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# The Wealth-Consumption Channel: Evidence from a Panel of Spanish Households

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**Abstract**

Understanding the way households modify their consumption is essential to address the impact of different economic policies. In this paper we use a panel of Spanish households spanning the period 2002-2011 to study the marginal propensity to consume (MPC) out of wealth. The wealth effect is identified by exploiting within-household variations in a period of relatively large volatility in asset prices. We estimate a MPC out of total wealth of around 1 cent with changes in housing wealth affecting consumption more than other assets. We also find supporting evidence on the concavity of the consumption function, showing that the MPC is a decreasing function of net wealth. Finally, in line with theoretical models accounting for liquidity constraints and precautionary savings, our results confirm the existence of sign and magnitude asymmetries in the MPC.

**JEL Codes**: D12; E21; G51.

**Keywords**: Marginal propensity to consume out of wealth; Wealth distribution; Household survey; Panel data.

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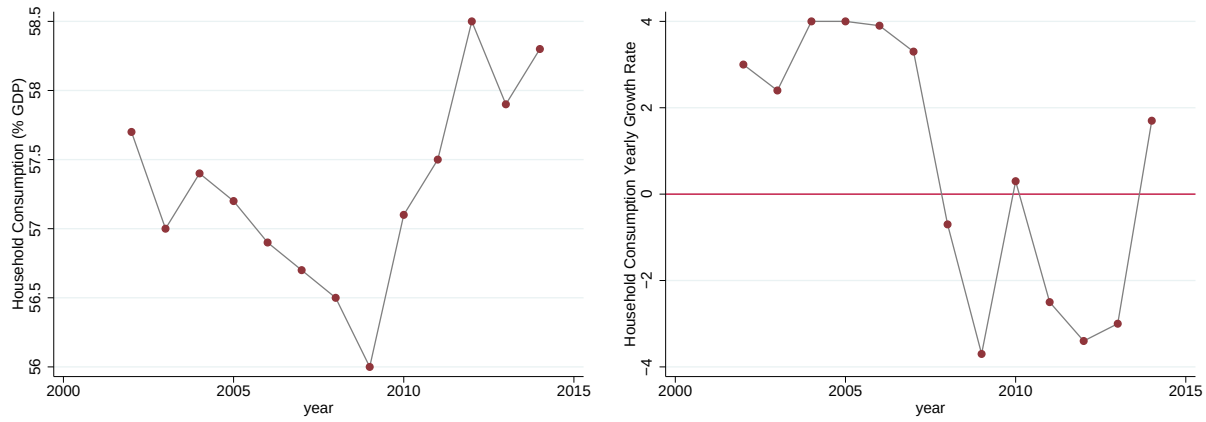
# 1 Introduction

Households' consumption is the largest component of aggregate demand in developed countries. Understanding the determinants of households' consumption is, therefore, essential to assess the economic impact of fiscal and monetary policies. In this paper we analyze how households' consumption responds to changes in wealth using a panel of Spanish households during the last business cycle.

Figure 1.a displays aggregate consumption as a share of GDP over the period 2002-2014: from 2002 to 2009, roughly coinciding with the expansion phase of the business cycle (2002-2007), this share decreased by 1.7 percentage points (from 57.7% to 56%); on the other hand, during the economic crisis its trend reverted with consumption rising to 58.3% of GDP in 2014. The fact that this key ratio displays a counter-cyclical behaviour confirms that consumption is less sensitive to the business cycle than other components of the GDP. Figure 1.b completes the picture by showing that, despite the lower volatility showed by consumption, this period is characterized by important variations in its growth rate. During the expansion phase of the business cycle real households' consumption grew, on average, at a yearly rate of 3.4% with peaks of 4% in 2004 and 2005. The period 2008-2011 is characterized by an average yearly growth rate of -1.6% with a minimum of -3.7% in 2009.

Figure 1: Households' consumption during the last business cycle in Spain




(a) % GDP

(b) Yearly growth rate (%)

*Source:* Yearly National Accounts, Instituto Nacional de Estadística.

Disentangling consumption main drivers has been at the core of the economic debate for decades. Standard life-cycle models, such as the textbook version of the permanent income hypothesis (PIH), predict that households consumption responds on a one-to-one basis to permanent income shocks, but is nearly insensitive to transitory income shocks.

In these kind of models households usually accumulate wealth to smooth consumption. However, PIH predictions were rejected long time ago by empirical studies (Flavin, 1981; Hall and Mishkin, 1982; Hansen and Singleton, 1983) contributing to the development of new models stressing the importance of factors such as liquidity constraints, income uncertainty or households patience (see for example Zeldes, 1989 and Carroll and Kimball, 1996).[1] Based on these models, some authors have found empirical evidence supporting the idea that the consumption function is concave in wealth (Johnson et al., 2006; Blundell et al., 2008; Jappelli and Pistaferri, 2014; Carroll et al., 2017) and that households show an asymmetric behaviour depending on the sign and magnitude of the income shock (Bunn et al., 2018; Christelis et al., 2019).

Other papers have investigated the existence of a wealth effect or, in other words, how households adjust their consumption in response to changes in the value of their assets. Due to the lack of comprehensive databases with information on both wealth and consumption, some scholars relied on aggregate data to estimate this relationship through cointegration or country panel data techniques. However, the results are far from conclusive. Most of the literature estimates a marginal propensity to consume (MPC) out of wealth between 1 and 10 cents, but the importance of different assets (financial vs real) varies across countries, sample period and the econometric method used for the estimation. For example, using cointegration techniques for US during the period 1951-2003, Lettau and Ludvigson (2004) estimate that the MPC out of permanent changes in wealth is between 4 and 5 cents; however, they calculate that most of the wealth variation is due to transitory shocks and, therefore, movements in asset values do not influence aggregate demand. Case et al. (2005) use panel data techniques for both a sample of 14 countries and US states during the 80s and 90s. In their paper they find that consumption reacts to changes in housing wealth in both panels but not to changes in financial wealth. In contrast, Sousa (2009) considers the euro area as a whole for the period 1980-2007 and only identifies a significant effect coming from financial assets. Using a panel of 16 countries for a 35 years period Slacalek (2009) estimates a MPC out of total wealth of 5 cents, but with important heterogeneities across countries. Consumption is more sensitive to changes in financial than in housing wealth for most countries but US and UK, something that the author relates to the fact that in these countries it is easier and more common to borrow against housing assets. Exploiting the stickiness of consumption growth, using US data for a period of 50 years, they also find a more significant MPC out of housing (between 2 cents in the short-run and 9 cents in the long-run) than out of financial wealth.

Although this approach allows us to disentangle short and long-run effects and es-

[1]For a detailed survey of the income-consumption literature see Jappelli and Pistaferri (2010).

timate the speed of adjustment in consumer spending from a wealth shock, the use of aggregate data has some drawbacks. For instance, the use of aggregate data prevents from controlling for heterogeneous effects across households. A non-significant MPC out of total wealth could, hence, either imply that households do not respond at all to changes in wealth or that the coefficient takes opposite signs for different segments of the population, resulting in a zero average effect. Also, aggregate data does not allow to investigate heterogeneities in the MPC across assets. Indeed, investment choices are likely to be endogenous: less wealthy families typically direct their savings largely towards real-estate assets or deposits, while affluent families favour riskier financial products. Hence, different MPC coefficients may be the result of the sorting of households across investment markets rather than a genuine heterogeneity response. Generally speaking, it is much more complicated to identify exogenous variations using aggregate data than with household-level data.

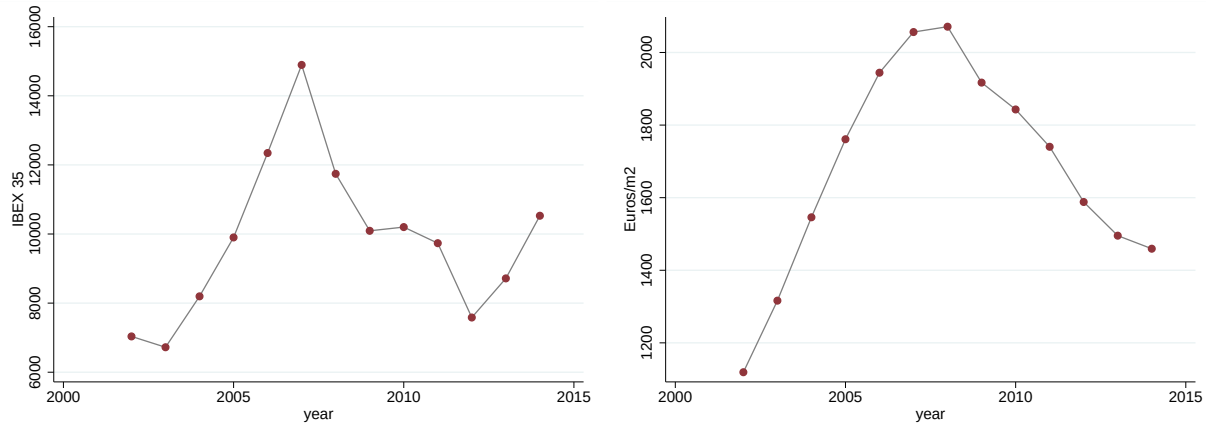
With the development of new databases there has been an increased number of studies investigating the existence of a wealth effect by exploiting cross-sectional variation in household-level data. Dynan and Maki (2001) use the Consumer Expenditure Survey to estimate the MPC out of stock wealth in US for the period 1983-1999. Movements in stock prices are related to changes in the consumption of households that own stocks, but not to changes in the consumption of households without equity. They calculate that the MPC is between 5 and 15 cents, although it is likely that their results are affected by the exclusion of high-income households from their sample. Bover (2005), using the 2002 Spanish Survey of Households Finance, finds a larger consumption reaction to changes in real assets prices than to changes in the value of financial wealth. In contrast, Paiella (2007), using analogous data for Italy for the period 1991-2002, finds a stronger effect from financial than from real assets variation. Disney et al. (2010) combine household-level data with county-level house prices to estimate the impact of unexpected capital gains on households' consumption in UK between 1994 and 2003. They find a MPC out of unanticipated shocks to housing wealth of 1 cent. In a more recent contribution, Paiella and Pistaferri (2017) estimate a marginal propensity to consume out of unexpected and exogenous changes in wealth of 3 cents which is mainly driven by housing prices. Arrondel et al. (2019) find a decreasing relationship between the MPC out of wealth and the wealth distribution for a cross-section of French households.[2]

In this paper we study the wealth effect using the panel component of the Spanish Survey of Households Finance (*Encuesta Financiera de las Familias*, henceforth EFF) for the period 2002-2011. This dataset presents a number of nice features. First of all, the survey follows households for a relatively long time span. As opposed to previous studies,

[2]For a detailed survey of the wealth-consumption literature see Paiella (2009).

we are therefore able to control for time invariant unobserved heterogeneity mitigating the concern stemming from potential endogeneity. Second, the EFF includes, not only detailed questions on households' consumption, income, assets and liabilities but also provides information on topics such as households' risk profile or income expectations, that are crucial to isolate the genuine wealth effect. Finally, as our approach exploits the within-household variation in wealth to estimate the response to shocks, it is crucial to observe enough variation in asset prices during the period of observation. Luckily, the surveys exactly covers the years of the 2008 financial crisis, characterized by uncommonly high fluctuations in prices and, consequently, in families' wealth. Figure 2 provides an overview of the variation in asset prices for the period of analysis, displaying the evolution of the Spanish reference stock index (IBEX 35, Figure 2.a) and house prices in euros per squared meter (Figure 2.b).[3] Both indicators show parallel trajectories with large jumps during the expansion period and significant drops during the crisis. During the expansion period (2002-2007) the IBEX 35 and house prices grew, respectively, 112% and 85%. After the crisis, stock prices adjusted faster, decreasing 35% from 2007 to 2011 compared to a decrease of only 16% in house prices.[4]

Figure 2: Stock and house prices during the last business cycle in Spain




(a) IBEX 35

(b) House prices

*Source:* Instituto Nacional de Estadística.

By using this unique dataset, this paper contributes to the existing literature in several ways: i) We alleviate the concern of biased estimates due to omitted variables by exploiting within-household, rather than cross-sectional variation to estimate the MPC out of total wealth and its different components; ii) we provide empirical evidence on the

[3]House prices per squared meter are calculated by Ministerio de Fomento using the appraised value after taking into account the physical and geographical characteristics of the different dwellings.

[4]The IBEX 35 index continued falling until 2012 to start a fast recovery from there on. House prices have continued the adjustment until 2014.

concavity of the consumption function by analyzing the MPC for different quintiles of the wealth distribution; iii) we estimate the MPC out of exogenous changes in housing wealth by restricting our sample to include only households that have been living in the same residence for the whole period of analysis. Finally, iv) to the best of our knowledge, we present the first empirical evidence of asymmetric consumption behaviour following changes in housing wealth.

Our findings are diverse. First, we observe that out of 1 additional euro of wealth, households increase their consumption by 1 cent, a relatively small response compared to the average findings of previous studies. However, results are heterogeneous across assets. We find that households consumption mostly responds to changes in the value of the primary residence, with a MPC of 3 cents, while we do not find evidence of any relevant effect of financial or other real assets.

Second, we study the specific response to changes in households' wealth across the distribution of wealth. Households in the bottom 20% of the distribution increase their consumption by around 6.3 cents out of 1 additional euro of wealth as opposed to only 1.7 cents of the median quintile and 0.5 cents of the richest 20%. Again, these results are mostly driven by consumption responses to changes in the value of the primary residence. We also find evidence of households in the bottom quintile reacting to changes in the value of financial assets. However, for financial and other real assets, we cannot separate exogenous changes in their value from households' savings decisions. Given the negative relationship between the latter component and households' consumption, their results must be considered a lower bound.

Finally, we confirm the existence of an asymmetric response by sign and magnitude which is compatible with an intertemporal choice model with income uncertainty and liquidity constraints. More specifically, we find a larger consumption response to negative than to positive shocks. The larger the negative shock the larger is the decrease in consumption, while the opposite happens with positive shocks. We also show that this outcome is not due to a heterogeneous concentration of shocks across the distribution of wealth.

The rest of the paper is structured in the following way. Section 2 describes the data and presents some stylized facts, Section 3 shows the empirical results and Section 4 provides a simple simulation exercise to evaluate the relevance of our results. Section 5 concludes.

# 2 Data

## 2.1 Data source and sample selection

Our analysis relies on the EFF, an official survey conducted by the Bank of Spain every three years since 2002 that provides detailed information on households' financial situation.[5]

The EFF presents some nice features for the purpose of our analysis: i) it has a panel data component that allows us to follow the same household during consecutive waves; ii) it over-represents wealthy families to better capture the financial behaviour of households at the top of the wealth distribution; iii) it uses stochastic multiple imputation techniques to decrease the non-response rate; and iv) it provides detailed information on households consumption, income, assets and liabilities, along with socio-economic information regarding every member of the household.[6]

We use the panel component of the dataset to create a balanced panel with households that are present in each of the four waves from 2002 to 2011. A fifth wave (EFF 2014) was released in 2017; unfortunately, the Bank of Spain decided to limit to four the maximum number of editions of the survey in which a household may participate and, as a consequence, 2014 wave does not include any household taking part in the survey in 2002.[7]

Following Blundell et al. (2008), we restrict our sample to households formed by a stable couple where the reference person is aged between 25 and 65.[8] By stable couples we mean that the reference person of the household and her partner must be present in every wave of the sample. By doing so we help mitigating the concern stemming from changes in the wealth-consumption relationship due to events such as divorce, widowhood, new couple formation or couple break-ups. By restricting the age range of the reference person we focus on households engaged in the working life and avoid potential issues related to retirement choices.

We further exclude households displaying negative values of either income or consumption restricting the final sample to 415 households present in each of the four waves during the period 2002-2011. We are aware that sample selection might affect the interpretation

[5]The EFF is also part of the Household Finance and Consumption Network (HFCN), an ECB project that coordinates similar surveys across European countries. There have been three survey waves on which the data have been released in April 2013, December 2016 and March 2020 respectively.

[6]Due to the use of multiple imputation techniques, coefficients and standard errors along the paper are adjusted accordingly for a correct interpretation of the results (Rubin, 1996).

[7]Selecting households that are present in every wave from 2005 to 2014 provides qualitatively similar results but the size of the final sample decreases by almost 50%. Results are available upon request.

[8]The reference person is self-reported. If a household alternates the reference person across waves we take as a benchmark the reference person self-reported in the third wave (EFF 2008). Selecting another year as a benchmark does not significantly alter our sample or results.

of our results. However, it is worthy to note that the goal of this paper is not to estimate the marginal propensity to consume out of wealth among the Spanish population, but to explore the properties of the MPC using a panel of Spanish households.[9]

## 2.2 Stylized facts

In this section we present the descriptive statistics of our main variables of interest, with special emphasis on the behaviour and composition of households' wealth. The first column of Table 1 shows the median values of household consumption, non-financial income and a number of wealth variables. In our sample, the median household owns a net worth of €269,950, consumes €15,033 and receives a non-financial income of €38,148 per year (in 2011 euros).[10]

Table 1: Descriptive statistics, 2002-2011

| | €2011 | % Share | | | | |
|---|---|---|---|---|---|---|
| | Median | Q1 | Q2 | Q3 | Q4 | Q5 |
| Net wealth | 269,950 | 2.39 | 5.49 | 8.94 | 16.47 | 66.71 |
| Net financial wealth | 14,018 | 0.37 | 1.28 | 5.98 | 12.1 | 80.27 |
| Net housing wealth | 169,098 | 5.51 | 12.38 | 15.99 | 23.82 | 42.29 |
| Net other wealth | 32,406 | 0.82 | 1.91 | 4.75 | 12.59 | 79.94 |
| Consumption | 15,033 | 14.61 | 15.45 | 18.43 | 20.86 | 30.65 |
| Income | 38,148 | 10.77 | 12.77 | 16.97 | 21.56 | 37.92 |

*Source*: Spanish Survey of Households Finance (*Encuesta Financiera de las Familias*).

The remaining columns in the table display the concentration of wealth, consumption and income by wealth quintile.[11] In line with previous studies, we observe a larger level of inequality in wealth than in consumption or income.[12] Specially, households in the richest 20% of the distribution own two-thirds of net total wealth in the whole sample, while the next 20% owns 16.47% of total wealth. Taken together, the top 40% owns virtually as much wealth as the remaining 60% of the distribution. Consumption and income are

[9]It is worth noticing that, given the over-representation of wealthier households in the sample, the bottom 20% of the distribution is, by construction, richer than the bottom 20% of the population.

[10]The use of the median mitigates issues related with outliers and the asymmetry of the distribution, which would affect the mean. On average, households in our sample own a net worth of €642,845, consume €18,160 and have a gross non-financial income of €51,906 per year.

[11]Households are assigned to the same quintile for the whole period based on their average total net wealth.

[12]See Anghel et al. (2018) for an exhaustive analysis on income, consumption and wealth inequality in Spain.

more evenly distributed: households in the top quintile earn 37.92% and consume 30.65% of the total, respectively, 3.5 and 2 times the share of the bottom quintile.

The asymmetries detected in the distribution of wealth could hide important differences across assets. In a comprehensive study of Spanish wealth inequality and asset composition, Martínez-Toledano (2020) shows that the primary residence is the main form of wealth for households in the middle part of the distribution. However, moving to the top of the distribution, "unincorporated business assets, secondary owner-occupied and tenant-occupied housing gain importance, and financial assets (mainly equities) gradually become the dominant form of wealth" (Martínez-Toledano, 2020, p.15). We examine the presence of these heterogeneities in the sample by dividing the net total wealth into the following three components:[13]

- Net financial wealth, which includes all financial assets hold by the household (deposits, shares, fixed-income securities, mutual funds, pension schemes, life insurances...).
- Net housing wealth, which only includes the net value of the primary residence.
- Net other real wealth, including other real estate properties, value of business related to self-employment, jewellery, works of art and antiques.[14]

The median household owns €14,018 in financial assets, €32,406 in other real wealth and most of its wealth comes from the primary residence with a net median value of €169,098.[15] As we expected, housing wealth is more evenly distributed than the other components. In particular, households in the bottom 40% of the distribution account for 18% of the total housing wealth, by 42.29% of the top 20%. On the other hand, the share of financial and other real assets owned by households in the bottom 40% of the distribution is negligible (1.7% and 2.7% of the total, respectively), while the richest 20% households own around 80% of the total.

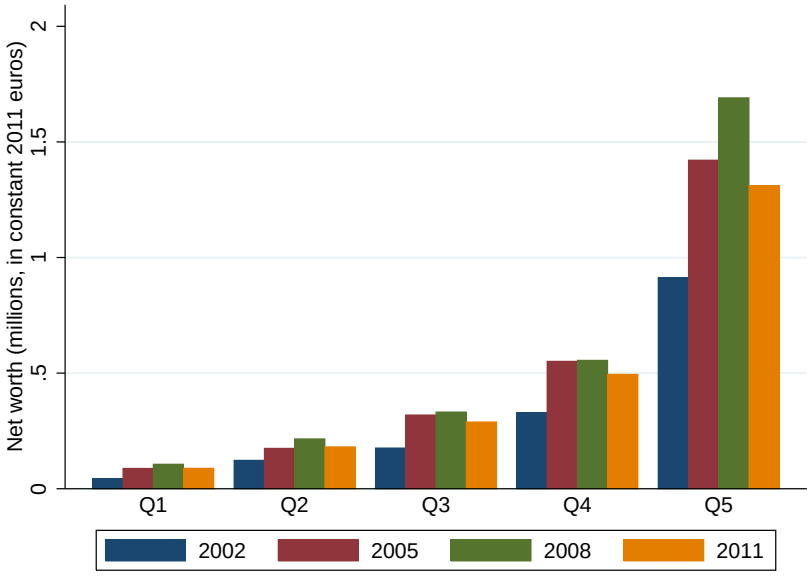
Figure 3 shows the median net wealth by quintile and year during the period of analysis. In line with the descriptive statistics above, we find significant variation across

[13]Other studies follow a different classification (e.g. real vs. financial wealth). Our categorization is not arbitrary, but necessary for identification purposes. Below we provide a detailed explanation.

[14]To compute the net value of each type of wealth we subtract the debt associate with each asset from the gross component. Accordingly, outstanding debts from loans used to purchase the primary residence are deducted from the value of the primary residence. Liabilities associated to other real estate properties or businesses are discounted from other real wealth. Any other debt (secured loans, personal loans, credit cards balances...) is subtracted from the gross financial wealth value.

[15]The average values show striking differences. If we look at the mean, other real wealth is the most important element in households' portfolios with a value of €300,072. It follows the primary residence, with a net value of €226,972. Finally, the average of the net financial assets held by households is €115,800.

Figure 3: Net wealth during the Business Cycle



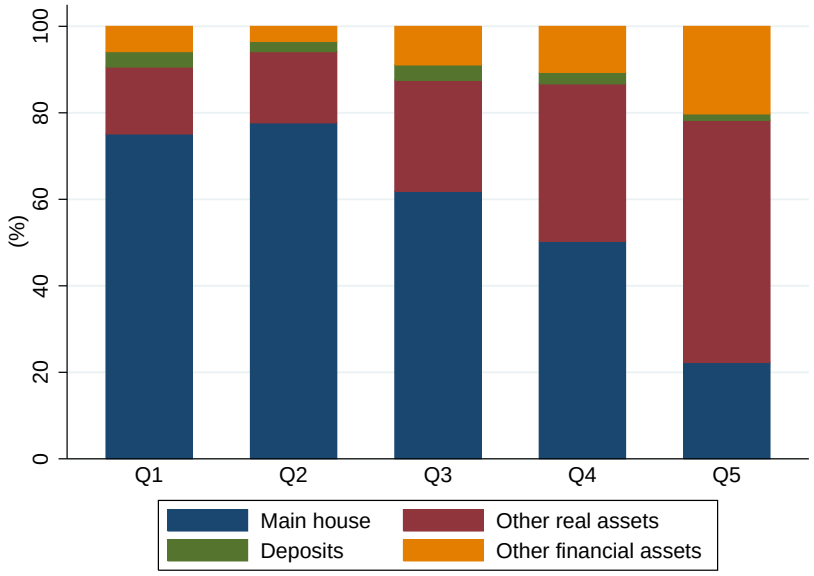

*Notes:* Median net wealth by quintile and year. Millions in constant 2011 euros.

quintiles. The median net wealth spans from a value of €81,803 for the bottom quintile to €1,334,048 at the top of the distribution. These heterogeneities are also observable across quintiles at the middle part of the distribution with the median household in the second quintile owning on average a net wealth of €173,762 over the whole period 2002-2011 and the median household in the second top quintile almost half a million (€482,675). The middle quintile net wealth amounts to €279,006.

On the other hand, all quintiles share a similar trend during the business cycle. Independently of the quintile, the growth rates are negative only in the period 2008-2011, the one that fully accounts for the Great Recession. The largest increase in households' wealth is between 2002 and 2005 where, on average, the growth rate for median households was 69.23%, with the bottom quintile doubling their wealth. Between 2005 and 2008 the growth rate slowed down to 13.53%, problaby an early sign of the upcoming crisis. Finally, considering the whole period, there has been a general increase in households wealth, with an average growth rate for the median household in every quintile of 61.28%. The median household at the bottom quintile experienced the largest increase, doubling its level of wealth between 2002 and 2011.

Figure 4 shows the composition of wealth by quintile. In order to explore potential heterogeneities in households assets, we further divide financial wealth into deposits and other financial wealth. Not surprisingly, the primary residence is the principal source of wealth for most of the distribution and its relevance decreases with the level of wealth. Around 80% of the total wealth for the bottom 40% comes from this asset, but it is still

Figure 4: Wealth composition by quintile




*Notes:* Average gross wealth composition by net wealth quintiles.

the most relevant asset for the third and fourth quintile with shares of 60% and 50%, respectively, of the total wealth. However, it only accounts for 20% of the wealth for households in the top quintile. Interestingly, financial assets (excluding deposits) are not extremely relevant at any point of the distribution. The share increases along the wealth distribution, but it rises from 5% in the bottom quintile to only 20% for the top 20% richest households. Curiously, the main component of wealth at the top of the distribution is other real wealth, such as other real estate properties and businesses. This is also the second most important component for the rest of the distribution. Although we are fully aware that our sample is not representative of the whole population, it is reassuring that the wealth composition shown in Figure 4 shares many similarities with the one presented by Martínez-Toledano (2020) for Spain in 2015.[16]

# 3 Empirical analysis

## 3.1 Baseline estimates

Following Paiella (2007) and Arrondel et al. (2019), we estimate a consumption function based on the life cycle model where households use wealth accumulation to smooth consumption over their life cycle. In addition, their current consumption is proportional to their total wealth (see Deaton, 1992).

[16] See Figure 3 in Martínez-Toledano (2020).

Empirically, we have:

$$\frac{C_{h,t}}{Y_{h,t}} = \beta_0 + \beta_1 \frac{W_{h,t}}{Y_{h,t}} + \beta_2 \boldsymbol{X_{h,t}} + Q^j * \phi_t + \mu_h + \epsilon_{h,t}, \tag{1}$$

where $C_{h,t}$, $W_{h,t}$ and $Y_{h,t}$ represent, respectively, household $h$'s non-durable consumption, wealth, and non-financial income in period $t$. $\boldsymbol{X_{h,t}}$ is a row vector of control variables, $\mu_h$ are household fixed effects, $Q^j * \phi_t$ are quintile-specific time dummies controlling for common shocks across households within the same quintile ($j$) in a given wave, and $\epsilon_{h,t}$ is a zero mean white-noise residual. $\beta_1$ is our parameter of interest and can be interpreted as the marginal propensity to consume out of wealth.

An important contribution to the existing literature is the use of within-household variation to estimate the MPC out of wealth. The inclusion of household fixed effects alleviates the concerns arising from unobserved heterogeneity common in cross-sectional studies. However, time-varying unobserved heterogeneity might still bias the estimates. To mitigate the concern, we follow the literature and include a large set of variables to account for the life cycle position and changes in preferences of the household. More specifically, we control for the age of the reference person, the size of the household, the number of employed adults and the number of kids below 16 or dependent adults under 25. Heterogeneities in the consumption profile are taken into account by including categorical variables on the work status, health condition, education and job skills for both members of the couple. We also control for whether the household has any outstanding debt, the type of house ownership and a dummy indicating if households have carried out reforms in the main house the year before the survey takes place.

We further include in the analysis categorical variables that, although recognized as relevant by the literature, are usually not available due to data limitations. In particular we include proxies of households': i) preferences towards risk, ii) credit constraints, iii) liquidity constraints, iv) unexpected deviations from the normal value of current income, v) future uncertainty and vi) income expectations.[17]

In a recent study, Arrondel et al. (2019) stress the importance of including income expectations in the analysis to isolate the direct wealth effect from any indirect or confidence channel (Poterba, 2000). The intuition is that both wealth and consumption would respond to changes in expectations about the future state of the economy. For example, an increase in the expected productivity growth would raise both asset values (current asset values take into account the larger expected profits) and households' consumption today (households are more optimistic about the future state of the economy) leading to

[17]Table A1 and Table A2 in the Appendix present, respectively, the descriptive statistics of our variables of interest and the definition of some selected variables.

an spurious positive relation between wealth and consumption.[18]

Following the literature, we decrease the influence of extreme values on our results by controlling for the presence of outliers. An observation is considered an outlier if any of the following conditions hold: i) the yearly non-financial income is less than €2000, ii) the consumption to income ratio is larger than 5, iii) the three years growth rate of consumption is larger than 200%, iv) the three years growth rate of income is larger than 200%, or v) the net total wealth three years growth is bigger than 300%. Conditions i) and ii) account for extreme values of income and consumption. As our strategy relies on within-household variation, points iii) to v) identify outliers using growth rates.[19]

In total, 9.06% of our observations are considered outliers. Dropping households that present at least an outlier observation would imply to lose 36% of our sample (150 households). In order to avoid dropping more observations, our preferred specification include an interaction term between our variables of interest and a dummy which identifies outliers.[20]

In more technical terms, we estimate:

$$\frac{C_{h,t}}{Y_{h,t}} = \alpha_0 + \alpha_1 \frac{W_{h,t}}{Y_{h,t}} + \alpha_2 \frac{W_{h,t}}{Y_{h,t}} * D_{h,t} + \alpha_3 D_{h,t} + \alpha_4 \boldsymbol{X_{h,t}} + Q^j * \phi_t + \mu_h + \varepsilon_{h,t}, \qquad (2)$$

where $D_{h,t}$ represents a dummy variable indicating the presence of an outlier observation for a household $h$ in a wave $t$. $\alpha_1$ is our parameter of interest and represents the marginal propensity to consume out of wealth without considering outliers.[21]

### 3.1.1 MPC out of wealth

Table 2 divides the first set of results in two blocks. Block A shows the results obtained from equation (2), our preferred specification. In contrast, Block B estimates equation (1) using a sample that excludes from the analysis any household with at least one outlier observation. Despite the significant difference in the size of the sample between blocks, results are virtually identical; which points out that both methods account for the presence of outliers in a similar way. Given that the inclusion of a dummy variable identifying outliers allows us to include 150 more families in the analysis, from now on we will

[18] For a more detailed explanation on the role of expectations and the wealth-consumption relation see, among others, Attanasio and Weber (1994); Attanasio et al. (2009); Disney et al. (2010); Carroll et al. (2011).

[19] Values are selected using the sample distribution of the variables of interest.

[20] Below we show the robustness of our results to different approaches.

[21] For the sake of simplicity along the paper we only present our coefficients of interest. Full set of results are available upon request.

present results obtained from equation (2).[22]

Table 2: MPC out of wealth: Baseline results

| | Block A: Dummy | | | Block B: No outliers | | |
|---|---|---|---|---|---|---|
| | [1] | [2] | [3] | [4] | [5] | [6] |
| Gross wealth/Income | 0.010 | | | 0.008 | | |
| | (0.002)*** | | | (0.002)*** | | |
| Net wealth/Income | | 0.009 | | | 0.008 | |
| | | (0.002)*** | | | (0.002)*** | |
| Net financial wealth/income | | | 0.007 | | | 0.007 |
| | | | (0.006) | | | (0.005) |
| Net housing wealth/income | | | 0.032 | | | 0.030 |
| | | | (0.006)*** | | | (0.007)*** |
| Net other wealth/income | | | 0.003 | | | 0.002 |
| | | | (0.002) | | | (0.001)* |
| Constant | 0.578 | 0.580 | 0.445 | 0.248 | 0.255 | 0.228 |
| | (0.182)*** | (0.182)*** | (0.165)*** | (0.105)** | (0.103)** | (0.089)** |
| Households | 415 | 415 | 415 | 265 | 265 | 265 |
| Obs | 1660 | 1660 | 1660 | 1060 | 1060 | 1060 |
| $R^2$ | 0.354 | 0.341 | 0.571 | 0.182 | 0.171 | 0.262 |
| RMSE | 0.291 | 0.294 | 0.237 | 0.172 | 0.173 | 0.164 |
| % Outliers | 9.06 | 9.06 | 9.06 | - | - | - |
| Household FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Quintile $*$ Wave FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*Notes*: The dependent variable is the ratio of non-durable consumption to non-asset income. Robust standard errors clustered at the household level in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%. Table A1 in the Appendix displays the complete list of controls included in every regression. RMSE presents the root mean squared error. % Outliers shows the percentage share of outlier observations in the regression.

Columns [1] and [2] show the marginal propensity to consume out of total wealth. Regardless of whether we consider gross (column [1]) or net (column [2]) total wealth, we find that 1 additional euro of wealth is associated with 1 cent of additional consumption. These results are in line with previous studies, though in the lower bound. Nonetheless, there might be significant heterogeneity across households depending on asset composition (Case et al., 2005). One might think, for instance, that asset characteristics such as liquidity, risk, or type of investment could play a role in the way consumption responds to changes in asset values. Economic theory, however, did not reach consensus on the size and direction of these effects and, therefore, the question remains mainly empirical. We try to shed some light in Column [3], where we show the MPC after total net wealth splits in three broad components, as defined in the previous section: financial wealth, housing (primary residence) and other real assets. Our results unveil important heterogeneities across assets. In particular, we do not observe any significant effect on households' consumption arising

[22]In the Appendix (Table A3), we study the robustness of our results to different outlier definitions.

from changes in either the value of financial or other real assets. On the other hand, the overall wealth effect uncovered in column [2] is explained by the response of consumption to changes in the net value of housing wealth. The MPC is equal to 0.032 or, in other words, households increase their consumption by 3.2 cents out of every extra euro increase in the value of the house.

These results are in line with the ones presented by Bover (2005). Using a cross-sectional sample of Spanish households in 2002, she estimates a MPC out of housing wealth of 2 cents but no significant effect emerges with respect to the financial wealth-consumption relationship. At first, this result could seem a little counter-intuitive. That is, we might expect more liquid assets (e.g. financial assets) to be more likely associated with changes in consumption as they are more easily translated into cash. However, it is worth mentioning that this mechanism would only be relevant if the household had to dis-save in order to increase its consumption. If they are able to decrease their current savings without having to cash assets, there is no reason why financial assets should imply a larger MPC than non-liquid assets. Households' consumption could respond to changes in the value of housing assets for different reasons: i) higher housing prices could incentive families to increase their consumption today if they plan to sell their primary residence in the future, or ii) households could make use of the increased real estate wealth as a collateral for borrowing.[23] However, once we look at the data, neither of these channels seem to be very relevant for Spanish households. Interestingly, Skinner (1996) points out that the mere possibility of doing it in the future may be sufficient for homeowners to increase their consumption if the rise of housing prices reduce precautionary saving motives. This could be particularly relevant in the case of Spain, where real estate assets have been traditionally used to channel households' savings.

In this section, we have assumed that all households react in the same way to changes in wealth. However, some scholars have suggested that this relationship might be affected by households' net worth. Next section investigates this issue.

### 3.1.2 Heterogeneities across the distribution of wealth

Carroll and Kimball (1996) show that under the presence of income uncertainty or borrowing constraints the consumption function is concave with respect to wealth. In other words, the marginal propensity to consume decreases with net wealth.[24]

In order to study the MPC across the distribution of wealth, we first divide house-

[23]It is worthy to note that an increase in housing prices would have opposite effects depending if households are owning or renting the primary residence. If housing price rises, owners increase their net worth, whereas renters (future owners) see it as a larger future cost (Campbell and Cocco, 2007).

[24]Recently, Arrondel et al. (2019) show empirical evidence of this decreasing relation using French cross-sectional data for 2010.

holds into wealth quintiles. The use of panel data, however, involves an extra challenge, as households could change their position in the distribution during the period of analysis, raising potential endogeneity issues. We alleviate this concern by considering a time-invariant measure of households wealth, fixing the position of households in the distribution for the whole period. One option would be to distribute households in quintiles using wealth at the beginning of the period; the main advantage being for the explanatory variable to be predetermined, alleviating endogeneity issues. However, given the large variation in asset prices witnessed during the last business cycle, if we were to consider only a specific year, the position assigned to households would likely suffer of significant measurement error. As a halfway solution, we determine households' positions across the wealth distribution using their average net wealth during the whole period.[25]

Empirically, we estimate:[26]

$$\frac{C_{h,t}}{Y_{h,t}} = \beta_0 + \sum_{j=1}^{5} \beta_1^j \frac{W_{h,t}}{Y_{h,t}} * Q^j + \beta_2 \boldsymbol{X_{h,t}} + Q^j * \phi_t + \mu_h + \epsilon_{h,t}, \tag{3}$$

where $\beta_1^j$ is the MPC for the $j$ wealth group.

Figure 5 shows the MPC estimates out of total net wealth by quintile along with their 90% confidence intervals. What emerges is a clear descending pattern across the distribution of wealth. Households in the bottom quintile increase their consumption by 6.3 cents for each additional euro of net wealth, more than 12 times the response observed for households in the top quintile, which only increase their consumption by 0.5 cents. Interestingly, all the coefficients but the one for the top quintile are larger than the MPC obtained in the second column of Table 2. The median quintile shows a MPC out of wealth equal to 1.8 cents, twice the value of the average MPC obtained in column [2], confirming the already commented skewness of the distribution of wealth.[27]

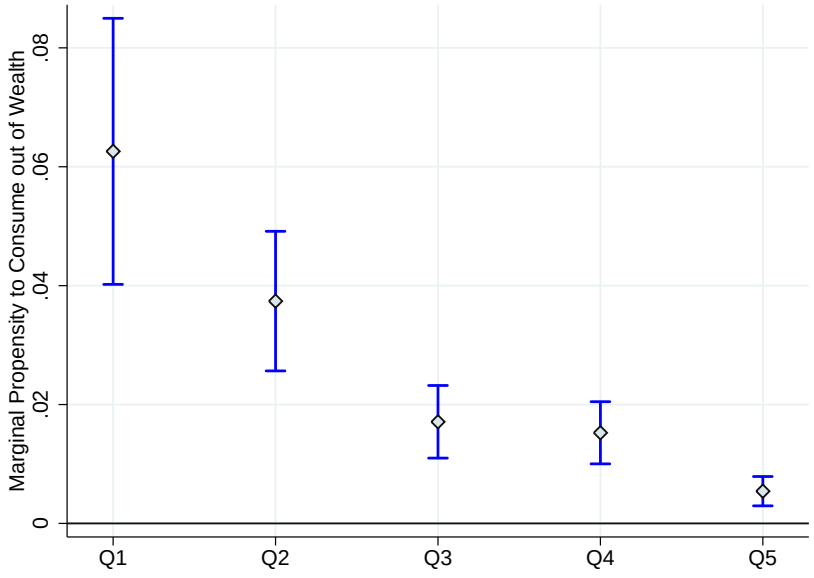
In the previous section we have uncovered heterogeneous effects in the MPC depending on the characteristics of households' assets. While changes in the value of the primary residence was the key driver of households' consumption, we did not find any statistically significant effect on consumption of either financial or other real assets on consumption. It is worth mentioning that these two types of assets are usually owned by households in the upper part of the wealth distribution (Figure 4). As such we next study to what

[25] Although this choice could still present some problems, it solves our two main concerns: i) endogeneity problems arising from households moving throughout the distribution during our sample period and ii) a classification that is not representative of households' wealth during most of the period under analysis.

[26] For the sake of simplicity we exclude the dummy interaction term from our terminology. In order to include all constitutive terms we also include an interaction term between quintile categorical variables and the presence of outliers.

[27] The net wealth weighted average MPC is 0.011, very close to the average MPC obtained in Table 2.

Figure 5: MPC out of net total wealth




*Notes:* Marginal propensity to consume out of net total wealth by quintile. Results are obtained from equation (3). Table A4 (Regression A) in the Appendix shows more information on the regression. Blue lines represent 90% confidence intervals.

extent our previous results are due to this composition effect.

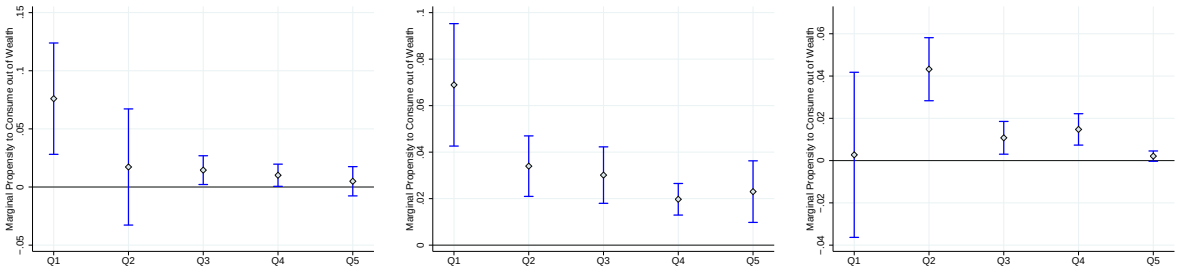
Figure 6 displays the marginal propensity to consume out of financial, housing, and other real wealth. The coefficients are obtained from a regression where the three measures of wealth are simultaneously included and interacted with quintile indicators.[28] Figure 6.a shows the MPC out of financial wealth. A significant effect is found for the bottom quintile, where an extra euro of financial wealth is associated with increases of consumption of 7.6 cents. For the rest of the distribution the point estimate goes from 1.7 cents in the second quintile to 0.5 cents in the fifth quintile, but only the third and fourth quintiles are statistically significant.

Concerning housing wealth, Figure 6.b suggests a very similar pattern to the one presented in Figure 5. Households in the bottom quintile increase their consumption by 6.9 cents out of every extra euro of housing wealth and the coefficient decreases along the wealth distribution until the forth quintile, where it stabilizes at 2 cents.

Finally, Figure 6.c presents the MPC estimates out of other real assets. Here, the pattern is slightly different, with significant effects in the central parts of the distribution (Q2,Q3 and Q4) and non-significant coefficients at the extremes. However, the MPC in the central part of the distribution does not follow any specific pattern, making it harder to interpret the results.

[28]Table A4 in the Appendix shows the regressions behind the figures presented in this section. The full set of results is available upon request.

Figure 6: MPC out of net wealth components




(a) Financial wealth (b) Housing wealth (c) Other real assets

*Notes:* Marginal propensity to consume out of financial, housing and other real wealth by quintile. Results are obtained from equation (3) once wealth is divided in the its three components. Table A4 (Regression B) in the Appendix shows more information on the regression. Blue lines represent 90% confidence intervals.

It is worth noticing that, given the concentration of financial and other real assets at the top of the distribution (Figure 4) and the fact that neither variations in financial wealth nor in other real assets have an impact on the MPC of the top quintile of the distribution might help explaining the lack of significance of the coefficients found in column [3] of Table 2.

All in all, our results show that: i) the MPC out of total wealth decreases along the wealth distribution, ii) housing wealth follows the same pattern than the MPC out of total wealth and iii) financial and other real assets have a significant effect in some parts of the distribution, but their patterns are much less clear.

Up to this point, we exploited observed variations in wealth to estimate the MPC. However, it is important to note that these changes in wealth do not only consist of changes in the value of households' assets (i.e. wealth effect) but it also account for endogenous households' saving decisions. Next section explains in detail to what extent this issue could bias our estimates and presents a set of results exploiting arguably exogenous variations of a specific asset.

## 3.2 Endogeneity issues

Our empirical strategy relies on the use of within-household variations in wealth to estimate the MPC. However, changes in wealth across two time periods can be decomposed as follows:

$$\begin{aligned} \Delta W_{h,t+1} &= W_{h,t+1} - W_{h,t} \\ &= \underbrace{p_{t+1}(A_{h,t+1} - A_{h,t})}_{\text{Endogenous}} + \underbrace{(p_{t+1} - p_t)A_{h,t}}_{\text{Exogenous}}, \end{aligned} \tag{4}$$

where, for simplicity, $A$ represents a generic asset of price $p$.

Equation (4) splits wealth variation into two components: the first one, $p_{t+1}(A_{h,t+1} - A_{h,t})$, shows changes in wealth associated with changes in the composition of households' portfolio, while the second component, $(p_{t+1} - p_t)A_{h,t}$, represents changes in wealth due only to asset price variations.[29] The last component is exogenous under the assumption that a household cannot affect asset prices. On the other hand, the first component is correlated with both households' wealth and consumption, raising endogeneity concerns. In other words, an increase in wealth due to the purchase of new assets is, by definition, associated with higher household's savings and, hence, lower consumption expenditures. Given that this negative correlation between wealth and consumption would bias downwards the estimates of the MPC, our previous results must be considered a lower bound estimate.

The goal of this section is to isolate the second term of the decomposition in order to estimate consumption responses coming solely from exogenous variations in asset prices. Unfortunately, for most assets our dataset does not provide the required level of disaggregation to separate price variations from changes in the composition of the portfolio. More precisely, the EFF presents information on different wealth components (i.e. stocks, bonds, deposits...) but not on the specific underlying assets that comprise them. Given this constraint, we decide to narrow the scope of our analysis and focus on the primary residence, an asset for which the EFF has comprehensive data and is still a relevant component of Spanish households' wealth.

Our strategy to isolate exogenous housing price variations consists in restricting our sample to include only households that have been living in the same residence since at least 2002, the first year in our sample. Note that the value of the primary residence could also change due to works of improvement made during the period under analysis. In order to control for this potential effect, we include a categorical variable accounting for households that have carried out reforms in the primary residence the year before the survey took place.[30]

[29] Paiella and Pistaferri (2017) further decompose wealth variation in anticipated and unanticipated changes. Following the literature, a wealth effect would only emerge from unanticipated changes. Unfortunately, we do not have enough information to identify this component.

[30] The identification of the exogenous component could also be achieved by using instrumental variables. We have explored this option by following Schwandt (2018), where household changes in wealth are instrumented with the weighted average of different asset prices, with the average portfolio composition during the sample period being the weights. We checked different specifications depending on the level of aggregation (aggregate financial assets; stock, bonds and other financial assets...), but results from the first stage indicated that our instrument was not correlated with changes in wealth. Although unfortunate, the result comes as no surprise for at least two reasons: i) the composition of households' stock and bond portfolios are likely to be very heterogenous and not always correlated with standard indexes like IBEX 35, S&P500, or the 10-year Government Bond and ii) the EFF does not provide households' geographic information and, therefore, we are constrained to use the average housing price index at the national level, ignoring important regional heterogeneities.

### 3.2.1 MPC out of wealth: Homeowners sample

The initial sample consists of 415 households with an average ownership rate of 91% in the period considered (see Table A1). However, some of those households do not own their house for the whole period or have changed their primary residence at some point between 2002 and 2011. We hence restrict the sample to households owning the same residence for the whole period. The final sample considered in the analysis counts 336 families, corresponding to roughly 81% of the initial sample.

This section repeats the exercise of Section 3.1.1, where we study the marginal propensity to consume out of total wealth and its different components. For the sake of comparison, Table 3 is divided in two blocks. Block A reports the same coefficients of Table 2 columns [1]-[3], while Block B presents the MPC out of wealth from the homeowners sample.

Table 3: MPC out of wealth: Homeowners sample

| | Block A: Table 2 - Block A | | | Block B: Homeowners sample | | |
|---|---|---|---|---|---|---|
| | [1] | [2] | [3] | [4] | [5] | [6] |
| Gross wealth/Income | 0.010 | | | 0.010 | | |
| | (0.002)*** | | | (0.003)*** | | |
| Net Wealth/Income | | 0.009 | | | 0.010 | |
| | | (0.002)*** | | | (0.003)*** | |
| Net financial wealth/income | | | 0.007 | | | 0.006 |
| | | | (0.006) | | | (0.004) |
| Net housing wealth/income | | | 0.032 | | | 0.029 |
| | | | (0.006)*** | | | (0.006)*** |
| Net other wealth/income | | | 0.003 | | | 0.003 |
| | | | (0.002) | | | (0.002) |
| Constant | 0.578 | 0.580 | 0.445 | 0.469 | 0.479 | 0.266 |
| | (0.182)*** | (0.182)*** | (0.165)*** | (0.125)*** | (0.126)*** | (0.099)*** |
| Households | 415 | 415 | 415 | 336 | 336 | 336 |
| Obs | 1660 | 1660 | 1660 | 1344 | 1344 | 1344 |
| $R^2$ | 0.354 | 0.341 | 0.571 | 0.489 | 0.474 | 0.691 |
| RMSE | 0.291 | 0.294 | 0.237 | 0.260 | 0.264 | 0.203 |
| % Outliers | 9.06 | 9.06 | 9.06 | 6.76 | 6.76 | 6.76 |
| Household FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Quintile $*$ Wave FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*Notes*: The dependent variable is the ratio of non-durable consumption to non-asset income. Robust standard errors clustered at the household level in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%. Table A1 in the Appendix displays the complete list of controls included in every regression. RMSE presents the root mean squared error. % Outliers shows the percentage share of outlier observations in the regression.

Comparing the two blocks, one can notice that block B provides a better fit to the data (larger $R^2$ and smaller RMSE for each of the three regressions), probably due to the relatively smaller presence of outliers (6.76% vs. 9.06%). Beyond that, there are no

significant differences in the results displayed in the two blocks. As before, regardless of whether we consider gross or net total wealth, we find that for every extra euro of wealth households increase their consumption, on average, by only 1 cent. When we consider the different components of wealth (Column [6]) we observe, again, a very low MPC out of financial and other real wealth, statistically not different from zero. On the other hand, in contrast, the response to changes in the value of the primary residence is three times the size of the MPC out of total wealth (2.9 cents). It is worth noticing that financial and other real assets are still affected by the downward bias related with households' savings decisions. The goal of this section is precisely to address this concern, focusing on the arguably exogenous wealth variation arising from the families' house value.

The comparison between blocks A and B is relevant as it proves the robustness of our results to changes in the selected sample. Still, the interpretation of the results is not straightforward, and we have to be careful before claiming that sample selection does not affect our results. From our previous analysis, we would expect a larger MPC out of housing wealth in Block B for two reasons: i) the homeowners sample should not be affected by the downward bias stemming from households' saving decisions and ii) by excluding renters from the analysis we do not consider households who do not benefit from higher housing prices. Nonetheless, the MPC is even smaller than the one computed in Table 2 (2.9 vs. 3.2 cents). This outcome could be explained in part through a composition effect: most of the households discarded from the baseline sample (35 out of 79) belonged to the bottom quintile of the distribution, which is a quintile associated with a larger MPC.[31]

Next, we study the concavity of the consumption function using our homeowners sample.

### 3.2.2 Heterogeneities across the distribution of wealth: Homeowners sample

As in Section 3.1.2, we estimate equation (3) using the sample of homeowners. Households are reassigned to quintiles based on their average total net wealth. Table 4 shows results from two specifications, one considering the total net wealth (Regression A) and another estimating the MPC out of the three wealth components (Regression B).

Regression A reports a decreasing MPC across the distribution of wealth, results that are in line with the ones showed in Figure 5 on the baseline sample. Households in the bottom part of the distribution increase their consumption by 5.4 cents for each additional euro of net wealth, 9 times the response observed in households in the top quintile and 3 times the MPC in the median quintile.

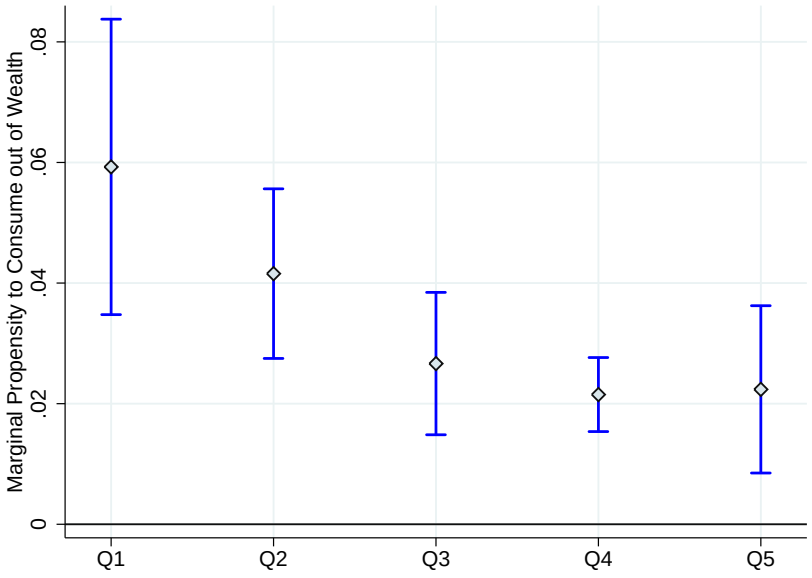
[31] The full distribution of the 79 households excluded from the analysis in the homeowners sample is: Q1=35, Q2=12, Q3=12, Q4=9 and Q5=11.

Table 4: Marginal Propensity to Consume out of Wealth: Homeowners sample

| | Q1 | Q2 | Q3 | Q4 | Q5 | | |
|---|---|---|---|---|---|---|---|
| Regression A: Net wealth | | | | | | | |
| | | | | | | Households | 336 |
| Net wealth/income | 0.054 | 0.037 | 0.018 | 0.015 | 0.006 | Obs | 1344 |
| | (0.013)*** | (0.007)*** | (0.003)*** | (0.003)*** | (0.002)*** | R2 | 0.658 |
| | | | | | | RMSE | 0.214 |
| Regression B: Figure 7 | | | | | | | |
| Net financial wealth/income | 0.057 | -0.006 | 0.005 | 0.012 | 0.005 | | |
| | (0.026)** | (0.029) | (0.010) | (0.006)* | (0.005) | Households | 336 |
| Net housing wealth/income | 0.059 | 0.042 | 0.027 | 0.022 | 0.022 | Obs | 1344 |
| | (0.015)*** | (0.009)*** | (0.007)*** | (0.004)*** | (0.008)*** | R2 | 0.754 |
| Net other wealth/income | 0.015 | 0.040 | 0.013 | 0.014 | 0.002 | RMSE | 0.183 |
| | (0.021) | (0.010)*** | (0.004)*** | (0.004)*** | (0.002) | | |

*Notes*: The dependent variable is the ratio of non-durable consumption to non-asset income. Robust standard errors clustered at the household level in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%. Both regressions include: households fixed effects, quintile-specific time fixed effects and the full set of control variables (Table A1). RMSE presents the root mean squared error. The percentage share of outlier observations in the regressions is 6.76.

Figure 7: MPC out of net housing wealth: Homeowners sample




*Notes:* Marginal propensity to consume out of net housing wealth by quintile. Results are obtained from equation (3) once net total wealth is divided in three components: financial, housing and other real wealth. Table 4 (Regression B) shows more information on the regression. Blue lines represent 90% confidence intervals.

Regression B shows the MPC out of financial, housing and other real wealth across the distribution of wealth. Results are virtually identical to the ones presented in Figure 6, reassuring on the potential bias arising from sample selection. Given that financial and other real assets are still exposed to the bias arising from household's saving behaviour, their result comes as no surprise. More interesting, however, is the MPC out of housing wealth. Figure 7 graphically shows the new estimates where a clear decreasing MPC across the distribution of wealth is again observed. Households in the bottom quintile present a MPC equal 5.9 cents that progressively decreases along the distribution of wealth ($MPC_{Q2} = 4.2$ and $MPC_{Q3} = 2.7$) to stabilize at the top two quintiles (Q4 and Q5) at 2.2 cents, reinforcing our previous results about the concavity of the consumption function.

## 3.3 Asymmetries

So far, we have assumed a symmetric response of households' consumption to changes in wealth regardless of whether wealth variations were positive or negative, or the magnitude of the change. However, intertemporal choice models including income uncertainty and liquidity constraints predict that consumers will make different adjustments depending on the size and magnitude of the shock. In particular, in the presence of income risk and liquidity constraints a household would react more to negative than to positive shocks. In the case of a negative shock, the adjustment is positively related with size of the shock. In contrast, for positive changes, consumers facing liquidity constraints are more likely to overcome them when the shock is larger, so the consumption response is expected to be smaller for larger positive shocks.[32]

Recently, Christelis et al. (2019) have found empirical evidence of this asymmetric behaviour analyzing the marginal propensity to consume out of income for a sample of Dutch households. As the authors emphasize, in order to study the existence of asymmetries in the MPC, we need to keep in mind that consumption responses to a realized shock are probably not only reflecting the different characteristics of the selected sample, but also the business cycle context in which the shock occurs. In our case, this latter issue should be attenuated by the use of panel data covering both an expansion and a recession period.

To the best of our knowledge, in this section we present the first evidence of asymmetric consumption behaviour following changes in housing wealth.[33]

[32]It is worth noticing that the proxy of liquidity constraints included in our analysis does not fully capture the concept and leaves some room for this mechanism to play a role in our estimates. More specifically, our proxy aims to reduce the within-household unobserved heterogeneity by taking into account changes during our sample, but it does not control for liquidity constraints related with households idiosyncrasies.

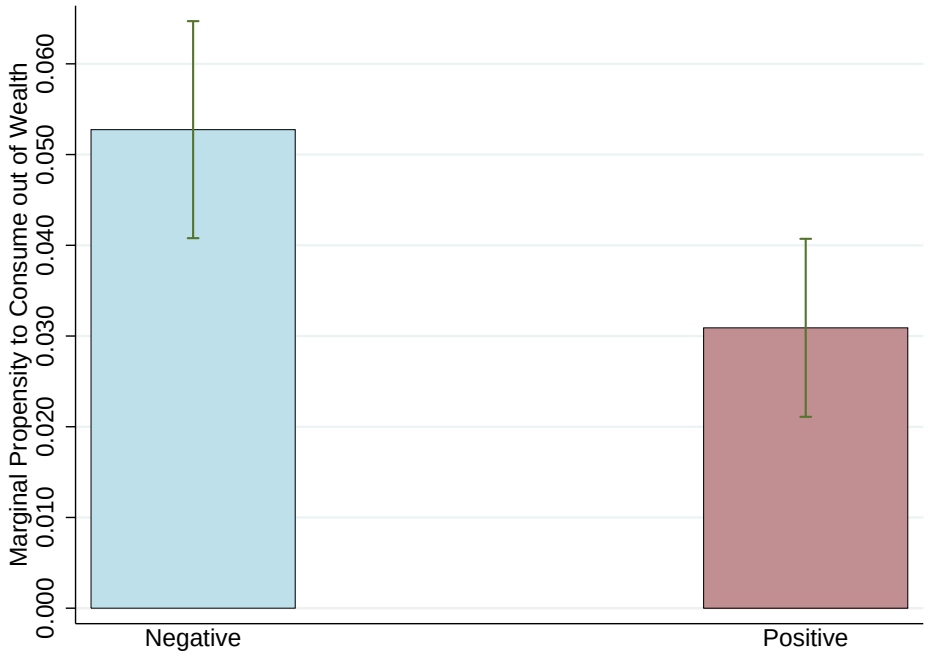
[33]It is not clear how the bias from households' savings behaviour could affect our estimates. For the

### 3.3.1 Sign Asymmetries

We start analyzing households' consumption responses to positive and negative changes in housing wealth. Changes in wealth are computed as the difference in the net value of the primary residence between two time periods and, therefore, the regression will be run on the waves 2005-2011. We estimate an adapted version of equation (2), where different consumption responses are allowed by interacting net housing wealth with a dummy variable for positive changes in wealth. Financial and other real wealth are included as controls in the regression.[34]

Figure 8 shows the MPC out of negative and positive shocks from housing wealth.[35] As the theory predicts, we find a larger consumption reaction to negative than to positive changes in wealth. More specifically, our results show that households' consumption decreases by 5.3 cents when there is a 1 euro decline in the net value of their house, but it only increases by 3.1 cents when there is an 1 euro increment in that value.

Figure 8: MPC out of net housing wealth: Sign asymmetries




*Notes:* MPC out of positive and negative changes in net housing wealth (along with the 90% confidence intervals). Results are obtained from an adapted version of equation (2) where net total wealth is divided in: financial, housing and other real wealth. Net housing wealth is interacted with a dummy that indicates a positive change in wealth. Table A5 (Column [1]) in the Appendix shows more information on the regression. A Wald test rejects the equality of the coefficients with a $p - value = 0.001$.

sake of caution, in this section we focus again on housing wealth using the homeowners restricted sample.

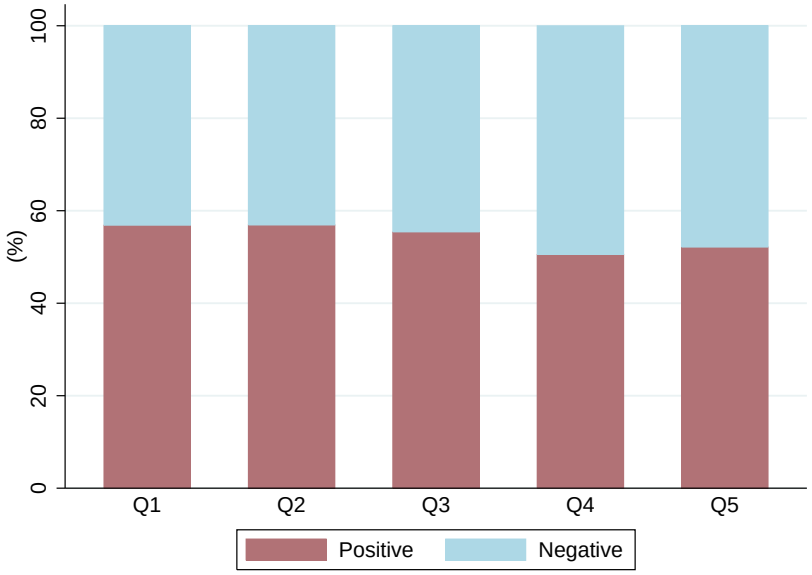
[34] In order to facilitate the interpretation of our coefficients, we present the results after the marginal propensities to consume and their corresponding standard errors are computed.

[35] Table A5 in the Appendix present the regression results corresponding to the figures displayed in this section.

However, previously we have seen that households in the lower part of the wealth distribution are associated with larger MPCs. If negative changes in wealth are mostly concentrated on that part of the distribution, a larger MPC out of negative changes in wealth could be representing a mere compositional effect and not a household asymmetric behaviour. We explore to what extent this could affect our results by studying the distribution of the shocks and the different consumption responses at different places in the distribution.

Figure 9 shows that changes in wealth are evenly distributed across the distribution of wealth. Regardless of the quintile, changes in wealth are mostly positive, with households in the upper part of the distribution experiencing a slightly larger share of negative shocks. This supports the idea that the asymmetric response found in Figure 8 should not be driven by a mere compositional effect.

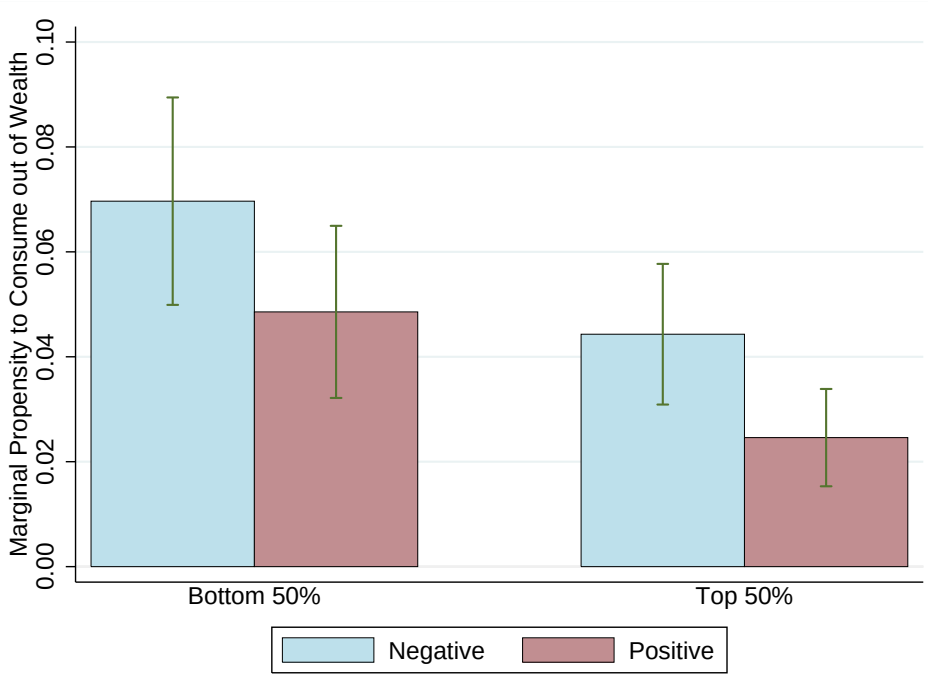
Figure 9: MPC: Positive and negative wealth variation by quintile




A more rigorous analysis is presented in Figure 10, where we estimate the MPC out of negative and positive changes in wealth at different points of the distribution. More specifically, we further interact households' wealth with a categorical variable for whether the household is above or below the median total net wealth in our sample. We find that households' consumption reacts more to negative changes in housing wealth independently of the portion of the distribution under analysis. Households in the bottom part of the distribution present a MPC of 7 cents out of negative changes in wealth while the positive counterpart is only 4.9. Findings are similar for households above the median. Families decrease their consumption by 4.4 cents when their wealth decreases by 1 euro, but they only increase it in 2.5 cents when there is a positive shock. The equality between negative

and positive MPC is rejected in both parts of the distribution. Beyond the asymmetric response of the MPC, these results reinforce the idea that households in the bottom part of the distribution present a larger MPC than households at the top. In this case, we also observe that it is not due to the kind of shocks they face.

Figure 10: MPC out of net housing wealth: Sign asymmetries across the distribution



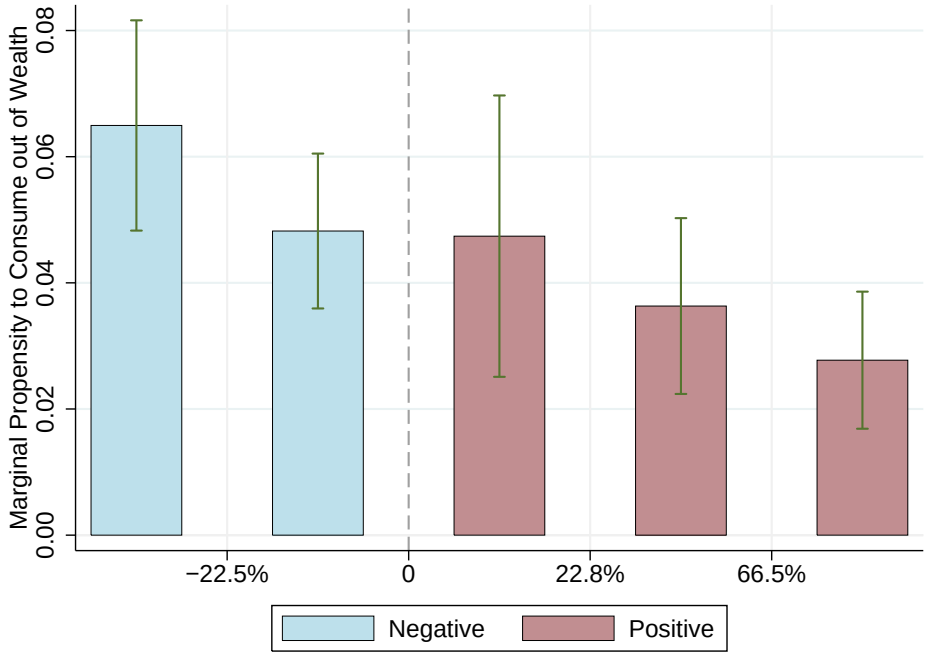

*Notes:* MPC out of positive and negative changes in net housing wealth across the distribution of wealth (along with the 90% confidence intervals). Results are obtained from an adapted version of equation (3) where only two parts of the distribution are considered (above and below the median). Net total wealth is divided in: financial, housing and other real wealth. Net housing wealth is interacted with a dummy that indicates a positive change in wealth. Table A5 (Column [2]) in the Appendix shows more information on the regression. A Wald test rejects the equality of the coefficients in both the bottom ($p - value = 0.062$) and top part of the distribution ($p - value = 0.006$).

### 3.3.2 Magnitude asymmetries

Intertemporal models with income risk and liquidity constraints further suggest that households' consumption response does not only depends on the sign, but also on the magnitude of the shock. In particular, the theory predicts that, due to tighter budget constraints or stronger precautionary saving motives, households facing large negative shocks adjust more their consumption than households facing small decreases in wealth. In contrast, households facing larger positive shocks are more likely to overcome these constraints and, therefore, we expect a smaller MPC the larger is the increase in wealth.

In this section we decompose changes in wealth in five categories depending on the relative size of the change. As our sample presents more positive than negative shocks, we separate positive variations in 3 equal groups while negative changes are evenly distributed

Figure 11: MPC out of net housing wealth: Magnitude asymmetries




*Notes:* MPC out of net housing wealth by magnitude of the change (along with the 90% confidence intervals). Results are obtained from an adapted version of equation (2) where net total wealth is divided in: financial, housing and other real wealth. Net housing wealth is interacted with a categorical variable that classifies changes in wealth in 5 categories depending on the magnitude of the variation.

in 2. The cutting points separating our groups are: -22.5%, 22.8% and 66.5%. On average (across the 5 imputed datasets), every negative (positive) group has 228 (184) observations. The results are obtained from an adapted version of equation (2) that includes interaction terms between the net value of the primary residence and a categorical variable accounting for the 5 groups representing housing wealth variation.

Figure 11 shows estimated MPC. For relatively small variations of wealth (between -22.5% and 22.8%), there are no differences between positive and negative shocks and households adjust their consumption by 4.7 and 4.8 cents, respectively. However, the response changes when we consider larger changes in wealth. For positive changes in the range of 22.8%-66.5% households display a MPC of 3.6 cents, while the MPC is only 2.8 cents when we consider changes in wealth larger than 66.5%. The opposite occurs for negative variations, with households decreasing their consumption by 6.5 cents when negative shocks are larger in absolute values than 22.5%.[36]

In general, our results are in line with theoretical models that incorporate income uncertainty and liquidity constraints. We find that households' consumption is more sensitive to negative than to positive changes in wealth, but also that this response depends

[36]Figure A1 in the Appendix shows that changes in wealth are evenly distributed across the wealth distribution and, therefore, compositional effects should not play a relevant role in the analysis.

Table 5: MPC out of wealth: Simulation exercise

| | Wealth distribution | | | $\Delta Consumption$ | $\%\Delta Consumption$ |
|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | | |
| Scenario A): Homogenous MPC | | | | | |
| | 0.032 | 0.032 | 0.032 | 0 | 0 |
| Scenario B): Heterogenous MPC | | | | | |
| | 0.056 | 0.029 | 0.022 | 18,163.27 | 0.29 |
| Scenario C): Heterogenous and asymmetric MPC | | | | | |
| *Negative* | 0.071 | 0.045 | 0.049 | | |
| *Positive* | 0.058 | 0.030 | 0.026 | 4,743.53 | 0.08 |
| Total housing wealth in Q3 | | | | | 53,139,636 |
| Total consumption | | | | | 6,186,036 |

on the size of the shock. Households decrease their consumption more when they face a large negative shock than when they face a large positive change in wealth. Given that our results exploit changes in housing wealth, and that the use of instruments to make housing a more liquid asset is negligible in Spain, we believe that changes in precautionary saving motives is a more plausible explanation than liquidity constraints; nonetheless, exploring the channels through which wealth affects consumption is beyond the scope of this paper.

# 4 Simulation Exercise

Given the importance of reliable estimates of the MPC to evaluate the effects of different fiscal and monetary policies, our empirical findings could have significant economic policy implications. In this section, following Jappelli and Pistaferri (2014), we perform a very simple policy simulation exercise to study to what extent different assumptions on the MPC could lead to different economic consequences.

Imagine, for simplicity, that the Government decides to impose a tax of 1% on the net value of the primary residence of households in the top tercile of the distribution and uses this money to increase the value of the primary residence of households at the bottom tercile of the distribution. How this revenue-neutral policy would affect aggregate consumption?[37]

We consider three different scenarios: A) the MPC is homogeneous across the distribution of wealth and symmetric, B) the MPC is heterogeneous across the distribution of wealth and symmetric and C) the MPC is heterogeneous across the distribution of wealth and asymmetric. Table 5 shows the different outcomes using the homeowners sample. The top tercile in our sample owns housing wealth worth more than 53 million euros. A

[37]We are well aware that the exercise proposed is highly unrealistic. The reason is that we prefer to use information from our more reliable estimates (i.e. MPC out of housing wealth). Notwithstanding, the exercise is useful to illustrate the results obtained using different assumptions on the MPC.

1% tax on this value implies a redistribution of more than half a million euros between the top and the bottom part of the distribution. In the first scenario, there is no change in aggregate consumption. Scenario A) assumes that all households react in the same way independently of their position in the distribution and the size of the shock. The decrease in consumption of the top tercile due to the tax is fully compensated for the increase in consumption of the households at the bottom tercile. Scenario B), in contrast, implies a positive effect on aggregate consumption. Households at the bottom part of the distribution have a larger MPC than households at the top. The increase in consumption of the bottom tercile more than compensates the decrease in consumption at the top. In this scenario aggregate consumption increases by 0.29% (18,163 €). The last scenario is the more flexible regarding the behaviour of the MPC out of housing wealth: not only we do allow for different MPC across the distribution of wealth, but also for asymmetric responses depending on the sign of the shock. In this case, the 1% tax on the net value of the primary residence for the top tercile will increase aggregate consumption by 4,743 €. This is a 0.08%, a much smaller value than in scenario B).

This exercise shows the different effects on consumption of a simple fiscal reform depending on the behaviour of the MPC. Redistribution policies typically do not have aggregate demand effects in representative agent models (as in Scenario A). However, once we allow for the MPC to be heterogeneous across the distribution of wealth (Scenario B), we find a positive aggregate demand impact of the policy. Finally, the positive effect is mitigated once we allow for asymmetric responses to positive/negative shocks (Scenario C).[38] Even though the differences in the impact of the policy across scenarios may seem small, we need to keep in mind that: i) results may change if we introduce magnitude asymmetries in the MPC, ii) more realistic policies which target narrower groups would have larger effects and iii) poor households, associated with larger MPC, are underrepresented in our sample.

All in all, our results suggest that macroeconomic models need to take into account MPC heterogeneities and asymmetries in order to improve their predictions about fiscal and monetary policies. Combining more realistic MPC out of wealth and income would help to better understand the effects of economic policy proposals such as a progressive wealth tax (Saez and Zucman, 2019) or the redistributive consequences of Central Banks' decisions.

[38]Note that we only focus on partial equilibrium effects. General equilibrium results are beyond the illustrative intention of this section.

# 5 Conclusions

Households' consumption decisions play a crucial role on both economic growth and inequality. How households change their consumption when there is a change on the value of their assets is not only important to understand the effect of current economic events, but to improve macroeconomic models that try to forecast the effect of fiscal and monetary policies.

We estimate the marginal propensity to consume out of wealth using a panel of Spanish households. We find that households' consumption increases around 1 cent for each additional euro of net total wealth. This result hides important heterogeneities across both the distribution of wealth and the type of asset. In particular, the MPC out of wealth is a decreasing function of households' net worth. Which is revealing of the concavity of the consumption function in wealth. Regarding the type of asset, the most important component of wealth is the primary residence with a MPC of around 3 cents. We only find significant effects of financial assets in the bottom part of the distribution, while other real assets have some impact in the central part. In any case, these last findings are less conclusive since they are potentially affected by a bias from households' saving decisions and must be considered as a lower bound estimate.

By focusing on housing wealth, we are able to identify exogenous variations of wealth and check the validity of various theoretical predictions. Beyond the concavity of the consumption function in wealth, we acknowledge the existence of sign and magnitude asymmetries in the MPC out of wealth as predicted by intertemporal consumption models with income uncertainty and liquidity constraints. Households do not only adjust more their consumption to negative changes in wealth than to positive ones, but the larger is the negative shock the bigger is the adjustment in consumption, while the opposite is true for positive shocks. Given that this set of results come from a sample of homeowners who stay in the same house during the whole period, we think that the transmission channel is more likely related to precautionary saving motives than to liquidity constraints. Future research must aim to clarify the channel(s) behind these effects and the role played by financial and other real assets.

All in all, this paper uncovers a complex relation between wealth and consumption. There is not only evidence of heterogeneities across the distribution of wealth, but also of asymmetric responses depending on the type of shock. This evidence should be taken into consideration in macroeconomic models aiming to address the impact of diverse economic policies.

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# APPENDIX: Supplementary tables and figures

## Table A1: Descriptive statistics

| | 2002-2011 | 2002 | 2005 | 2008 | 2011 |
|---|---|---|---|---|---|
| **Monetary variables** (median) | | | | | |
| Gross wealth | 306,336 | 205,972 | 338,094 | 352,797 | 320,609 |
| Gross financial wealth | 18,061 | 11,795 | 19,180 | 19,981 | 21,729 |
| Gross housing wealth | 189,971 | 151,977 | 216,152 | 211,739 | 180,304 |
| Gross other real wealth | 37,779 | 10,013 | 32,068 | 78,964 | 82,630 |
| Net wealth | 269,950 | 187,147 | 316,241 | 328,488 | 285,873 |
| Net financial wealth | 14,018 | 7,841 | 14,523 | 16,057 | 19,513 |
| Net housing wealth | 169,098 | 126,713 | 201,921 | 193,665 | 162,319 |
| Net other real wealth | 32,406 | 7,669 | 22,389 | 65,588 | 55,005 |
| Consumption | 15,033 | 14,960 | 15,051 | 15,317 | 14,254 |
| Income | 38,148 | 35,451 | 36,983 | 41,432 | 39,305 |
| **Age** | | | | | |
| 25-34 | 0.050 | 0.133 | 0.046 | 0.019 | 0.002 |
| 35-44 | 0.296 | 0.422 | 0.364 | 0.248 | 0.149 |
| 45-54 | 0.419 | 0.369 | 0.419 | 0.453 | 0.436 |
| 55-65 | 0.235 | 0.077 | 0.171 | 0.280 | 0.412 |
| **Employment status** | | | | | |
| *Reference person* | | | | | |
| Employee | 0.714 | 0.745 | 0.735 | 0.723 | 0.655 |
| Unemployed | 0.065 | 0.041 | 0.048 | 0.060 | 0.111 |
| Retired | 0.044 | 0.012 | 0.027 | 0.048 | 0.089 |
| Inactive | 0.177 | 0.202 | 0.190 | 0.169 | 0.145 |
| *Partner* | | | | | |
| Employee | 0.669 | 0.663 | 0.694 | 0.682 | 0.639 |
| Unemployed | 0.067 | 0.053 | 0.043 | 0.065 | 0.108 |
| Retired | 0.036 | 0.007 | 0.029 | 0.041 | 0.067 |
| Inactive | 0.227 | 0.277 | 0.234 | 0.212 | 0.186 |
| **Education** | | | | | |
| *Reference person* | | | | | |
| Terciary | 0.311 | 0.311 | 0.313 | 0.307 | 0.313 |
| Secondary | 0.283 | 0.311 | 0.287 | 0.267 | 0.267 |
| Primary or lower | 0.406 | 0.378 | 0.400 | 0.426 | 0.419 |

| | 2002-2011 | 2002 | 2005 | 2008 | 2011 |
|---|---|---|---|---|---|
| **Education** | | | | | |
| *Partner* | | | | | |
| Terciary | 0.236 | 0.234 | 0.246 | 0.227 | 0.239 |
| Secondary | 0.323 | 0.364 | 0.311 | 0.324 | 0.292 |
| Primary or lower | 0.441 | 0.402 | 0.443 | 0.449 | 0.470 |
| **Health and Job skills** | | | | | |
| *Reference person* | | | | | |
| Good Health | 0.863 | 0.892 | 0.887 | 0.870 | 0.802 |
| High skills | 0.280 | 0.258 | 0.308 | 0.267 | 0.287 |
| *Partner* | | | | | |
| Good Health | 0.894 | 0.925 | 0.917 | 0.901 | 0.834 |
| High skills | 0.223 | 0.198 | 0.239 | 0.212 | 0.242 |
| **Household composition** | | | | | |
| #Size | 3.637 | 3.817 | 3.720 | 3.578 | 3.434 |
| #Working adults | 1.554 | 1.465 | 1.571 | 1.660 | 1.518 |
| #Kids | 0.848 | 1.104 | 0.952 | 0.771 | 0.564 |
| **House ownership** | | | | | |
| Rented | 0.036 | 0.036 | 0.034 | 0.043 | 0.029 |
| Ownership | 0.910 | 0.884 | 0.913 | 0.918 | 0.923 |
| Free transfer (usufruct) | 0.053 | 0.077 | 0.051 | 0.039 | 0.046 |
| Other | 0.002 | 0.002 | 0.002 | 0.000 | 0.002 |
| **Level of income** | | | | | |
| Normal | 0.612 | 0.648 | 0.635 | 0.622 | 0.545 |
| Higher than usual | 0.086 | 0.075 | 0.096 | 0.089 | 0.082 |
| Lower than usual | 0.302 | 0.277 | 0.269 | 0.289 | 0.373 |
| **Income expectations** | | | | | |
| The same | 0.596 | 0.618 | 0.566 | 0.632 | 0.568 |
| Higher | 0.250 | 0.302 | 0.334 | 0.206 | 0.160 |
| Lower | 0.154 | 0.080 | 0.100 | 0.162 | 0.272 |
| **Preferences toward risk** | 0.040 | 0.053 | 0.058 | 0.024 | 0.024 |
| **Credit constraints** | 0.032 | 0.010 | 0.038 | 0.020 | 0.058 |
| **Liquidity constraints** | 0.068 | 0.060 | 0.060 | 0.068 | 0.085 |
| **Future uncertainty** | 0.069 | 0.055 | 0.039 | 0.073 | 0.109 |
| **Reforms** | 0.173 | 0.188 | 0.191 | 0.145 | 0.166 |
| **Debt** | 0.638 | 0.636 | 0.668 | 0.642 | 0.606 |

*Source*: Spanish Survey of Households Finance (*Encuesta Financiera de las Familias*).
*Notes*: We display the median value of the monetary variables in euros of 2011. The rest of the variables are the full list of controls included in our regressions.

## Table A2: Definition of selected variables

| Variable | Definition |
|---|---|
| Preferences toward risk | Our categorical variable takes value 1 if households describe themselves as willing to run on a lot or a reasonable amount of risk in the expectation of obtaining a lot or above-normal profit. Zero otherwise. |
| Credit constraints | A household is considered credit constrained if in the last two years: i) they did not ask a credit because they think it would be turned down, ii) they have been denied a loan or iii) they have been granted a loan for an amount less than that they requested. |
| Liquidity constraints | Our categorical variable takes value 1 if in the last twelve months the household have had financial difficulties which resulted in the delay of the payment of any debt. |
| Current level of income | The variable takes value: i) 0 if households define their current level of income as normal, ii) 1 if households define their current level of income as higher than usual and iii) 2 if they define their current income as lower than usual. |
| Future uncertainty | Our categorical variable takes value 1 if the reference person or her partner expect to lose their job in the next 12 months and 0 otherwise. In 2011 the Bank of Spain asks explicitly for the probability of losing their jobs in the following 12 months, our variable takes value 1 if the reference person or her partner consider that this probability is larger than 50%. |
| Expected level of income | Our categorical variable takes value: i) 0 if households expect their future income to be the same as at present, ii) 1 if households expect their future level of income to be higher than at present and iii) 2 if they expect a future income lower than at present. |

## Table A3: Marginal Propensity to Consume out of Wealth

| | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [9] |
|---|---|---|---|---|---|---|---|---|---|
| | Outliers: No action | | | Outliers: $\frac{W}{Y}$ levels | | | Outliers: Growth rate 100 | | |
| Gross wealth/Income | 0.012 | | | 0.011 | | | 0.011 | | |
| | (0.004)*** | | | (0.002)*** | | | (0.003)*** | | |
| Net Wealth/Income | | 0.012 | | | 0.011 | | | 0.011 | |
| | | (0.004)*** | | | (0.002)*** | | | (0.003)*** | |
| Net financial wealth/income | | | 0.003 | | | 0.003 | | | 0.007 |
| | | | (0.004) | | | (0.005) | | | (0.006) |
| Net housing wealth/income | | | 0.057 | | | 0.034 | | | 0.043 |
| | | | (0.009)*** | | | (0.006)*** | | | (0.007)*** |
| Net other wealth/income | | | 0.003 | | | 0.006 | | | 0.003 |
| | | | (0.002) | | | (0.002)*** | | | (0.002) |
| Constant | 0.502 | 0.504 | 0.370 | 0.386 | 0.403 | 0.367 | 0.542 | 0.543 | 0.442 |
| | (0.185)*** | (0.186)*** | (0.168)** | (0.169)** | (0.172)** | (0.157)** | (0.184)*** | (0.185)*** | (0.173)** |
| Households | 415 | 415 | 415 | 415 | 415 | 415 | 415 | 415 | 415 |
| Obs | 1660 | 1660 | 1660 | 1660 | 1660 | 1660 | 1660 | 1660 | 1660 |
| R2 | 0.325 | 0.314 | 0.519 | 0.480 | 0.482 | 0.661 | 0.333 | 0.321 | 0.543 |
| RMSE | 0.297 | 0.300 | 0.251 | 0.260 | 0.260 | 0.211 | 0.296 | 0.298 | 0.245 |
| % Outliers | - | - | - | 0.52 | 0.52 | 0.52 | 24.19 | 24.19 | 24.19 |
| Household FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Quintile ∗ Wave FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*Notes*: The dependent variable is the ratio of non-durable consumption to non-asset income. Robust standard errors clustered at the household level in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%. Columns [1]-[3] estimates equation (1) without considering the presence of outliers; Columns [4]-[6] estimates equation (2) and an observation is considered an outlier if: i) the yearly non-financial income is less than €2000, ii) the consumption to income ratio is larger than 5, or iii) the net wealth to income ratio is larger than 200; Columns [7]-[9] estimates equation (2) and an observation is considered an outlier if: i) the yearly non-financial income is less than €2000, ii) the consumption to income ratio is larger than 5, iii) the three years growth rate of consumption is larger than 100%, iv) the three years growth rate of income is larger than 100%, or v) the net total wealth three years growth is bigger than 100%. Table A1 in the Appendix displays the complete list of controls included in every regression. RMSE presents the root mean squared error. % Outliers shows the percentage share of outlier observations in the regression.

## Table A4: Marginal Propensity to Consume out of Wealth

| | Q1 | Q2 | Q3 | Q4 | Q5 | | |
|---|---|---|---|---|---|---|---|
| Regression A: Figure 5 | | | | | | | |
| | | | | | | Households | 415 |
| Net wealth/income | 0.063 | 0.037 | 0.017 | 0.015 | 0.005 | Obs | 1660 |
| | (0.014)*** | (0.007)*** | (0.004)*** | (0.003)*** | (0.001)*** | $R^2$ | 0.546 |
| | | | | | | RMSE | 0.245 |
| Regression B: Figure 6 | | | | | | | |
| Net financial wealth/income | 0.076 | 0.017 | 0.015 | 0.010 | 0.005 | | |
| | (0.029)*** | (0.030) | (0.008)* | (0.006)* | (0.008) | Households | 415 |
| Net housing wealth/income | 0.069 | 0.034 | 0.030 | 0.020 | 0.023 | Obs | 1660 |
| | (0.016)*** | (0.008)*** | (0.007)*** | (0.004)*** | (0.008)*** | $R^2$ | 0.642 |
| Net other wealth/income | 0.003 | 0.043 | 0.011 | 0.015 | 0.002 | RMSE | 0.219 |
| | (0.024) | (0.009)*** | (0.005)** | (0.005)*** | (0.001) | | |

*Notes*: The dependent variable is the ratio of non-durable consumption to non-asset income. Robust standard errors clustered at the household level in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%. Both regressions include: households fixed effects, quintile-specific time fixed effects and the full set of control variables (Table A1). RMSE presents the root mean squared error. The percentage share of outlier observations in the regressions is 9.06.

## Table A5: Marginal Propensity to Consume out of Wealth: Asymmetries by sign and magnitude

| [1] | | [2] | | [3] | |
|---|---|---|---|---|---|
| Figure 8 | | Figure 10 | | Figure 11 | |
| Net financial wealth/income | 0.006 | Net financial wealth/income | 0.006 | Net financial wealth/income | 0.004 |
| | (0.005) | | (0.006) | | (0.005) |
| Net housing wealth/income$^-$ | 0.053 | Net housing wealth/income$^-_{Q<50}$ | 0.07 | Net housing wealth/income$_1$ | 0.065 |
| | (0.007)*** | | (0.012)*** | | (0.010)*** |
| Net housing wealth/income$^+$ | 0.031 | Net housing wealth/income$^+_{Q<50}$ | 0.049 | Net housing wealth/income$_2$ | 0.048 |
| | (0.006)*** | | (0.010)*** | | (0.007)*** |
| Net other wealth/income | 0.001 | Net housing wealth/income$^-_{Q>50}$ | 0.044 | Net housing wealth/income$_3$ | 0.047 |
| | (0.001) | | (0.008)*** | | (0.014)*** |
| | | Net housing wealth/income$^+_{Q>50}$ | 0.025 | Net housing wealth/income$_4$ | 0.036 |
| | | | (0.006)*** | | (0.008)*** |
| | | Net other wealth/income | 0.002 | Net housing wealth/income$_5$ | 0.028 |
| | | | (0.002) | | (0.007)*** |
| | | | | Net other wealth/income | 0 |
| | | | | | (0.002) |
| Households | 336 | | 336 | | 336 |
| Obs | 1008 | | 1008 | | 1008 |
| R2 | 0.76 | | 0.789 | | 0.799 |
| RMSE | 0.185 | | 0.174 | | 0.17 |
| % Outliers | 9.01 | | 9.01 | | 9.01 |
| Household FE | ✓ | | ✓ | | ✓ |
| Quintile $*$ Wave FE | ✓ | | ✓ | | ✓ |
| Controls | ✓ | | ✓ | | ✓ |

*Notes*: The dependent variable is the ratio of non-durable consumption to non-asset income. Robust standard errors clustered at the household level in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%. Table A1 in the Appendix displays the complete list of controls included in every regression. RMSE presents the root mean squared error. % Outliers shows the percentage share of outlier observations in the regression.

Figure A1: Wealth variation by magnitude and quintile