	0.0134 ***	0.0305	0.0137 **
Constant	-0.3216	0.0422 ***	-0.3000	0.0427 ***	-0.3460	0.0753 ***	-0.2537	0.0921 ***
Number of Observations	1,915		1,883		1,883		1,881	

Notes: *,**,*** denote statistical significance at 10%, 5% and 1%, respectively. We calculate robust standard errors.

Table 10. Elasticities and marginal propensities to consume, PSID data

Variable	Model 1		Model 2		Model 3		Model 4	
	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error
			Panel A. Regression Estimates					
Age/100	-0.0414	0.0225 *	-0.0673	0.0237 ***	-0.1001	0.0247 ***	-0.1268	0.0294 ***
Household Size	0.0194	0.0023 ***	0.0195	0.0023 ***	0.0159	0.0023 ***	0.0138	0.0027 ***
Becomes Unemployed			-0.1117	0.0124 ***	-0.0975	0.0124 ***	-0.0713	0.0135 ***
Becomes Retired			-0.0168	0.0141	-0.0147	0.0141	-0.0290	0.0150 *
Health Deterioration			-0.0072	0.0196	0.0031	0.0196	-0.0159	0.0270
Household Net Worth (IHS)					0.0012	0.0004 ***	0.0011	0.0004 ***
Household Income (IHS)					0.0165	0.0028 ***	0.0125	0.0033 ***
Couple							0.0110	0.0087
High School Education							-0.0121	0.0118
More than High School							-0.0137	0.0114
Bad Health							0.0250	0.0199
Working							0.0555	0.0126 ***
Retired							0.0678	0.0163 ***
White							-0.0084	0.0073
Percentage Change in Value of the Main Residence	0.0482	0.0200 **	0.0448	0.0199 **	0.0554	0.0200 ***	0.0558	0.0201 ***
Percentage Change in Value of Financial Assets	0.0219	0.0074 ***	0.0233	0.0074 ***	0.0257	0.0074 ***	0.0256	0.0074 ***
Constant	-0.0680	0.0141 ***	-0.0452	0.0145 ***	-0.2163	0.0345 ***	-0.1922	0.0368 ***
Number of Observations	10,686		10,580		10,580		10,488	
			Panel B. Marginal Propensities to Consume					
Implied Marginal Propensity to Consume with Respect to the Value of the Main Residence	0.0083	0.0034 **	0.0077	0.0034 **	0.0095	0.0034 ***	0.0095	0.0034 ***
Implied Marginal Propensity to Consume with Respect to the Value of Financial Assets	0.0094	0.0032 ***	0.0100	0.0032 ***	0.0110	0.0032 ***	0.0109	0.0031 ***

Notes: The implied marginal propensity to consume out of the value of the main residence and out of financial assets is computed as the corresponding elasticity (which is equal to the regression coefficient) divided by the ratio of the associated asset to total expenditure. *,**,*** denote statistical significance at 10%, 5% and 1%, respectively. We calculate robust standard errors.

Table A1. Elasticities of consumption obtained after disaggregrating net worth, with the percentage change in consumption as the dependent variable

Variable	(1)	(2)		(3)	(4)		(5)	(6)		(7)	(8)	
	Aggregated Financial Assets						Disaggregated Financial Assets					
	Model 3			Model 4			Model 3			Model 4		
	Marg. Eff.	Std. Error		Marg. Eff.	Std. Error		Marg. Eff.	Std. Error		Marg. Eff.	Std. Error	
Age/100	0.3029	0.0602	***	0.2348	0.0732	***	0.2661	0.0569	***	0.2215	0.0690	***
Household Size	0.0090	0.0051	*	0.0063	0.0054		0.0074	0.0049		0.0051	0.0052	
Becomes Unemployed	-0.1007	0.0276	***	-0.0973	0.0276	***	-0.1000	0.0262	***	-0.0979	0.0262	***
Becomes Retired	-0.0277	0.0123	**	-0.0248	0.0128	*	-0.0172	0.0116		-0.0153	0.0121	
Health Deterioration	-0.0108	0.0174		-0.0149	0.0175		-0.0028	0.0170		-0.0044	0.0171	
Gross Financial Assets (IHS)	-0.0020	0.0020		-0.0013	0.0021		-0.0014	0.0019		-0.0005	0.0020	
Gross Real Assets (IHS)	0.0026	0.0027		0.0023	0.0027		0.0021	0.0026		0.0020	0.0026	
Total Debts (IHS)	-0.0024	0.0008	***	-0.0022	0.0008	**	-0.0026	0.0008	***	-0.0025	0.0008	***
Household Income (IHS)	0.0054	0.0049		0.0071	0.0051		0.0057	0.0048		0.0072	0.0050	
Couple				0.0223	0.0140					0.0175	0.0131	
High School Education				-0.0161	0.0446					-0.0126	0.0439	
More than High School				-0.0286	0.0451					-0.0254	0.0445	
Bad Health				-0.0036	0.0113					0.0033	0.0103	
Numeracy Score				-0.0102	0.0063					-0.0107	0.0058	*
Working				-0.0054	0.0254					0.0002	0.0243	
Retired				0.0151	0.0245					0.0129	0.0235	
White				-0.0087	0.0178					-0.0134	0.0165	
Percentage Change in Value of the Main Residence	0.0520	0.0312	*	0.0507	0.0310		0.0639	0.0289	**	0.0631	0.0286	**
Percentage Change in Value of Financial Assets	0.0830	0.0299	***	0.0740	0.0299	**	-..-			-..-		
Percentage Change in Value of Employer-Provided Pension Plans	-..-			-..-			0.0110	0.0281		0.0087	0.0282	
Percentage Change in Value of IRAs	-..-			-..-			0.0322	0.0280		0.0256	0.0278	
Percentage Change in Value of Mutual Funds	-..-			-..-			0.0177	0.0290		0.0168	0.0291	
Percentage Change in Value of Stocks Directly Held	-..-			-..-			0.0804	0.0254	***	0.0776	0.0256	***
Percentage Change in Value of Trusts	-..-			-..-			0.0013	0.0416		0.0013	0.0422	
Percentage Change in Value of Other Assets Invested in Stocks	-..-			-..-			0.0085	0.0349		0.0053	0.0346	
Constant	-0.2739	0.0736	***	-0.1951	0.0908	**	-0.2466	0.0689	***	-0.1845	0.0851	**
Number of Observations	1,883			1,881			2,193			2,191		

Notes: The coefficients of IHS-transformed variables denote elasticities. *,**,*** denote statistical significance at 10%, 5% and 1%, respectively. We calculate robust standard errors.

Table A2. Elasticities of consumption obtained after disaggregrating net worth, with the categorical change in consumption as the dependent variable

Variable	Model 3		Model 4	
	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error
Probability that Consumption is lower				
Becomes Unemployed	0.2086	0.0529 ***	0.2014	0.0522 ***
Gross Financial Assets (IHS)	0.0010	0.0030	-0.0003	0.0031
Gross Real Assets (IHS)	-0.0010	0.0016	-0.0002	0.0016
Total Debts (IHS)	0.0108	0.0050 **	0.0104	0.0050 **
Percentage Change in Value of the Main Residence	-0.0140	0.0069 **	-0.0135	0.0073 *
Percentage Change in Value of Financial Assets	-0.0225	0.0068 ***	-0.0188	0.0068 ***
Probability that Consumption is the same				
Becomes Unemployed	-0.0708	0.0302 **	-0.0670	0.0289 **
Gross Financial Assets (IHS)	0.0002	0.0003	0.0000	0.0004
Gross Real Assets (IHS)	0.0000	0.0003	0.0001	0.0003
Total Debts (IHS)	0.0014	0.0009	0.0013	0.0008
Percentage Change in Value of the Main Residence	-0.0007	0.0009	-0.0006	0.0008
Percentage Change in Value of Financial Assets	-0.0016	0.0013	-0.0011	0.0010
Probability that Consumption is higher				
Becomes Unemployed	-0.1378	0.0242 ***	-0.1344	0.0244 ***
Gross Financial Assets (IHS)	-0.0011	0.0032	0.0002	0.0034
Gross Real Assets (IHS)	0.0010	0.0018	0.0000	0.0018
Total Debts (IHS)	-0.0122	0.0057 **	-0.0117	0.0057 **
Percentage Change in Value of the Main Residence	0.0147	0.0074 **	0.0141	0.0078 *
Percentage Change in Value of Financial Assets	0.0241	0.0076 ***	0.0199	0.0075 ***
Number of Observations	1,907		1,905	

Notes: Marginal effects of the percentage changes in the values of the main residence and of financial assets are computed after assuming a change of 15 pp in the two underlying variables. Marginal effects of the variables denoting gross financial assets, gross real assets and total debts are computed after assuming a change of 10,000 dollars in all three underlying variables. *,**,*** denote statistical significance at 10%, 5% and 1%, respectively. We calculate robust standard errors.

Table A3. Categorical changes in consumption using quartiles of changes in asset values

Variable	Model 1		Model 2		Model 3		Model 4	
	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error
				Probability that Consumption is lower				
Becomes Unemployed	-..-	-..-	0.2067	0.0531 ***	0.2095	0.0534 ***	0.2022	0.0524 ***
3d Quartile of Percentage Change in Value of the Main Residence	-0.0197	0.0298	-0.0170	0.0297	-0.0171	0.0292	-0.0204	0.0294
4th Quartile of Percentage Change in Value of the Main Residence	-0.0563	0.0233 **	-0.0526	0.0240 **	-0.0549	0.0238 *	-0.0556	0.0247 *
2nd Level of Percentage Change in Value of Financial Assets	-0.0620	0.0243 **	-0.0605	0.0239 **	-0.0601	0.0239 *	-0.0537	0.0232 *
3d Level of Percentage Change in Value of Financial Assets	-0.0894	0.0247 ***	-0.0824	0.0244 ***	-0.0843	0.0252 ***	-0.0755	0.0245 ***
4th Level of Percentage Change in Value of Financial Assets	-0.0670	0.0225 ***	-0.0642	0.0228 ***	-0.0708	0.0248 ***	-0.0524	0.0240 *
				Probability that Consumption is the same				
Becomes Unemployed	-..-	-..-	-0.0697	0.0302 **	-0.0714	0.0305 **	-0.0670	0.0294
2nd Quartile of Percentage Change in Value of the Main Residence	-0.0042	0.0060	-0.0038	0.0057	-0.0042	0.0062	-0.0033	0.0057
3d Quartile of Percentage Change in Value of the Main Residence	0.0021	0.0039	0.0017	0.0037	0.0017	0.0039	0.0020	0.0038
4th Quartile of Percentage Change in Value of the Main Residence	0.0016	0.0038	0.0009	0.0036	0.0009	0.0037	0.0012	0.0036
2nd Level of Percentage Change in Value of Financial Assets	0.0079	0.0048 *	0.0066	0.0045	0.0074	0.0049	0.0050	0.0041
3d Level of Percentage Change in Value of Financial Assets	0.0053	0.0054	0.0043	0.0053	0.0054	0.0055	0.0027	0.0048
4th Level of Percentage Change in Value of Financial Assets	0.0079	0.0047 *	0.0066	0.0045	0.0072	0.0048	0.0052	0.0040
				Probability that Consumption is higher				
Becomes Unemployed	-..-	-..-	-0.1370	0.0243 ***	-0.1381	0.0242 ***	-0.1352	0.0243 ***
2nd Quartile of Percentage Change in Value of the Main Residence	-0.0188	0.0245	-0.0196	0.0255	-0.0200	0.0254	-0.0166	0.0243
3d Quartile of Percentage Change in Value of the Main Residence	0.0176	0.0267	0.0154	0.0270	0.0153	0.0262	0.0184	0.0266
4th Quartile of Percentage Change in Value of the Main Residence	0.0547	0.0210 ***	0.0517	0.0220 **	0.0541	0.0216 **	0.0545	0.0226 **
2nd Level of Percentage Change in Value of Financial Assets	0.0542	0.0211 **	0.0539	0.0212 **	0.0527	0.0208 **	0.0488	0.0207 **
3d Level of Percentage Change in Value of Financial Assets	0.0841	0.0234 ***	0.0781	0.0233 ***	0.0790	0.0236 ***	0.0728	0.0234 ***
4th Level of Percentage Change in Value of Financial Assets	0.0591	0.0192 ***	0.0576	0.0197 ***	0.0637	0.0216 ***	0.0472	0.0210 **
Number of Observations	1,940		1,907		1,907		1,905	

Notes: Marginal effects of the percentage changes in the values of the main residence and of financial assets are computed after assuming a change of 15 pp in the two underlying variables. *,**,*** denote statistical significance at 10%, 5% and 1%, respectively. We calculate robust standard errors.

Table A4. Changes in consumption (categorical) using changes in the values of disaggregated financial assets

Variable	Model 1		Model 2		Model 3		Model 4	
	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error	Marg. Eff.	Std. Error
				Probability that Consumption is lower				
Becomes Unemployed	-..-	-..-	0.2090	0.0513 ***	0.2109	0.0513 ***	0.2059	0.0510 ***
Percentage Change in Value of the Main Residence	-0.0146	0.0061 **	-0.0136	0.0063 **	-0.0139	0.0063 *	-0.0137	0.0060 *
Percentage Change in Value of Employer-Provided Pension Plans	-0.0033	0.0068	-0.0028	0.0070	-0.0029	0.0069	-0.0030	0.0069
Percentage Change in Value of IRAs	-0.0133	0.0067 **	-0.0128	0.0070 **	-0.0146	0.0068 *	-0.0119	0.0072 *
Percentage Change in Value of Mutual Funds	-0.0080	0.0075	-0.0056	0.0077	-0.0069	0.0075	-0.0050	0.0076
Percentage Change in Value of Stocks Directly Held	-0.0269	0.0064 ***	-0.0243	0.0063 ***	-0.0255	0.0065 ***	-0.0251	0.0063 ***
Percentage Change in Value of Trusts	0.0007	0.0123	-0.0042	0.0121	-0.0037	0.0126	-0.0032	0.0119
Percentage Change in Value of Other Assets Invested in Stocks	0.0020	0.0095	0.0008	0.0097	0.0009	0.0096	0.0013	0.0092
				Probability that Consumption is the same				
Becomes Unemployed	-..-	-..-	-0.0699	0.0295 **	-0.0709	0.0292 **	-0.0679	0.0287 **
Percentage Change in Value of the Main Residence	-0.0008	0.0008	-0.0009	0.0008	-0.0009	0.0008	-0.0009	0.0007
Percentage Change in Value of Employer-Provided Pension Plans	-0.0002	0.0004	-0.0002	0.0004	-0.0002	0.0004	-0.0002	0.0004
Percentage Change in Value of IRAs	-0.0007	0.0008	-0.0009	0.0009	-0.0010	0.0010	-0.0008	0.0008
Percentage Change in Value of Mutual Funds	-0.0004	0.0007	-0.0004	0.0006	-0.0004	0.0006	-0.0003	0.0006
Percentage Change in Value of Stocks Directly Held	-0.0024	0.0015	-0.0023	0.0015	-0.0025	0.0016	-0.0024	0.0014 *
Percentage Change in Value of Trusts	-0.0004	0.0007	-0.0005	0.0009	-0.0005	0.0009	-0.0005	0.0008
Percentage Change in Value of Other Assets Invested in Stocks	-0.0002	0.0005	-0.0002	0.0005	-0.0002	0.0005	-0.0002	0.0005
				Probability that Consumption is higher				
Becomes Unemployed	-..-	-..-	-0.1392	0.0230 ***	-0.1400	0.0233 ***	-0.1379	0.0235 ***
Percentage Change in Value of the Main Residence	0.0154	0.0066 **	0.0145	0.0068 **	0.0147	0.0069 **	0.0146	0.0065 **
Percentage Change in Value of Employer-Provided Pension Plans	0.0035	0.0070	0.0030	0.0072	0.0031	0.0071	0.0032	0.0071
Percentage Change in Value of IRAs	0.0140	0.0073 *	0.0137	0.0077 **	0.0156	0.0075 **	0.0127	0.0078
Percentage Change in Value of Mutual Funds	0.0084	0.0080	0.0059	0.0081	0.0074	0.0079	0.0053	0.0080
Percentage Change in Value of Stocks Directly Held	0.0293	0.0075 ***	0.0266	0.0074 ***	0.0280	0.0077 ***	0.0275	0.0074 ***
Percentage Change in Value of Trusts	-0.0004	0.0124	0.0047	0.0127	0.0042	0.0131	0.0037	0.0123
Percentage Change in Value of Other Assets Invested in Stocks	-0.0018	0.0095	-0.0006	0.0099	-0.0007	0.0098	-0.0011	0.0093
Number of Observations	2,267		2,223		2,223		2,221	

Notes: Marginal effects of the percentage changes in the values of the main residence and of financial assets are computed after assuming a change of 15 pp in the variable of interest. *,**,*** denote statistical significance at 10%, 5% and 1%, respectively. We calculate robust standard errors.