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Abstract

We study how the marginal propensity to consume out of wealth (MPC) varies across households depending on the level and composition of their wealth. We build a unique household-level panel dataset which combines wealth and consumption surveys for five European countries to estimate country-specific marginal propensity to consume out of wealth. We use instrumented household-level panel regressions. First, we show that the MPC out of total wealth is higher for low-wealth households, whatever the country. Second, we find that the MPC out of housing assets is significant and decreasing along the wealth distribution in all countries. Third, we show that the observed cross-country heterogeneity in MPC is strongly correlated with the use of mortgages, suggesting a collateral channel. Finally, we conduct a simulation exercise to investigate to what extent heterogeneous MPC and wealth inequality affect consumption inequality.

Classification: D12, E21, C21

Keywords: consumption, marginal propensity to consume out of wealth, collateral channel, household surveys

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1 Introduction

The heterogeneity across households, in particular according to their financial positions, wealth composition and indebtedness, has been shown to have important aggregate implications (e.g. [Auclert \(2019\)](#), [Cloyne et al. \(2020\)](#), [Kaplan et al. \(2018\)](#), [Mian et al. \(2021\)](#) or [Slacalek et al. \(2020\)](#)). Consumption reactions to wealth shocks are one channel through which this wealth heterogeneity may have such macroeconomic consequences, due to the decline in marginal propensity to consume along the wealth distribution ([Carroll and Kimball \(1996\)](#)). The empirical literature has already documented some differences in the marginal propensity to consume out of wealth (MPC) across households, mostly focusing on the impact of housing prices on consumption.^{1,2} Here, we build an original micro dataset and use the whole wealth distribution to provide a more systematic investigation on how heterogeneity in the *total* wealth composition (housing assets, financial wealth and debt) affects the MPC out of wealth.

One crucial difficulty is the lack of suitable data providing all together reliable information on the consumption³ and wealth distributions across a representative sample of households (including information about their debt), and that additionally allows to identify wealth shocks ([Cooper and Dynan \(2016\)](#)). Only few papers estimate the marginal propensity to consume out of wealth accounting both for housing and financial wealth at the household level (e.g. [Paiella \(2007\)](#) and [Paiella and Pistaferri \(2017\)](#) for Italy, [Angrisani et al. \(2019\)](#) for the U.S.). These papers mostly focus on mean es-

¹Most of the papers estimating the effect of asset prices on consumption based on microdata focus on housing assets and use consumption surveys merged with local housing prices (e.g. [Attanasio et al. \(2009\)](#), [Campbell and Cocco \(2007\)](#), [Disney et al. \(2010\)](#), [Aladangady \(2017\)](#)). Using geographical variations, [Mian et al. \(2013\)](#) study the heterogeneity across areas according to average income and leverage ratio. Other approaches based on micro-data include reported changes in spending and reported housing wealth losses and gains ([Christelis et al. \(2021\)](#)), administrative data about wealth and income that are also used to impute consumption ([Browning et al. \(2013\)](#) and [Di Maggio et al. \(2018\)](#)), survey questions about intended spending under various scenarios ([Fuster et al. \(2018\)](#)). There are also papers which focus on some part of the population (aged 50 or older) due to the data they use ([Christelis et al. \(2015\)](#), [Angrisani et al. \(2019\)](#)).

²There is an extensive literature estimating the wealth effect on consumption based on aggregate data (see among others, [Aron et al. \(2012\)](#), [Case et al. \(2005\)](#), [Carroll et al. \(2011\)](#), [Davis and Palumbo \(2001\)](#), [Guerrieri and Mendicino \(2018\)](#), [Slacalek \(2009\)](#) as well as [Paiella \(2009\)](#) or [Cooper and Dynan \(2016\)](#), for detailed literature surveys). The marginal propensity to consume out wealth is estimated on average around 5 cents for one dollar of additional wealth. Anglo-Saxon countries tend to exhibit larger MPC than Continental Europe. There is also a longstanding interest in the heterogeneous effect of income shocks on consumption, see for instance the surveys by [Jappelli and Pistaferri \(2010\)](#) or empirical analysis by [Fagereng et al. \(2021\)](#).

³See [Browning et al. \(2014\)](#) on the measurement of household consumption expenditures based on micro-data.

timates without providing information regarding the heterogeneity of the MPC across the wealth distribution or accounting for household debt. This paper aims at filling this gap building and exploiting a unique household-level panel data set.

We address the following question: How does the marginal propensity to consume out of wealth vary across households according to the level and composition of their wealth? Since there is a huge heterogeneity in wealth composition within and across countries, it is likely to lead to significant differences in the MPC.⁴ We additionally provide an original analysis of whether housing wealth and mortgages explain part of the heterogeneity in the MPC out of total wealth, as both housing assets and mortgages account for a crucial part of the wealth of many households. In doing so, we investigate the role that the collateral channel may play in explaining the heterogeneity of MPC across countries.

To answer this question, we build a unique panel dataset combining individual data from wealth surveys (Household Finance and Consumption Survey, ECB), and consumption surveys (Household Budget Surveys, National Statistical Institutes). Our main data source is the Eurosystem Household Finance and Consumption Survey which is a harmonized wealth survey for Euro area countries with a panel component for some of them.⁵ It also includes some questions about consumption. We use the two first waves of this survey which provide household-level changes in wealth between 2010 and 2014. In order to measure total non-durable consumption, we perform statistical matching with the Household Budget Surveys (Skinner (1987), Browning et al. (2003) and Browning et al. (2014)). In the end, this dataset allows us to study the heterogeneity in the MPC within five European countries⁶ based on a harmonized approach in terms of both data and empirical design.⁷

⁴See Arrondel et al. (2016) for stylized facts on household wealth heterogeneity in Euro area countries.

⁵The construction of our dataset is closely related to Arrondel et al. (2019) who combined the French wealth survey with the Household Budget survey. A major difference is first that we do not restrict our analysis to one sole country and second, more importantly, that they rely only on cross-sectional variations to estimate the MPC while we are able to use instrumented wealth shocks based on our panel dataset.

⁶These countries are: Belgium, Cyprus, Germany, Spain and Italy. While the country selection is driven by data availability (countries for which we have panel data on wealth at the household level), nevertheless we cover a wide cross-country heterogeneity in terms of country size and economic situations in the Euro area. Indeed, the GDP of these countries amounts to 60% of the Euro area GDP in 2014. Note that France (about 20% of Euro area GDP) is not included in this analysis, because there is no panel component for France in the main data source we use (the Wave 1 and Wave 2 of the Household Finance and Consumption Survey).

⁷The existing micro-data based papers use country-specific data sources on consumption, wealth or on asset prices which may differ in various dimensions making cross-country comparisons difficult. These

Based on this unique household-level information, this paper estimates country-specific marginal propensity to consume out of wealth accounting for differences in the level and composition of wealth between households. We tackle endogeneity issues related to potential omitted variables and to active saving/dissaving behaviors by using instrumented household-level panel regressions: in addition to individual specific effects and to a large number of control variables (including subjective expectations about future income) allowing us to account for individual heterogeneity, we consider an instrumental variable approach for wealth shocks. Our instrument is based on lagged changes in asset prices (i.e. observed before 2010) and on asset composition at the household level. Such an approach allows us to provide country-specific MPC estimates and analyze their heterogeneity along the wealth distribution as well as depending on asset composition.

Our main results are as follows. First, the marginal propensity to consume out of wealth is higher for low-wealth households than for the wealthy ones. Such a pattern is observed along the net wealth distribution for all countries. In particular, for households in the top ten percent of the net wealth distribution, the estimated MPC is only one cent (in Belgium) or less (in other countries), meaning that for the 10% richest households, one additional euro of wealth is associated with 1 cent (or less) of additional annual consumption. Second, decomposing total wealth into housing and financial assets, we find that the MPC out of housing assets is statistically significant and decreasing along the wealth distribution in all countries. Third, our results suggest that the collateral channel is a significant determinant of the cross-country differences in MPC. Indeed, we show a significant positive correlation between the marginal propensity to consume out of wealth and the use of mortgages in a country. This source of cross-country differences has not been investigated before. This is suggestive of the role of housing and credit market as a source of cross-country heterogeneity in MPC: increases in housing prices, everything else being equal, may relax financing constraints for households that have contracted mortgages.

A benefit for macro-economists from our results is that they can use these micro-based estimates as inputs when assessing the aggregate implications of heterogeneous households' behaviours in more general frameworks (see [Slacalek et al. \(2020\)](#) or [Mian](#)

differences include time periods, consumption measure or questions about hypothetical gains or losses, panel versus cross-section data, household level versus local variations in wealth or in asset prices, type of the shocks, etc.

et al. (2021) for a direct use of our estimates). Another benefit of our work is related to methodological issues. Our results strongly advocate for using panel data with instrumented wealth shocks rather than cross-sectional data, otherwise a downward bias is observed in the panel OLS estimates for all countries. Correcting for this bias, our country-specific average estimates are in line with macro-based estimates (Guerrieri and Mendicino (2018), Slacalek (2009)). The MPC out of wealth levels at 1.5 cents in Italy, meaning that one additional euro of wealth is associated with 1.5 cents of additional annual consumption. The MPC is about 1.2 cents in Belgium and Spain, while it is less than one cent in Germany and in Cyprus.

We also find two additional results. First, we are the first to investigate whether there are differences in MPCs depending on the consumption expenditure category at the household level. We find higher MPC for less affluent households for necessities, consistently with the predictions from the Engel curve. In contrast, the wealth effect on “education” or on “restaurants and hotels” is not statistically significant.⁸ Second, based on our main results, we investigate how heterogeneous MPC and wealth inequality can affect consumption inequality. We conduct a simple simulation exercise to assess the effect on consumption of an exogenous shock on assets values.⁹ We find that housing prices shock decreases consumption inequality while financial wealth shocks have a limited effect on consumption inequality.

Our paper builds on the empirical literature which estimates the marginal propensity to consume out of wealth at the household level, and it can be related to recent papers also based on household panel data (Angrisani et al. (2019) and Paiella and Pistaferri (2017)). While each of these paper focuses on one country (the U.S. and Italy), one of our contribution is to provide MPC micro-based estimates following a harmonized approach both in terms of data and empirical approach for five countries. Our second contribution is to account for several dimensions of household wealth heterogeneity using country-representative data: we account both for housing and financial assets, and investigate the MPC heterogeneity across the net wealth distribution, i.e. accounting for household debt. Angrisani et al. (2019) focus on changes in housing wealth for a sample of American adults over the age of 50 and find the marginal propensity to consume out of housing wealth change to be six cents per dollar. Paiella

⁸With the sole exception of Spain for “restaurants and hotels”.

⁹Let us emphasize that in this simple exercise we do not account for changes in household behaviors, or for general equilibrium effects.

and Pistaferri (2017) used two waves of the Bank of Italy survey about Income and Wealth and find that the wealth effect is about 3 cents per (unexpected) euro increase in wealth in Italy. They obtained similar result regarding expected wealth changes. We also find significant wealth effect in Italy (about 1.5 cents at the mean) coming both from housing and financial assets.¹⁰ The financial wealth effect dominates the housing wealth effect in our sample. Finally, our paper also provides new insights on MPC heterogeneity using a different approach than the one used by Christelis et al. (2021). We rely on observed changes in household wealth and use an instrumental variable approach to account for endogeneity issues rather than using direct survey questions where respondents are asked to what extent they would change their consumption in response to an unexpected change in the value of their house.

Finally, we also contribute to the empirical literature showing the role of debt and housing assets in explaining the heterogeneity in household behavior and its consequences for aggregate consumption (e.g. Mian et al. (2013), Misra and Surico (2014), Cloyne et al. (2020), Cumming and Hubert (2021)). Our contribution to this strand of the literature is twofold. First, using country-representative household-level information, we find heterogeneous marginal propensity to consume out of wealth along the net wealth distribution, i.e. accounting for household debt. Households in the bottom of the net wealth distribution who are more likely to be liquidity constrained exhibit higher MPC, which means that their consumption is more affected by wealth shocks than wealthier and less constrained people. Second, our results suggest that institutional differences in the mortgage market may drive differences in the consumption behaviour.

The rest of the paper is organised as follows. Section 2 presents the data. We next present our empirical strategy in Section 3. In Section 4, we estimate heterogeneous marginal propensity to consume out of wealth across the net wealth distribution. The role of housing wealth and the collateral channel is considered in Section 5. In Section 6, we investigate how the heterogeneity in MPC combined with wealth inequality can affect consumption inequality. Section 7 concludes.

¹⁰Note that the empirical approaches in both papers are closely related. However there are significant differences. Our paper uses the same data source to measure wealth changes at the household level for Italy on a more recent period (between 2010 and 2014 while they use 2008-2010). Regarding consumption, we improve the measure they use (a summary question asked in the wealth survey) by imputing it based on the consumption distribution measured in the Household Budget survey. Finally, they control for household expectations about asset returns, which we do not do because such information is not available for all the other countries we are looking at. Nevertheless, this turns out to make no difference since the results they present are the same for expected and non-expected wealth shocks.

2 Wealth and consumption at the household level

2.1 Data sources

To estimate a MPC, a household-level dataset including reliable information on consumption and wealth, and allowing additionally to identify wealth shocks is required. It turned out to be a crucial challenge in the literature ([Cooper and Dynan \(2016\)](#)). We combine here two main types of surveys, namely wealth and consumption surveys that we complement with a survey on income and living conditions. Our main data source is the Eurosystem Household Finance and Consumption Survey (HFCS) which is a harmonized wealth survey for Euro area countries with a panel component for some of them. To measure total non-durable consumption, we perform statistical matching with the Household Budget Surveys (HBS). Additionally, we also perform the same kind of statistical matching with the Survey on Income and Living Conditions (SILC) in order to measure disposable income.

Wealth survey

Our main data source, the Household Finance and Consumption Survey (HFCS, ECB) is designed to measure the distribution and composition of household wealth in Euro area countries (see [HFCN \(2016b\)](#)). The HFCS provides detailed household-level information on wealth (assets and debt), on the household composition and on demographics. It also covers gross income and includes some questions on consumption (food at home, food outside home). The survey methodology ensures country-representativeness and cross-country comparability. We take advantage of the fact that a panel component is available for some countries (Belgium, Cyprus, Germany, Italy and Spain).

Consumption measure

The measure of consumption is a crucial issue. The HFCS only collects information on some item expenditures but does not provide a measure of total non-durable consumption. The best available household-level information about consumption distribution is provided by the Household Budget Survey (HBS). It collects item expenditures by asking households to fill in a highly-detailed diary, thereby providing precise and detailed information on households' consumption behaviors. Unfortunately, the HBS cannot be directly linked with the HFCS as they do not survey the same sample of households. Nevertheless, we take advantage of the information on consumption collected in the HFCS to construct an estimation of non-durable consumption based on the HBS:

this procedure can be seen either as imputation or statistical matching. Our matching strategy relies both on a regression and on a rank hot deck imputation to better address potential measurement errors. First, we follow [Skinner \(1987\)](#) and [Browning et al. \(2003\)](#) to estimate non-durable consumption: we estimate on HBS data¹¹ an auxiliary equation linking non-durable consumption with covariates such as food at home, food outside home and other controls that are both available in the HBS and the HFCS.¹² Then the resulting regression coefficients estimates are used to predict the non-durable consumption of the HFCS households (see [Browning et al. \(2014\)](#) for a justification of this method). Second, we use this consumption estimate as an instrumental variable to implement statistical matching between the HFCS and HBS data. Following [D’Orazio et al. \(2006\)](#), respondents in the HFCS are matched with respondents in the HBS according to the rank of their estimated consumption (rank hot deck imputation).¹³ In other words, we relax the assumption that consumption for non-durables is properly measured, while preserving the consumption ranking across households. We stratify our rank hot deck by tenure status and household composition.¹⁴ This procedure allows to better reproduce the marginal distribution of consumption for non-durable goods and services compared to the Skinner’s approach that is also commonly used (See [Table A3](#) and [Figure A1](#) in [Appendix A](#)).

This rank hot deck imputation based on HBS data also allows us to break down consumption into detailed items of the Classification of Individual Consumption by Purpose (COICOP).

Disposable income

The HFCS provides only gross income, while accounting for taxes and transfers may be a crucial issue for cross-country analysis. To tackle down this issue, we use the Survey on Income and Living Conditions (SILC-Eurostat) which is specifically designed to measure income components at the household level in the European Union. We then apply a rank hot deck imputation to impute disposable income from the SILC to HFCS households. We use gross income which is available in both sources to rank

¹¹The HBS vintages we use are detailed in [Table A4](#) in [Appendix A](#)

¹²[Browning et al. \(2003\)](#) explain how only few recall questions on consumption in other purpose survey can be used to impute total consumption using a consumption survey. Moreover, based on Italian data [Battistin et al. \(2003\)](#) show that food expenditure data are of comparable quality and informational content across the two surveys (SHIW and HBS), once heaping, rounding and time averaging are properly accounted for. This method is similar to a two-sample-two-stage least squares approach.

¹³We use the function implemented in the R package StatMatch ([D’Orazio \(2017\)](#)).

¹⁴More precisely, we allocate non-durable consumption measured in the HBS to HFCS households based on their rank in the non-durable consumption distribution (and accounting for tenure status and household composition).

households according to their gross income. Assuming that the household rank is the same in the gross and in the disposable income distributions, we perform a rank hot deck imputation stratified by household composition and tenure status, the same way we do it for consumption.¹⁵

2.2 Sample selection

We select the countries for which a panel component is available in the two first waves of the HFCS and for which all necessary information is available (Belgium, Cyprus, Germany, Spain, and Italy). Wave 1 refers to the year 2010 and Wave 2 to the year 2014.¹⁶

We select households where the reference person is aged between 25 and 75 years old in Wave 1 and perform some usual cleaning on extreme values (see the detail in the Data Appendix). Our estimation sample includes from 812 households in Cyprus to 3,023 households in Spain. The comparison between the descriptive statistics for the main variables based on the initial sample and the ones obtained after cleaning do not reveal significant differences (Table A2 in Appendix A).

2.3 Heterogeneity in wealth and consumption

Descriptive statistics from our sample are in line with well-known facts about the distributions of consumption, wealth and income. First, there is substantial cross-country heterogeneity as regards net wealth, income and consumption distributions. Wealth is far more unequally distributed than income (e.g. Davies and Shorrocks (1999)), while the heterogeneity in non-durable consumption is much more limited within countries (See Figure C2 in Appendix C).¹⁷

Second, as illustrated by Figure 1, there is a huge heterogeneity within and across countries regarding net wealth composition. In particular, the share of housing assets¹⁸ in total assets varies a great deal across countries: on average housing wealth amounts to 77% of the total assets of Spanish households while it accounts only for only 42% of German households' total assets. There are however some common pat-

¹⁵We also check the sensitivity of our estimations to the use of gross income (from the HFCS) versus disposable income (resulting from the rank hot deck imputation using SILC). Our results are not impacted in terms of cross-country comparisons (Table B12 in Appendix B).

¹⁶The few exceptions to this rule are details in Table A1 in the Data Appendix.

¹⁷See for instance Brindusa et al. (2018) for Spain.

¹⁸Housing assets refers to household's main residence and other real estate properties.

terms across countries.¹⁹ In bottom deciles, households' assets are mostly financial assets (essentially sight accounts and saving accounts) and other assets (durables), and debt amounts to a large share of total assets. The share of housing assets in total assets tends to increase along the wealth distribution. At the very top, wealth composition is much more diversified.²⁰

At the macro level, there was a huge cross-country heterogeneity in asset price developments over our sample period 2010-2014. Three of the countries we consider (Cyprus, Spain and Italy) faced large drops in asset prices, notably in house prices, domestic shares, and government bonds (for Spain). The two other countries (Belgium and Germany) saw all asset prices increase over the period (Table 1). Cyprus, Spain and Italy are also countries where consumption dropped, while it increased moderately in Belgium and Germany. These distinct patterns in aggregate consumption may partly reflect the heterogeneity of the effect of wealth shocks on consumption. This heterogeneity may be due to the country-specific effects of wealth shocks on consumption, notably since these countries differ in wealth inequality and household asset composition. At the micro level, we observe in all countries of our sample both households for whom net wealth increased between Wave 1 and Wave 2 (39% in Italy to 57% in Germany) and other ones for whom net wealth decreased (Figure 2). Such heterogeneity may partly reflect saving decisions over the period. When focusing only on the value of total assets (gross wealth), we also observe gains and losses across households (Figure C2 in Appendix C).

Overall, these differences in wealth levels and composition combined with the heterogeneity in wealth shocks are likely to lead to differences in the marginal propensity to consume out of wealth within (and across) countries.

¹⁹See Figure C1 in Appendix C for the other countries (Belgium, Cyprus and Italy).

²⁰The financial assets at the top of the distribution may be underestimated in this type of survey because of off shore wealth or of a covering of the very top of the distribution that, despite the oversampling methods, could not be precise enough (see Bricker et al. (2016), Vermeulen (2018) or Garbinti et al. (2020) for a discussion and other references).

Table 1: Asset prices and consumption developments (%) between Wave 1 and Wave 2 at the country level

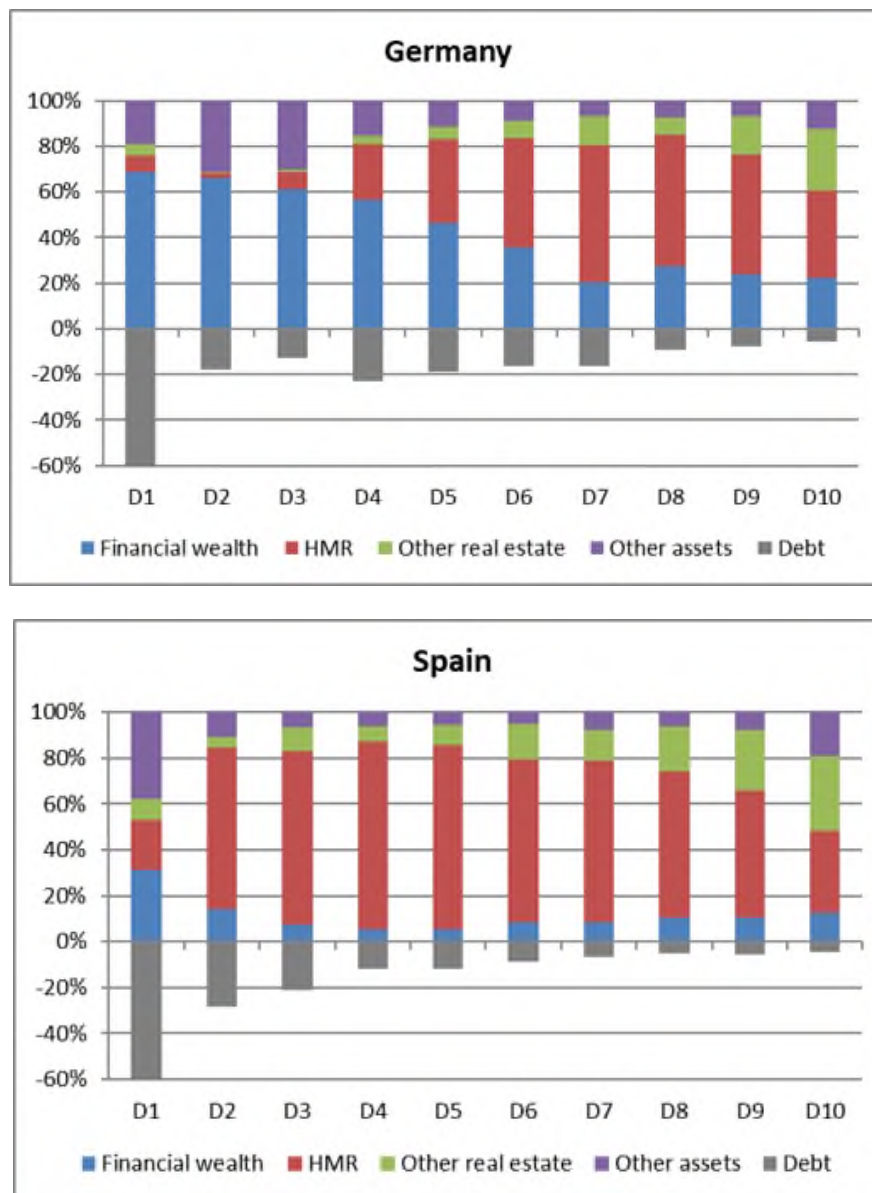
	Belgium	Cyprus	Germany	Spain	Italy
Period covered by the survey	2010-2014	2010-2014	2011-2014	2009-2012	2010-2014
Aggregate asset prices					
House prices	8.1	-21.9	9.4	-21.7	-12.0
Domestic shares	21.8	-87.4	44.7	-23.7	-3.2
Government bonds	10.6	6.2	5.7	-8.3	9.1
Interest rates on deposits	11.7	15.6	5.6	8.0	10.5
Financial corporation bonds	7.9	7.9	10.2	5.9	7.9
Non-financial corporation bonds	4.2	4.2	6.9	5.8	4.2
Foreign companies	38.8	38.8	35.5	40.2	38.8
Aggregate households' consumption	1.0	-8.7	1.6	-6.3	-6.7

Sources:

House prices: country specific house price index (Eurostat). Domestic shares: BEL-20 (Belgium), FTSE Cyprus SE20, DAX 30 (Germany), IBEX 35 (Spain), FTSE MIB Index (Italy). Government bonds: country specific FTSE Global government bonds (all maturities), not available for Cyprus (we then consider the Eurozone index). Interest rates on deposits: Bank interest rates on deposits from households (country specific, source: ECB). Financial corporation bonds: FTSE Euro corporate bonds index (non-financials), financial corporation bonds: FTSE euro corporate bonds (financials). Foreign companies: FTSE all world equities index.

Households' consumption: final household consumption expenditure. Growth rate adjusted by inflation (IPCH). Source: Eurostat

Figure 1: Heterogeneity in assets composition and in debt by net wealth decile (% of total assets) – Germany and Spain



The vertical axis is limited to - 60%. The percentage of debt in total assets for the first net wealth decile (D1) is 44.7% in Germany and 12.9% in Spain. Figures based on the Wave 1 of the HFCS.

HMR: household's main residence

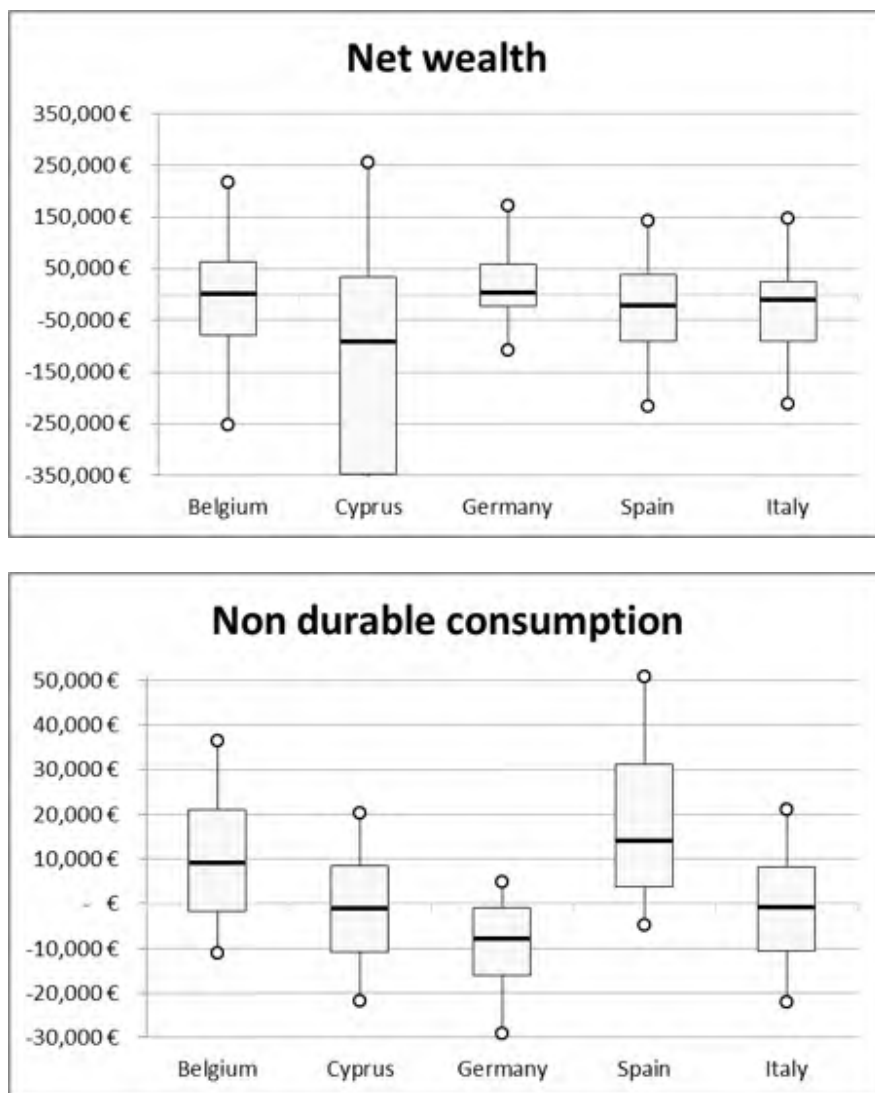
Other real estate: includes all other real estate properties

Financial wealth: all financial assets owned by the household (sight accounts, saving accounts, mutual funds, bonds, non-self-employment private business, shares, managed accounts, private lending, voluntary pension plans or whole life insurance contracts, and 'other' financial assets).

Other assets: household's vehicles, valuables, and the value of self-employment businesses.

Debt: all types of debts (mortgages and non-collateralized debt).

Figure 2: Distribution of the changes in net wealth and non-durable consumption between Wave 1 and Wave 2 (median, Q1, Q3, P10, P90)



Distributions of the differences between the value of net wealth (non-durable consumption or disposable income) in Wave 2 and in Wave 1 at the household level. Values are adjusted for inflation between Wave 1 and Wave 2. Weighted statics based on the estimation sample.

3 Empirical strategy

Our estimation strategy is based on an instrumented panel regression approach. Concretely, we use i) a first-difference estimator, and ii) an instrument based on lagged price changes of each asset in each household’s portfolio. We explain here the different steps of our approach.

First, we build on the reduced-form equation estimated on household-level data in the literature (see [Paiella and Pistaferri \(2017\)](#), [Paiella \(2007\)](#) or [Arrondel et al. \(2019\)](#)).²¹ Based on micro-data, wealth effects on consumption are typically estimated by regressing changes in consumption on changes in wealth ([Equation 1](#)):

$$\Delta \frac{C_h}{Y_h} = \beta_1 \Delta \frac{W_h}{Y_h} + \gamma Z_h + \vartheta_h \quad (1)$$

where Δ is the first-difference operator, i.e. in our set up the difference between Wave 2 and Wave 1, C_h , Y_h and W_h stand respectively for consumption, disposable income and wealth for a given household h . β_1 denotes the marginal propensity to consume out of wealth (also called “wealth effect”), Z_h is a list of control variables and ϑ_h is an error term. We are thus able to control for individual unobserved time-invariant heterogeneity that might vary systematically across households and contaminate the estimation of the relationship between consumption and wealth ([Paiella \(2009\)](#), [Disney et al. \(2010\)](#), [Angrisani et al. \(2019\)](#)). Following [Paiella and Pistaferri \(2017\)](#), we add a list of variables Z_h to control for age, permanent income and preferences at the beginning of the period.²² More precisely, our list of control variables Z_h includes: age and its square, the employment status of the reference person (unemployed, retired), the household size (number of adults, number of children) and whether the household considers his income over the last twelve months as unusually high or low compared to a “normal” year (cf. [Carroll \(2000\)](#)). It also includes the reference person’s subjective expectations of the change in total household income. Indeed, the empirical literature has pointed out that individual income expectations may affect changes in both wealth and consumption (since they indicate changes in future income) which may in turn bias MPC estimates ([Dynan and Maki \(2001\)](#), [Disney et al. \(2010\)](#), [Angrisani et al. \(2019\)](#)). Based on our data, we are able to consider dummy variables reflecting household expectation about future total household income over the next year (i.e. household total

²¹See also [Poterba \(2000\)](#), [Juster et al. \(2006\)](#), [Case et al. \(2005\)](#), and [Christelis et al. \(2015\)](#) for other references that also analyze the wealth effects on consumption based on microdata using such specification.

²²This boils down to allow for a temporal trend $Z_{h,t}$ with t being the year.

income to go more or less than prices), as additional control variables.

Second, we take into account additional concerns regarding endogeneity issues by instrumenting the change in wealth to income ratio $\Delta \frac{W_h}{Y_h}$ (in Equation 1) with $\frac{\Delta CW_h}{Y_{h,t}}$ where ΔCW_h stands for a *counterfactual* change in wealth that we detail below.

Indeed, a first issue with the reduced-form equation presented in Equation 1 comes from the fact that, even after controlling for individual specific effect and for a large number of additional control variables, there may be a potential spurious correlation between wealth and consumption. Changes in wealth may obviously result from individuals' saving behavior. Since changes in saving behaviors (*active saving*) affect both wealth and consumption at the same time, it rises the concern of a simultaneity bias. To tackle down this endogeneity issue and rule out changes due to behavioral responses to changes in prices (e.g. changes in portfolio composition), we use an instrumental variable approach based on variations in asset prices. The intuition here is to rule out the effect of active saving to only consider exogenous variation of wealth that may be convincingly considered as exogenous to the households' behavior. One solution (used in Banks et al. (2013) and Bottazzi et al. (2017)) is to compute a counterfactual wealth by applying the asset price changes between the 2 periods to the initial wealth. However the changes in asset prices between the two periods may be endogenous to other factors that may affect both changes in wealth and consumption between the 2 waves observed.²³

To account for this potential source of bias, rather than the changes in assets price between the 2 waves, we compute a "lagged instrument" using lags of the changes in asset prices that are observed in each country *before* the first wave of the survey, i.e. between t-2 and t-1.²⁴ Such an approach, using past value as instrument for household wealth to estimate the MPC, has proven to lead to convincing results (Carroll et al. (2011)).²⁵

²³Such factors could be expectations about economic prospects, demographic trends, financial liberalization, etc., and have been discussed e.g. in Attanasio et al. (2009), Campbell and Cocco (2007) or Aladangady (2017).

²⁴Table A8 confirms that, for each asset, these changes are not perfectly correlated with the changes between waves 1 and 2.

²⁵Note that a large strand of the literature about housing wealth effects uses the heterogeneity in local changes in housing prices to identify the causal effect of house price fluctuations on consumer spending (e.g. Aladangady (2017), Angrisani et al. (2019)). In these papers, heterogeneity in local housing supply is used to control for such common factors and identify the causal effect of house prices on consumer spending. We do not implement such an instrumental variable approach here for two reasons. First, we are not only interested in housing prices but also in financial assets for which there is no obvious similar strategy. Second, due to data limitation, we are not able to rely on regional variations within each country using a harmonized approach for all considered countries.

In practice, our instrumental variable strategy is based on the computation of a *counterfactual wealth change*. For each asset A^i , we compute a *counterfactual asset change* as

$$(\Delta p_{t-2,t-1}^{A^i} - 1) \times A_{h,t}^i \quad (2)$$

where i stands for the asset category, h for the household.

$\Delta p_{t-2,t-1}^{A^i}$ is the change in the price of asset A^i between $t - 2$ and $t - 1$ (with t being the year of Wave 1, see [Appendix A, Table A7](#) for the periods used in the computations). We take into account the largest possible heterogeneity in asset composition by breaking down household total assets into 14 categories of assets. We match these assets with the corresponding asset prices. In a few cases, it requires to use the same price for different wealth components.²⁶ For this reason, the initial 14 assets categories are reduced to a smaller set of 8 categories with distinct price indexes which we use for our baseline estimates. Nevertheless for all our tables of results, we also present the results obtained with the 14 initial assets categories, as sensitivity tests, in the Appendix.

We then simply define the *counterfactual change in wealth* as the sum of the counterfactual changes in assets:

$$\Delta CW_h = \sum_{i \in I_h} (\Delta p_{t-2,t-1}^{A^i} - 1) \times A_{h,t}^i \quad (3)$$

where I_h stands for the set of assets held by the household h .

Finally, we instrument $\Delta \frac{W_h}{Y_h}$ with $\frac{\Delta CW_h}{Y_{h,t}}$ in [Equation 1](#). Note that another choice would have been to rather consider the difference $\frac{CW_h}{Y_{h,wave 2}} - \frac{W_{h,y}}{Y_{h,wave 1}}$ as an instrument. However, such a choice would have led to have $Y_{h,wave 2}$ in the instrument which includes capital income (from wealth measured in Wave 2) and would thus be endogenous to the wealth change observed between the two waves. Such a strategy, using past values as instruments for household wealth to estimate the MPC, has proven successful to led to convincing results ([Carroll et al. \(2011\)](#)).

²⁶See [Appendix A, Table A5](#)

4 Heterogenous MPC across the net wealth distribution

In this Section, we estimate the marginal propensity to consume out of wealth accounting for heterogeneity in wealth level. We first provide average estimates of the MPC based on our data and then analyze heterogeneity along the wealth distribution.

4.1 Baseline estimates

Our baseline results are displayed in [Table 2](#). Column 1 shows OLS estimates obtained from [Equation 1](#). IV panel estimates based on our instrumental strategy are in column 2. We also report cross-sectional OLS estimates (i.e. ignoring the panel dimension) for Wave 1 and Wave 2 in the last two columns.²⁷

We find statistically significant estimates for the marginal propensity to consume out of wealth. The MPC out of wealth levels at 1.5 cents in Italy (column 2), meaning that one additional euro of wealth is associated with 1.5 cents of additional annual consumption. The MPC is about 1.2 cents in Belgium and Spain, while it is smaller in Germany and in Cyprus (less than one cent). Our baseline IV-estimates (column 2) for the average MPC turn out to be higher than the ones obtained using only cross-sectional variations and are consistent with the macro-based evidence ([Guerrieri and Mendicino \(2018\)](#), [Slacalek \(2009\)](#)).²⁸

Regarding the quality of the instrument, the F-statistic from the first stage are always above the standard threshold (of 10)²⁹, and indicate that there is no weak instrument issue (see also the detailed results from the first-stage regression, [Appendix B, Table B1](#)). These results are obtained considering the same set of instruments for all

²⁷They are based on a specification where the cross-sectional ratio of consumption to income is explained by the cross-sectional ratio of wealth to income.

²⁸We check the sensitivity of our estimations to the use of gross income (from the HFCS) versus disposable income (resulting from the rank hot deck imputation using SILC). Overall our results are not impacted in terms of cross-country comparisons ([Table B13 in Appendix B](#)). Based on gross income, the MPC estimates tend however to be larger at the mean for 3 of the 5 countries and identical for Spain and Italy. When considering heterogeneous MPC across the net wealth distribution, there is no clear pattern as regards the percentiles which may explained such difference: in some countries, the MPC is higher in given wealth percentiles with gross income than with disposable income, and the other way around in other countries. Clearly, these differences rely on the link between gross and disposable income which may call for an analysis of the redistributive system in each country. Such an analysis is far beyond the scope of this paper.

²⁹With the sole exception of Spain (col. 3), where it is nevertheless close to 10.

Table 2: Baseline results: Marginal propensity to consume out of wealth at the mean – OLS, IV panel and cross-section estimates

	Panel		Cross-section		
	(1)	(3)	(3)	(4)	
	Baseline model				
	OLS	IV - 8 instr.	1st wave	2nd wave	Number of obs.
Belgium					
MPC	0.01***	0.012***	0.003***	0.004***	831
Std. Error	0.002	0.003	0.001	0.001	
Fstat		<i>34.0</i>			
Cyprus					
MPC	0.002**	0.002***	0	0.001	812
Std. Error	0.001	0.001	0.000	0.000	
Fstat		<i>79.6</i>			
Germany					
MPC	0.004***	0.004**	0	0	1776
Std. Error	0.001	0.002	0.001	0.001	
Fstat		<i>11.2</i>			
Spain					
MPC	0.004**	0.013***	0.003***	0.005***	3023
Std. Error	0.002	0.003	0.000	0.001	
Fstat		<i>5.6</i>			
Italy					
MPC	0.022***	0.015**	0.009***	0.008***	2219
Std. Error	0.003	0.006	0.001	0.001	
Fstat		<i>22.8</i>			

Notes: Control variables for panel regressions (columns 1 to 3): age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), household composition (number of adults and number of children) and questions on income (is income in the reference period normal/above normal/below normal, is income in the next year expected to rise below/above price). The control variables in the panel regressions are measured in Wave 1. Control variables for the cross-section regressions (columns 4 and 5): age (6 categories), situation on the labour market (employed, self-employed, retired, unemployed, other), education, household composition (number of adults and number of children) and questions on income.

Confidence intervals robust to weak instruments following [Andrews \(2018\)](#) are available in [Table B2](#).

countries.³⁰ To account for the case where our estimate may be subject of weak instru-

³⁰We also test for a alternative strategy considering a reduced number of instruments. Our results are not dramatically affected when considering country-specific selections of the instruments (i.e. when

ment issues here, as well as in all subsequent regression tables, we compute confidence intervals that are robust to weak instruments. These robust confidence intervals show that the average MPC is statistically significant (detailed results available in [Table B2](#) in Appendix).³¹

This instrumental strategy turns out to be crucial; otherwise we observe a downward bias in the OLS estimates for all countries ([Table 2](#), column 1). In order to compare our results with what would have been obtained in the absence of panel data, we also report OLS estimates based on cross-sectional regressions (rather than on our panel data) for Wave 1 and Wave 2 in [Table 2](#) (columns 3 and 4). These cross-sectional estimates are stable across waves and statistically significant for Belgium, Spain and Italy. They are however far much lower than the ones obtained with our IV panel regressions or than the macro-based ones obtained in the literature. Our results show the interest of using panel data with instrumented wealth shocks rather than cross-sectional data.

4.2 Heterogeneity across the net wealth distribution

From a theoretical point of view, uncertainty about wealth as well as liquidity constraints may lead the marginal propensity to consume out of wealth to decline along the wealth distribution ([Carroll and Kimball \(1996\)](#), [Carroll and Kimball \(2006\)](#)).³² Our contribution here is to investigate the heterogeneity in consumption reaction to asset prices all over the net wealth distribution. In order to investigate such heterogeneity across the net wealth distribution, we consider four wealth groups based on the net wealth distribution observed in Wave 1 within each country (below median net wealth, 50th to 69th percentiles, 70th to 89th percentiles and the top ten percentiles). For each country and wealth group, we estimate separate regressions. The results of the IV regressions are presented in [Table 3](#).³³

As it turns out, the marginal propensity to consume out of wealth is higher for

keeping the instrument variables in the first stage only when the p-value is below 10%, see [Table B5.a](#))

³¹These robust confidence intervals are based on [Andrews \(2018\)](#). We compute them using the Stata package *twostepweakiv* ([Sun \(2018\)](#)). More details are provided in each table notes.

³²Age is another source of MPC heterogeneity pointed out in structural life-cycle models (see [Carroll et al. \(2017\)](#)). We find some evidence of age dependence: in Germany and Spain, the marginal propensity to consume out of wealth is significantly higher for younger people. Such a result is in line with the findings of [Fagereng et al. \(2021\)](#) on Norwegian data and with life-cycle models considering the existence of borrowing constraints and realistic earning profiles. For the other countries, we do not find significant differences across ages (see [Table B13](#) in [Appendix B](#)).

³³See [Table B6](#) ([Appendix B](#)) for the OLS estimates.

Table 3: Marginal propensity to consume out of wealth across the net wealth distribution – IV panel estimates

Benchmark:		Belgium	Cyprus	Germany	Spain	Italy
8 IV						
p0-p49	MPC	0.066***	-0.003	0.013	0.011	0.015
	Std. Err.	(0.023)	(0.006)	(0.018)	(0.011)	(0.012)
	<i>Fstat</i>	3.287	6.705	6.456	8.524	10.017
	Nb obs	330	324	596	1031	949
p50-p69	MPC	0.085***	0.034***	0.004	0.034***	0.035**
	Std. Err.	(0.016)	(0.007)	(0.009)	(0.008)	(0.014)
	<i>Fstat</i>	9.888	5.149	3.119	9.630	13.441
	Nb obs	176	171	311	496	457
p70-p89	MPC	0.023***	0.002	0.039***	0.013*	0.02
	Std. Err.	(0.007)	(0.004)	(0.007)	(0.008)	(0.014)
	<i>Fstat</i>	14.548	7.068	8.224	17.656	16.126
	Nb obs	211	186	489	642	513
p90-p100	MPC	0.01***	0.002***	0.004***	0.007***	0.014
	Std. Err.	(0.003)	(0.001)	(0.001)	(0.002)	(0.009)
	<i>Fstat</i>	21.641	9.621	21.124	10.055	9.917
	Nb obs	114	131	380	854	300
Other ctrls		yes	yes	yes	yes	yes
Nb households		831	812	1776	3023	2219

Control variables for the panel regressions: age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), household composition (number of adults and number of children) and questions on income (is income in the reference period normal/above normal/below normal, is income in the next year expected to rise below/above price). The controls in the panel regression are measured in Wave 1. Confidence intervals robust to weak instruments following Andrews (2018) are available in Table B3.

low-wealth people than for the wealthy ones. Such a pattern is observed for all countries, even if for some low-wealth groups the MPC are imprecisely estimated.³⁴ For instance, in Belgium the marginal propensity to consume out of wealth decreases from

³⁴In those cases, the estimates are found not statistically significant. This can be due to the structure of the data. To ensure a better precision at the top of the distribution, the wealth surveys are generally oversampled at the top. A consequence of this oversampling at the top is that the very bottom of the wealth distribution may be imprecisely estimated.

6.6 cents below median wealth to one cent in the top ten wealth group.³⁵ Overall, for households belonging to the P50-P69 net wealth percentiles, the marginal propensity to consume out of wealth is estimated around 8.5 cents in Belgium and around 3.4 cents for the other countries (except for Germany where the coefficient turns out to be not statistically significant). For households belonging to the top ten percentile of the net wealth distribution, it is much lower: 1 cent in Belgium and even less in the other countries (and it not statistically significant in the case of Italy).³⁶ It leads us to conclude that the estimated MPC is less than one cent for households in the top ten percent of the net wealth distribution.

Our new dataset also allows us to provide an original analysis by category of non-durable consumption expenditures. We rely on the classification of individual consumption by purpose (COICOP – 2 digits). For each category of consumption expenditures, here again, our estimates show a decreasing pattern of the marginal propensity to consume out of wealth along the net wealth distribution, especially when statistically significant estimates are obtained i.e. for “Food and non-alcoholic beverage”, “Housing, water, electricity, gas and other fuels” (see [Table B14](#) in [Appendix B](#)). These results are clearly in line with the Engel curve prediction for necessities, with higher MPCs for less affluent households.

Overall, households do not only differ in terms of wealth level and composition, they also differ in their marginal propensity to consume out of wealth along the wealth distribution. Both wealth inequality and heterogeneous MPC are then at play to explain aggregate consumption reaction to asset prices. We investigate further the implications of this heterogeneity in consumption distribution in [section 6](#).

5 Housing wealth and the collateral channel

Where does this wealth effect on consumption come from? To answer this question, we further investigate the role of asset composition in this Section. The MPC may differ depending on the type of assets held. In particular, housing assets and mortgages which account for a large share of the net wealth of many households may play a

³⁵Note that for the sole case where a weak instrument issue may arise in Belgium (p0p49) the confidence interval robust to weak instruments confirms that the estimate is significantly above zero, see [Table B3](#).

³⁶In the case of Cyprus where there may be a weak instrument issue. The confidence interval robust to weak does not allow to conclude precisely that the coefficient is positive and significant, it only indicates that it is significantly distinct from zero without being able to conclude about its sign.

specific role.

5.1 Accounting for asset composition

To investigate the heterogeneity across asset types, we distinguish between housing and financial assets. The results are presented in [Table 4](#). According to our benchmark IV estimates, the wealth effect on consumption comes significantly from housing assets in all countries. Regarding financial wealth, the point estimates are higher than for housing wealth in all countries but one. Nevertheless, the mechanical increase in standard deviation due to the use of a two-stage least squares (TSLS) approach allows concluding for significance only for Italy and Cyprus.³⁷

The marginal propensity to consume out of housing assets ranges from 0.3 in Cyprus to 2 cents in Belgium; the marginal propensity to consume out of financial wealth is not statistically significant in Belgium, Germany and Spain while it reaches 10.7 cents in Italy.

The main asset channel is not the same depending on the country. For instance, in Cyprus and Italy, the financial wealth effect dominates the housing wealth effect, and the other way around in Belgium or in Germany. This cross-country heterogeneity may be due to various factors. First, it is worth noticing that there are sharp differences in house prices developments over the period across country: Belgium and Germany experienced increases in house prices (respectively + 8% and +9%), while in the other countries house prices were sharply declining (-22% in Cyprus and Spain and -12% in Italy, cf. [Table 1](#)). Asymmetries in households' reaction to gains versus losses may explain part of this heterogeneity.³⁸

³⁷We also report for IV estimates in [Table 4](#) standard F-statistics from the first stage regressions as well as the Sanderson-Windmeijer first stage F-statistics which are more appropriate with multiple endogenous variables ([Sanderson and Windmeijer \(2016\)](#)). Overall, these F-statistics do not raise concerns about the weakness of the instruments. They are above the standard threshold in all cases except for housing wealth in Germany and Spain. As for [Table 2](#), we provide confidence intervals robust to weak instrument to take into account these rare cases. It allows concluding for the significance of the coefficient for Spain but not for Germany (see [Table B4](#)). As robustness tests, we also consider IV regressions with our 14 instruments instead of the 8 used in the baseline (see [Table B5.b](#) in [Appendix B](#), Panel A). Our conclusions are not affected.

³⁸We explored this issue by splitting the sample between households facing financial losses and those experiencing financial gains. Our estimates confirm the decreasing marginal propensity to consume out of wealth for both types of shocks, but there is no clear evidence of asymmetries in consumption reaction to financial losses versus gains. Note that we are not able to investigate asymmetries in consumption reaction to housing wealth shocks because the counterfactual gains/losses in housing wealth are computed based on country-specific house prices. In order to perform such an analysis, information regarding the localization of the housing properties as well as geographical variations in housing prices within each country would be required. This is a promising avenue for further research.

Table 4: MPC out of housing and financial wealth – OLS and IV panel estimates

		Belgium	Cyprus	Germany	Spain	Italy
Panel A: OLS estimates (Panel)						
Housing wealth						
	MPC	0.013***	0.005***	0.004***	0.009***	0.024***
	Std. Err	0.003	0.001	0.001	0.003	0.004
Financial wealth						
	MPC	0.005	0.003	0.011***	0.004	0.022**
	Std. Err	0.003	0.004	0.002	0.003	0.010
Panel B: IV estimates (Panel - 8 instruments)						
Housing wealth						
	MPC	0.02***	0.003***	0.005**	0.015***	0.015**
	Std. Err	0.006	0.001	0.002	0.005	0.006
	Fstat	12.624	41.193	6.399	4.381	25.819
	SW Fstat	18.626	59.175	5.739	5.375	34.240
Financial wealth						
	MPC	0.003	0.018*	0.011	0.023	0.107***
	Std. Err	0.006	0.010	0.009	0.014	0.033
	Fstat	595.638	37.530	9.003	14.817	14.520
	SW Fstat	838.492	47.027	10.121	10.954	20.413
Other controls		Yes	Yes	Yes	Yes	Yes
Nb households		831	812	1 776	3 023	2 219

Note: The IV estimates display the standard F statistics (Fstat) and the Sanderson-Windmeijer F-statistics (SWFstat) from the first-stage regressions. Control variables for the panel regressions: age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), household composition (number of adults and number of children) and questions on income (is income in the reference period normal/above normal/below normal, is income in the next year expected to rise below/above price). The controls in the panel regression are measured in Wave 1. Financial wealth is all financial assets owned by the household. It includes: sight accounts, saving accounts, mutual funds, bonds, non-self-employment private business, shares, managed accounts, private lending, voluntary pension plans or whole life insurance contracts, and ‘other’ financial assets. Housing wealth is sum of the household’s main residence’s value, and the other real estate property’s value. The regression includes a control variable for “Other wealth”.

Confidence intervals robust to weak instruments following [Andrews \(2018\)](#) are available in [Table B4](#).

Differences in asset liquidity may be an additional important source of heterogeneity. We investigate whether the marginal propensity to consume out of wealth of liquid assets is higher than for illiquid financial assets thanks to an alternative specification (in the spirit of [Muellbauer et al. \(2016\)](#) and [Chauvin and Muellbauer \(2018\)](#)). We split the financial wealth into net liquid assets (net of non-collateralized debt) and illiquid

Table 5: Summary Table: MPC out of housing wealth by net wealth group

Net wealth group	Belgium	Cyprus	Germany	Spain	Italy
p0-p49	0.064	-0.003	0.011	0.012	0.016
p50-p69	0.121***	0.048***	0.015	0.031***	0.036**
p70-p89	0.022*	0	0.052***	0.015	0.025*
p90-p100	0.014***	0.004***	0.004**	0.012***	0.011

Note: Detailed results of each regressions are displayed in Table B8 (p0-p49 wealth group) to Table B11 (p90-p100 wealth group) in Appendix. This table only reports the estimated MPC out of housing wealth. Each regression includes control variable for financial wealth as well as the full list of control variables, i.e., age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), household composition (number of adults and number of children) and questions on income (is income in the reference period normal/above normal/below normal, is income in the next year expected to rise below/above price).

financial assets, and control for housing wealth net of mortgage debt (Table B7 in Appendix B). Accounting for mortgage debt, we find significant MPC out of net housing wealth in all countries. We also find a statistically significant marginal propensity to consume out of net liquid assets in Germany, Spain and in Italy and out of illiquid financial assets in Cyprus.

Similarly as done in subsection 4.2, we can further investigate the heterogeneity in the marginal propensity to consume out of housing and financial wealth across the net wealth distribution. To do so, we estimate separate regression for each net wealth group and split the wealth variable into housing and financial assets.³⁹ Consistently with the results obtained when considering total assets (Table 3), we find decreasing marginal propensity to consume out of housing wealth across the net wealth distribution (see Table 5). When statistically significant, the MPC out of housing wealth is higher for people with lower wealth. For households belonging to the p50-p69 net wealth group, the MPC out of housing wealth is estimated around 12 cents in Belgium, 4.8 cents in Cyprus, 3.6 cents in Italy, 3.1 cent in Spain and is not statistically significant for Germany. For the top wealth group, the MPC out of housing assets varies from 1.4 cent in Belgium, to less than 0.5 cent in Cyprus and Germany, and it is not statistically significant for Italy. Note that, as it was already the case for total wealth, the estimated MPC out of housing wealth for the lowest wealth group (p0-p49) is imprecisely estimated and turns out to be not statistically significant in most cases.

³⁹Detailed results are available in Table B8 to Table B11 in Appendix.

Regarding financial wealth, most of the estimates are not statistically significant and are associated with very low F-Statistics for the first stage (See Table B8 to Table B11 in Appendix).⁴⁰ Consequently, while we cannot exclude that financial wealth may play a role in driving part of the marginal propensity to consume out of total wealth, our main results here point towards two conclusions: first household consumption is affected by changes in housing wealth, and second such effect varies across the wealth distribution and across country.

5.2 The collateral channel

The cross-country differences in MPC may come from several factors. Institutional differences affecting stock market participation and portfolio composition (such as pension systems, cf. Arrondel et al. (2016) or financial literacy, cf. Lusardi and Mitchell (2014)) may play a role in explaining the cross-country heterogeneity in the marginal propensity to consume out of wealth. In this section, we provide first suggestive evidence about one possible explanation for the MPC cross-country heterogeneity related to credit and housing markets that have never been studied before. Increases in housing prices, everything else being equal, may relax financing constraints for households that have contracted mortgages. Therefore, depending on the legal and regulatory framework households may be able to borrow more or less (Bover et al. (2016)), and thus may be also more or less affected by housing prices. In order to investigate the potential role of such a collateral channel in explaining the cross-country heterogeneity, we consider the share of mortgages in total household debt by country and by wealth group as an indicator of cross-country heterogeneity in credit and housing markets. In practice, we define the following credit and housing markets indicator based on the individual data of the HFCS as a measure of the mortgage “intensity” within the country for each wealth group:

$$Mortgage\ intensity^{c,q} = \frac{\sum_i^{N^q} Mortgages^i}{\sum_i^{N^q} total_debt^i}$$

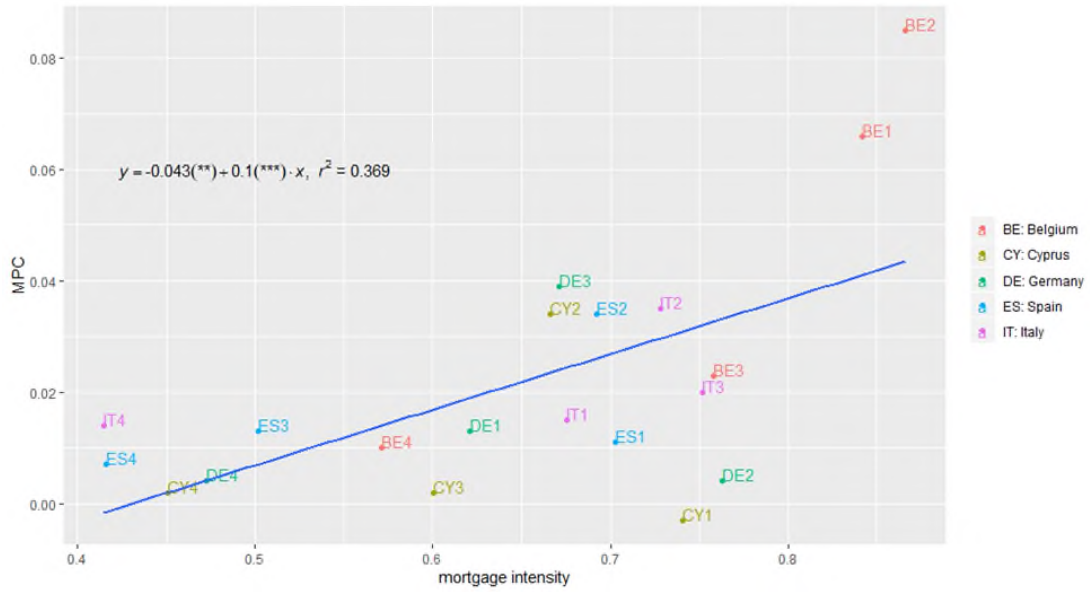
Where the superscript q stands for the wealth group, $mortgages$ is the household

⁴⁰Note that we have estimated alternative specifications (focusing on equities and mutual funds only instead of total financial wealth or considering the restricted sample of households holding equities or mutual funds) but have not obtained more significant results.

debt with the household main residence as collateral, N is the number of individuals i in the group q , and c is the country.⁴¹

Figure 3 shows a statistically significant positive correlation between the marginal propensity to consume out of wealth and the intensive use of mortgages in the country. As expected, in countries where the share of mortgages is larger, household consumption reacts more to wealth shocks.

Figure 3: Cross-country heterogeneity: Mortgage intensity and MPC



Correlations between country-specific MPC estimates by wealth groups (Table 4-y axis) and the intensity of mortgages in the country (x axis). Note: BE1 refers to Belgium, first wealth group (i.e. p0-p49), BE2 refers to Belgium, second wealth group (i.e. p50-p69), BE3 refers to Belgium, third wealth group (i.e. p70-p79) and BE4 refers to Belgium, fourth wealth group (i.e. p90-p100))

6 Wealth and consumption inequalities

Here we investigate how heterogeneous MPC and wealth inequality can affect consumption inequality. We conduct a simple simulation exercise to assess the effect of

⁴¹As robustness, we also consider an alternative definition which leads to similar conclusions:

$$Mortgage\ intensity_{2^{c,q}} = \frac{1}{N^q} \sum_i^{N^q} \frac{Mortgages^i}{total_debt^i}$$

an exogenous shock on assets values on consumption.⁴² We consider in turn a 10% increase in deposits, in shares or in housing assets at the household level; and we report in Table 6, how it affects wealth and consumption distributions at the country level, applying for the latter the MPC estimates by country and by wealth groups (reported in Table 3). Overall we find that a housing prices shock decreases consumption inequal-

Table 6: Simulation exercise: price shock on wealth and consumption inequalities

		Before shock (euros)		After shock					
		Consumption	Net wealth	Deposits		With a 10% increase in Shares		Housing wealth	
				Consumption	Net wealth	Consumption	Net wealth	Consumption	Net wealth
Belgium	Mean	27 959	394 124	0.57%	1.22%	0.05%	0.17%	4.03%	6.97%
	Median	25 092	261 663	0.54%	2.48%	0.00%	0.00%	5.04%	10.26%
	Top10/B50	0.72	2.67	-1.76%	-0.85%	-0.06%	0.32%	-3.27%	-6.18%
	Gini	0.28	0.54	-0.46%	0.09%	-0.04%	0.09%	-2.65%	-1.42%
Cyprus	Mean	27 718	722 385	0.06%	0.42%	0.01%	0.12%	1.31%	7.89%
	Median	24 179	326 477	0.07%	0.00%	0.00%	0.01%	2.33%	11.98%
	Top10/B50	0.79	5.47	1.14%	-0.32%	0.01%	0.04%	-0.15%	-5.33%
	Gini	0.31	0.65	-0.03%	-0.08%	0.01%	0.01%	-0.67%	-1.07%
Germany	Mean	24 644	244 307	0.18%	1.00%	0.02%	0.19%	1.06%	7.27%
	Median	21 246	80 400	0.27%	2.74%	0.00%	0.75%	0.82%	10.95%
	Top10/B50	0.75	12.98	0.06%	-2.75%	0.00%	-0.01%	-0.98%	-3.16%
	Gini	0.29	0.73	-0.12%	-0.34%	0.00%	0.01%	-0.42%	-0.52%
Spain	Mean	21 456	310 424	0.12%	0.63%	0.01%	0.08%	1.81%	8.70%
	Median	18 659	200 375	0.06%	0.81%	0.00%	0.00%	1.80%	10.68%
	Top10/B50	0.84	2.64	-0.14%	-0.30%	0.02%	0.07%	-2.24%	-5.02%
	Gini	0.32	0.54	-0.07%	-0.04%	0.00%	0.03%	-1.29%	-1.62%
Italy	Mean	23 058	263 050	0.11%	0.48%	0.01%	0.04%	1.85%	8.08%
	Median	19 383	187 093	0.29%	0.50%	0.00%	0.00%	3.58%	8.37%
	Top10/B50	0.84	3.09	0.30%	-0.94%	0.00%	0.01%	-1.39%	-0.80%
	Gini	0.32	0.56	-0.06%	-0.16%	0.00%	0.01%	-1.25%	-0.19%

The estimated mean for non-durable consumption in Belgium in Wave 1 is 27,959, euros. When increasing by 10% the value of deposits at the household level, mean net wealth increases by 1.22% and the predicted mean value of consumption by 0.57%. To compute this effect, we take the estimated value of consumption and add the increase in consumption as estimated by our empirical model (Table 4).

ity while financial wealth shocks have a limited effect on consumption inequality. The effect of financial shocks is however not the same according to the considered financial asset. A 10% value shock on deposits tends to decrease wealth inequality, due to the larger share of deposits in total net wealth for households in bottom deciles. Less wealth inequality combined with the decreasing MPC across the net wealth distribution also lowers consumption inequality. By contrast, a 10% rise in shares values (which are more concentrated among rich people) slightly increase wealth inequality. However, due to lower MPC for wealthy people, the effect is very limited on consumption inequality.

A 10% rise in housing prices has a larger impact on both wealth and consumption

⁴²Let us emphasize that this simple exercise does not account for changes in household behaviors, or for general equilibrium effects. It provides however useful insights on the transmission of wealth inequality on consumption inequality through the wealth effect on consumption.

inequalities. All inequality indicators for net wealth and consumption inequalities decrease within the five countries. Such an effect is explained by the fact that housing assets amount to a large share of household total assets for many households, in particular for middle-classes households (Figure 1), who also exhibit higher MPC out of wealth than high-wealth people. Interestingly, there is however some cross-country heterogeneity. In particular, the effect of housing prices on consumption inequality is far much limited in Germany than in the other countries due to its lower homeownership rate.⁴³ As previously stated, this simulation exercise is very simple and does not account for changes in households' behavior. In particular, the overall effect of housing prices on inequality may be ambiguous because higher housing prices also reduce the probability for poor people to become homeowners.⁴⁴

7 Conclusion

Using a unique household-level panel dataset, we investigate various dimensions of heterogeneity in the marginal propensity to consume out of wealth across households and across five Euro area countries. We draw on household-level changes in wealth that occurred between the years 2010 and 2014. Endogeneity issues related to omitted variables and to active saving/dissaving are tackled by using an instrumented panel regression approach. Our instruments are based on lagged price developments and on households' asset composition.

Our results highlight various new elements of heterogeneity in the wealth-consumption transmission channel. With our instrumental variable strategy, we find average MPC which vary from 1.5 cents in Italy to less than one cent in Cyprus and Germany. For all countries, we find higher MPC for low-wealth households than for the wealthy ones. Decomposing total wealth into housing and financial assets, we find statistically significant marginal propensity to consume out of housing wealth for all countries decreasing along the net wealth distribution. Moreover, we provide an original investigation of the cross-country heterogeneity in MPC and find that the collateral channel is likely to be a significant driver of this heterogeneity: in countries where the share of mortgages in total household debt is larger, consumption reacts more to wealth shocks.

Finally, we conduct a simple simulation exercise to assess how heterogeneous MPC and wealth inequality shape consumption inequality. We find evidences that housing prices shock decreases consumption inequality while financial wealth shocks have a

⁴³44% for Germany while it ranges between 70% (Belgium) and 83% (Spain) for the other countries.

⁴⁴See for instance [Bonnet et al. \(2018\)](#).

limited effect on consumption inequality. The heterogeneity of the results highlights in particular the role of the homeownership rates: the effect of housing prices on the effect of housing prices on consumption inequality is far much limited in Germany than in the other countries due to its much lower homeownership rate.

From a methodological point of view, our results strongly advocate for using panel dataset with instrumented wealth shocks rather than cross-sectional data, since the latter shows a downward bias in the estimates. Developing the collect of household-level information on wealth and consumption in a panel setup would be therefore very fruitful for future research. In particular, with a longer time-period and more countries in the sample, it would be possible to further investigate other sources of the cross-country heterogeneity (such as differences in tax regimes or social security systems).

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List of Tables

1	Asset prices and consumption developments (%) between Wave 1 and Wave 2 at the country level	11
2	Baseline results: Marginal propensity to consume out of wealth at the mean – OLS, IV panel and cross-section estimates	18
3	Marginal propensity to consume out of wealth across the net wealth distribution – IV panel estimates	20
4	MPC out of housing and financial wealth – OLS and IV panel estimates	23
5	Summary Table: MPC out of housing wealth by net wealth group . . .	24
6	Simulation exercise: price shock on wealth and consumption inequalities	27
A1	Reference periods for the first and second waves of the HFCS and sample size	38
A2	Panel descriptive statistics - main variables: Initial sample versus estimation sample	39
A3	Distribution of non-durable consumption in Consumption surveys (HBS), and in the HFCS after imputation with the Skinner method and with the rank hot-deck method.	43
A4	Household Budget Surveys (HBS) and Survey on Income and Living Conditions (SILC) used for imputation	44
A5	Wealth components and asset prices	45
A6	46
A7	Instruments: time period for aggregate asset prices	47
A8	Intertemporal asset price correlation	47
B1	First-stage regression – Baseline model (8 instruments)	48
B2	Baseline results: Marginal propensity to consume out of wealth at the mean – OLS, IV panel and cross-section estimates, full table	49
B3	Marginal propensity to consume out of wealth across the net wealth distribution – IV panel estimates, full table	50
B4	MPC out of housing and financial wealth – OLS and IV panel estimates, full table	51
B5	52
B6	Marginal propensity to consume out of wealth across the net wealth distribution – OLS estimates	53
B7	Marginal propensity to consume out of net housing wealth, illiquid financial assets and net liquid financial assets	54

B8	MPC Financial and Housing Assets, First Quartile of Net Wealth . . .	55
B9	MPC Financial and Housing Assets, Second Quartile of Net Wealth .	55
B10	MPC Financial and Housing Assets, Third Quartile of Net Wealth . .	56
B11	MPC Financial and Housing Assets, Fourth Quartile of Net Wealth . .	56
B12	Robustness: gross income (HFCS variable) instead of disposable in- come (Imputed from SILC)	57
B13	Heterogeneity across ages - IV estimates	58
B14	Estimated MPC by category of consumption expenditure and by net wealth groups (IV estimates)	59

Appendices

A Data Appendix

- **Sample selection**

We select the countries for which a panel component is available in the two first waves of the HFCS (Belgium, Cyprus, Germany, Spain, and Italy). We exclude Malta and the Netherlands (which also have a panel component) because some other crucial information is not available.⁴⁵ The references period differ across countries (see [Table A1](#) below), which is taken into account in our empirical strategy, when building instruments based on asset pricing developments. We select households where the reference person is aged between 25 and 75 years old in Wave 1. We exclude some households where the reference person is identified as student, households with extreme values in consumption to disposable income ratio (top 1% and bottom 1%), in wealth (top 0.1%), disposable income (bottom 0.1%) and in debt (debt/total assets above 100). After applying this cleaning, we rebalance the panel sample. Depending on the country, this cleaning excludes 3% to 10% of the initial panel sample. Descriptive statistics for the initial sample and the estimation sample are provided in [Table A2](#).

Table A1: Reference periods for the first and second waves of the HFCS and sample size

	HFCS reference period		Number of panel households	
	wave 1	wave 2	Initial sample	After cleaning
Belgium	2010	2014	891	831
Cyprus	2010	2014	844	812
Germany	2011	2014	1901	1776
Spain	2009	2012	3210	3023
Italy	2010	2014	2484	2219

⁴⁵Netherlands are not included in Eurostat HBS micro-data, while the age of the reference is not available for Malta Wave 1.

Table A2: Panel descriptive statistics - main variables: Initial sample versus estimation sample

Country		Total net wealth		Total gross wealth		Consumption non durable goods		Disposable income		Total net wealth / Disposable income		Total gross wealth / Disposable income		Consumption non durable goods / Disposable income	
		Before Cleaning	Estimation Sample	Before Cleaning	Estimation Sample	Before Cleaning	Estimation Sample	Before Cleaning	Estimation Sample	Before Cleaning	Estimation Sample	Before Cleaning	Estimation Sample	Before Cleaning	Estimation Sample
BE	Mean (€)	377 284	378 925	417 209	420 221	40 941	40 949	39 689	40 770	8.40	10.55	10.00	11.38	1.39	1.14
	Median (€)	263 500	266 260	303 700	310 353	34 266	34 165	31 997	33 172	6.57	6.74	7.66	7.98	1.07	1.05
	Std dev	566 070	550 588	575 272	558 245	25 718	24 995	27 893	28 149	72.52	13.87	68.47	13.76	7.73	0.53
	Q1	112 500	131 800	175 100	194 000	23 683	23 683	21 681	22 239	2.83	3.15	4.30	4.52	0.77	0.77
	Q3	451 400	460 462	486 218	495 000	50 630	51 680	52 480	53 400	13.54	13.68	14.24	14.26	1.43	1.39
	# obs	891	831	891	831	891	831	891	831	891	831	891	831	891	831
CY	Mean (€)	397 130	408 849	476 421	486 696	27 913	27 998	32 205	32 922	11.75	12.20	14.66	15.09	1.09	1.05
	Median (€)	174 400	180 000	245 340	256 690	24 544	24 609	24 717	25 291	6.33	6.66	8.68	8.96	0.94	0.93
	Std dev	1 038 686	1 008 705	1 067 854	1 033 712	16 317	16 145	34 703	35 121	29.55	30.02	30.91	31.39	0.68	0.59
	Q1	59 500	69 000	111 922	123 100	16 183	16 735	16 197	17 092	2.60	2.82	4.67	4.91	0.64	0.64
	Q3	362 495	377 846	465 909	473 673	35 798	35 497	39 296	40 352	13.65	13.77	16.07	16.66	1.32	1.29
	# obs	844	812	844	812	844	812	844	812	844	812	844	812	844	812
DE	Mean (€)	222 941	237 203	254 430	271 275	15 801	16 147	34 923	37 267	5.63	6.55	6.39	7.45	0.53	0.53
	Median (€)	83 900	103 500	116 000	133 000	14 087	14 575	28 679	31 294	2.46	2.71	3.44	3.67	0.48	0.47
	Std dev	500 387	514 467	519 895	534 310	9 654	9 618	31 591	31 987	16.24	13.55	17.65	14.11	1.40	0.29
	Q1	10 150	14 800	13 800	18 400	9 510	9 744	18 591	20 320	0.35	0.61	0.52	0.79	0.31	0.31
	Q3	252 100	266 400	295 270	308 900	19 600	19 883	45 244	46 936	7.14	7.40	8.33	8.64	0.70	0.67
	# obs	1 901	1 776	1 901	1 776	1 901	1 776	1 901	1 776	1 901	1 776	1 901	1 776	1 901	1 776
ES	Mean (€)	280 307	280 499	314 655	315 511	41 345	41 580	30 356	31 076	20.61	11.09	22.19	12.35	2.14	1.67
	Median (€)	170 500	173 268	201 000	205 241	34 721	35 099	25 184	25 871	6.79	6.86	8.14	8.18	1.39	1.38
	Std dev	675 742	578 491	687 863	587 411	27 767	27 644	29 391	29 338	785.55	23.25	785.93	23.40	26.61	1.11
	Q1	81 001	84 600	114 262	120 277	22 370	22 577	14 970	15 843	3.17	3.26	4.48	4.61	0.93	0.93
	Q3	317 441	325 567	360 320	363 764	52 190	52 450	37 731	38 153	12.57	12.56	13.49	13.20	2.13	2.10
	# obs	3 210	3 023	3 210	3 023	3 210	3 023	3 210	3 023	3 202	3 023	3 202	3 023	3 202	3 023
IT	Mean (€)	243 698	252 458	253 819	262 941	24 073	24 498	31 945	33 589	6.22	7.80	6.57	8.12	0.99	0.98
	Median (€)	157 824	164 470	165 857	176 500	20 621	21 064	25 632	27 567	5.67	5.85	6.11	6.22	0.78	0.76
	Std dev	366 855	353 305	376 413	359 741	15 441	15 536	31 727	32 320	74.31	8.62	74.37	8.66	5.13	0.78
	Q1	38 000	56 100	44 000	63 741	13 550	13 866	16 404	18 199	1.64	2.12	1.97	2.43	0.50	0.48
	Q3	305 000	315 700	310 000	321 100	29 976	30 258	39 251	40 629	10.45	10.36	10.65	10.58	1.28	1.22
	# obs	2 484	2 219	2 484	2 219	2 484	2 219	2 484	2 219	2 477	2 219	2 477	2 219	2 477	2 219

Variables measured in Wave 2.

■ Main definitions

- *Consumption of non-durable goods (C_i)* – Source: HBS

Consumption is restricted to services and non-durable goods; it implies that expenditures for durable goods are excluded from the measure. Durable goods are mostly vehicle and furniture purchases. Also imputed rents are subtracted from consumption. The detailed list of COICOP items that are excluded may be found in the code.

- *Disposable income (Y_i)* – Source : SILC

Disposable income is defined consistently with the EU-SILC framework. Hence it includes gross employee income, income from self-employment, pensions, unemployment benefits, old-age benefits, sickness benefits, disability benefits, education-related allowances, property income, family-related allowances, regular inter-household transfers received, interests, dividends, profits from capital investments, income received by people less than 16, from which are subtracted wealth taxes, regular inter-household transfers paid, tax on income and social contributions.

- *Wealth (W_i)* - Source: HFCS

Wealth is measured at the household level. All wealth variables are defined in gross values (i.e. not accounting for debt). Household indebtedness is taken into account to rank households in the net wealth distribution so as to define the wealth groups used to estimate heterogeneous MPC along the wealth distribution.

Total wealth: All assets owned at the household level — it includes all kind of assets: real assets (household main residence, other real estate properties, vehicles, valuables) and financial assets [variable name in the HFCS: DA3001].

Financial wealth: all financial assets owned by the household [DA1000]. It includes: sight accounts, saving accounts, mutual funds, bonds, non-self-employment private business, shares, managed accounts, private lending, voluntary pension plans or whole life insurance contracts, and ‘other’ financial assets.

Housing wealth: sum of the household’s main residence’s value [DA1100], and the other real estate property’s value [DA1120]. Net Housing wealth: housing wealth [DA1100+ DA1120] minus mortgage debt [DL1110 + DL1120].

Other gross assets: Non-housing real assets owned by the household. It includes the value of household’s vehicles [DA1130], valuables [DA1131], and the value of self-employment businesses [DA1140].

Net liquid financial assets: Liquid assets owned by the household minus non-collateralized debt. Liquid assets include deposits [DA2101], mutual funds [DA2102], bonds [DA2103], shares [DA2105], and managed accounts [DA2106]. Non collateralized debt is total debt [DL1000] minus mortgage debt [DL1110 + DL1120].

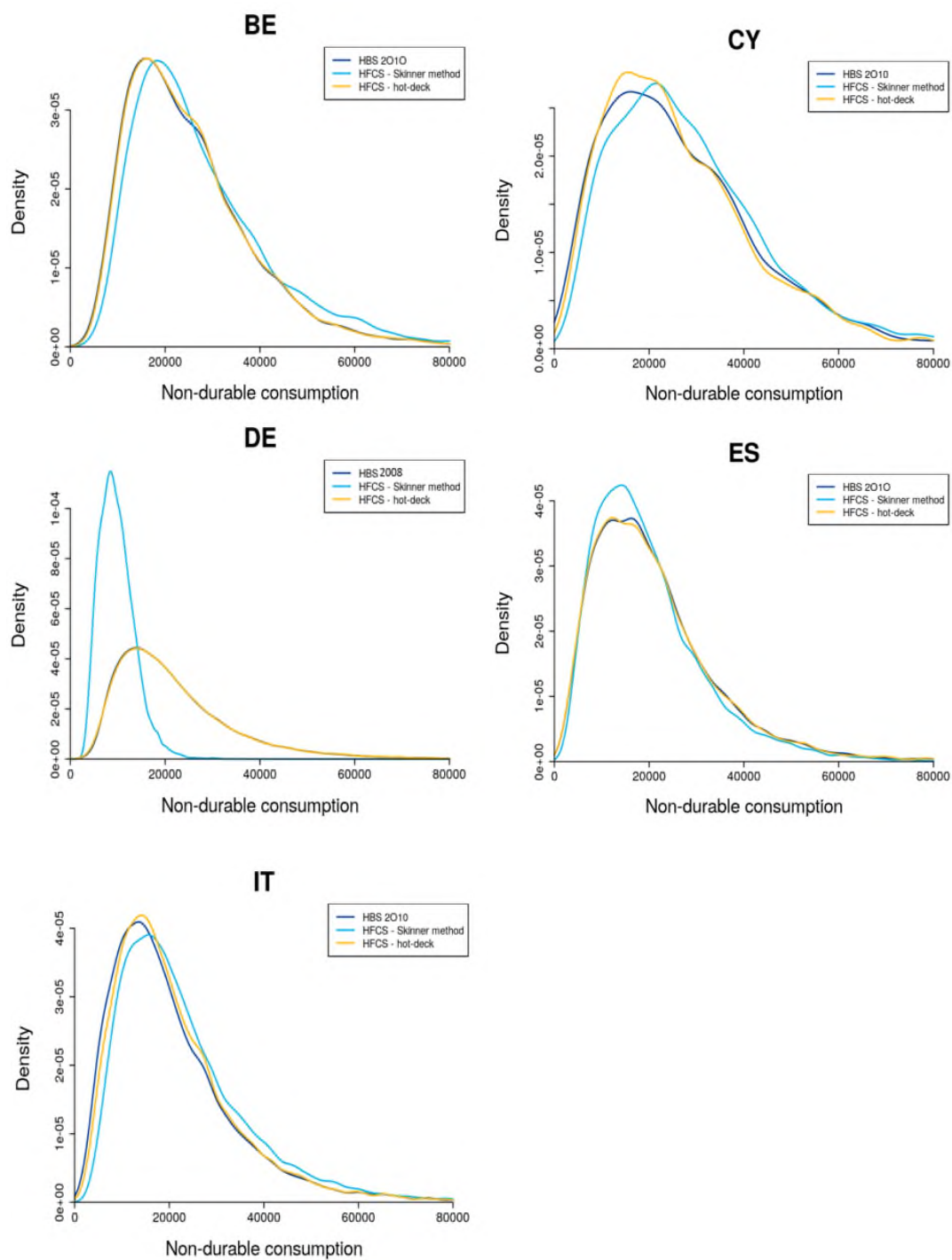
Illiquid financial assets: non-self-employment private business [DA2104], private lending [DA2107], voluntary pension plans or whole life insurance contracts [DA2109], and other assets [DA2018].

Wealth groups: We consider four wealth groups on the basis of the net wealth percentiles defined within country in Wave 1: below median net wealth, 50th to 69th percentiles, 70th to 89th percentiles and the top ten percentiles. Net wealth [DN3001] is household's total wealth minus total outstanding household's liabilities.

- *Other control variables (X_i)- Source: HFCS*

Demographic variables: age (defined in 6 classes: 25 to 29 / 30 to 39 / 40 to 49 / 50 to 59 / 60 to 69 / 70 to 75), education of the reference person (defined in 4 categories: primary or lower / lower secondary / upper secondary / tertiary), labor status of the reference person (defined in 5 categories: employed / self-employed / retired / unemployed / others), number of household members (number of adults and number of children).

Figure A1: Density of non-durable consumption measured in HBS and imputed in the HFCS with the Skinner method and with the rank hot-deck method (Wave 1)



BE: Belgium, CY: Cyprus, DE: Germany, ES: Spain, IT: Italy

Table A3: Distribution of non-durable consumption in Consumption surveys (HBS), and in the HFCS after imputation with the Skinner method and with the rank hot-deck method.

	Belgium		Cyprus		Germany		Spain		Italy	
	Wave 1	Wave 2	Wave 1	Wave 2	Wave 1	Wave 2	Wave 1	Wave 2	Wave 1	Wave 2
HBS distribution										
p10	11,131	14,362	8,341	-	9,484	6,127	7,344	11,898	7,051	7,503
p25	15,356	20,435	14,327	-	13,080	8,573	11,596	19,154	11,174	11,802
p50	22,504	30,034	23,757	-	18,916	12,537	18,331	30,891	17,428	18,454
p75	31,993	43,845	36,168	-	27,332	17,998	27,064	47,202	26,545	27,850
p90	43,477	61,462	50,318	-	38,252	24,920	38,037	67,308	38,032	39,765
HFCS distribution - Skinner method										
p10	12,624	12,070	10,309	9,228	5,486	5,506	7,588	7,458	9,234	7,846
p25	17,163	16,785	16,594	13,410	7,114	7,150	11,434	10,867	13,347	11,497
p50	24,346	23,963	25,906	21,491	9,337	9,282	17,447	16,324	19,871	17,496
p75	35,250	34,084	37,905	30,753	11,991	11,735	25,318	23,901	29,315	26,207
p90	49,378	46,531	51,892	41,554	14,622	14,528	35,433	33,636	41,480	37,383
HFCS distribution - rank hot-deck method										
p10	11,261	15,956	8,956	-	9,532	6,547	7,317	13,977	7,879	7,629
p25	15,516	22,782	14,529	-	13,132	9,227	11,527	22,324	11,940	12,094
p50	22,650	33,766	23,290	-	18,932	13,640	18,345	35,776	18,077	19,099
p75	32,109	50,891	35,314	-	27,360	19,829	27,156	55,107	26,970	28,507
p90	43,678	73,198	49,717	-	38,444	27,886	38,518	78,853	38,334	40,799

HBS data are not available for Cyprus Wave 2. The Skinner imputation is based on HBS Wave 1.

Table A4: Household Budget Surveys (HBS) and Survey on Income and Living Conditions (SILC) used for imputation

Country	Non-durable consumption		Disposable income	
	Source Wave 1	Source Wave 2	Source Wave 1	Source Wave 2
Belgium	HBS 2010	HBS 2015	SILC 2009	SILC 2013
Cyprus	HBS 2010	HBS 2010	SILC 2009	SILC 2014
Germany	HBS 2008	HBS 2013	SILC 2009	SILC 2013
Spain	HBS 2010	HBS 2015	SILC 2007	SILC 2010
Italy	HBS 2010	HBS 2015	SILC 2010	SILC 2014

We use the vintage of SILC corresponding to the income reference period in the HFCS. Individual data from Household Budget Surveys are available from Eurostat. However, for the most recent vintages, we access the data through the National Statistical Institutes of each country when available.

Table A5: Wealth components and asset prices

	HFCS variables	Asset types	Prices index
DA1000	Total real assets =		
	+ DA1110	Value of household's main residence	Housing
	+ DA1120	Value of other real estate property	Housing
	+ DA1130	Value of household's vehicles	-
	+ DA1131	Valuables	-
	+ DA1140	Value of self-employment businesses	Bonds (non-financial corporations)
DA2100	Total financial assets =		
	+ DA2101	Deposits	Interest rate on deposits
	+ DA2102	Mutual funds, total*	
		+ HD1320A Equity	Shares (domestic)
		+ HD1320B Bonds	Bonds (gov)
		+ HD1320C Money market	Bonds (gov)
		+ HD1320D Real estate	Housing
		+ HD1320E Hedge funds	Shares (domestic)
		+ HD1320F Others	Shares (domestic)
	+ DA2103	Bonds	
		+ HD1410A Governements	Bonds (gov)
		+ HD141B Banks	Bonds (financial corporations)
		+ HD1410C Corporates	Bonds (non-financial corporations)
		+ HD1410D Others	Bonds (non-financial corporations)
	+ DA2104	Value of non self-employment private business	Bonds (non-financial corporations)
	+ DA2105	Shares, publicly traded	
		+ HD1510 Domestic companies	Shares (domestic)
		+ HD1520 Foreign companies	Shares (world)
	+ DA2106	Managed accounts	Shares (domestic)
	+ DA2107	Money owed to households	-
	+ DA2108	Other assets	Shares (world)
	+ DA2109	Voluntary pension/whole life insurance	Shares (domestic)

Supposed all equity for Germany

Table A6

A6.a: Prices indexes by country for shares, government bonds, interest on deposits and housing assets

Country	Domestic shares	Foreign shares	Government Bonds	Interest rates on deposits	Housing prices
Belgium	BEL20-PROEINDEX	FTSEALLWORLDE-PRICEINDEX	FISEGLOBAL GOVT. BG ALLMATS(E) - CLEAN PRIOINDEX	Bank interest rates - deposits from households - BE	House price index - BE
Cyprus	FTSECYPRUSSE20-PRIOINDEX	FTSEALLWORLDE-PRICEINDEX	FTSEGLOBALGOVT. EUROZONEALLMATS(E)-CLEAN PRICEINDEX	Bank interest rates - deposits House from households - CY	House price index - CY
Germany	DAX30 PERFORMANCE-PRICEINDEX	FTSEALLWORLDE-PRICEINDEX	FTSEGLOBALGOVT.BD ALLMATS(E)-CLEAN PRICEINDEX	Bank interest rates - deposits House from households- DE	House price index - DE
Spain	IBEX35-PRICEINDEX	FTSEALLWORLDE-PRICEINDEX	FTSEGLOBALGOVT.ES ALLMATS(E)-CLEAN PRIOINDEX	Bank interest rates - deposits from households - ES	House price index - ES
Italy	FTSEMIBINDEX-PRIOINDEX	FTSEALLWORLDE-PRICEINDEX	FTSEGLOBALGOVT.IT ALLMATS(E)-CLEAN PRIOINDEX	Bank interest rates - deposits from households - IT	House price index - IT
Source	Datastream	Datastream	Datastream	ECB (sdw)	Eurostat

A6.b: Prices index for corporate bonds

Companies	Corporate bonds
All	FTSE EURO CORP. ALL MATURITIES - CLEAN
Non-financial corporation	FTSE EURO CORP. NON FINANCIALS- CLEAN PRICE INDEX
Financial corporations	FTSE EURO CORP. FINANCIALS - CLEAN PRICE INDEX
Source	Datastream

Table A7: Instruments: time period for aggregate asset prices

Countries	Year of HFCS wave 1	Period for Δp^i
Belgium	2010	2008-2010
Cyprus	2010	2008-2010
Germany	2011	2009-2011
Spain	2009	2007-2009
Italy	2010	2008-2010

Table A8: Intertemporal asset price correlation

	Government bonds	Deposits	Housing	Shares
Belgium	0.69	0.64	0.71	0.54
Cyprus	0.64	0.58	0.70	0.70
Germany	0.72	0.74	0.67	0.69
Spain	0.65	0.62	0.83	0.47
Italy	0.65	0.38	0.69	0.76

B Additional results

Table B1: First-stage regression – Baseline model (8 instruments)

		Belgium		Cyprus		Germany		Spain		Italy	
		Coeff.	Std. dev.	Coeff.	Std. dev.	Coeff.	Std. dev.	Coeff.	Std. dev.	Coeff.	Std. dev.
INS_HOUS	Instrument housing prices	208.491	*** 45.193	15.494	*** 1.430	-114.909	*** 23.947	30.270	*** 7.264	114.832	*** 10.488
INS_INTR	Instrument interest rates on deposits	-29.511	*** 6.322	-17.470	26.598	16.393	23.403	-5.206	18.242	-31.473	*** 11.274
INS_BONDC	Instrument corporate bonds prices	-6.968	6.570	-25.861	*** 1.574	-3.858	6.683	11.480	* 6.667	-12.433	*** 4.176
INS_BONDG	Instruments government bonds prices	-10.365	9.178	-30.911	* 15.777	-27.640	26.804	-575.643	362.601	16.601	15.799
INS_BONDF	Instrument financial bonds prices	-31.471	*** 2.378	43.320	64.482	149.777	126.234	86.448	85.195	-6.212	14.952
INS_SHARD	Instrument domestic shares prices	0.006	1.963	-2.364	2.451	-1.909	1.167	-0.732	2.776	-0.270	1.072
INS_SHARF	Instrument foreign share prices	-1.747	7.344	-47.568	76.935	-1.030	4.464	0.000	*** 0.000	4.435	4.544
INS_NOPI	Instrument constant prices	omitted		omitted		omitted		omitted		omitted	
RA0300	Age	0.097	0.094	0.058	0.334	0.019	0.075	-0.146	0.235	0.173	*** 0.039
AGE_SQUARE	Age square	0.001	0.001	0.005	0.008	0.002	0.001	0.005	0.004	-0.001	** 0.001
LS_RETIRED	Reference person is retired (1/0)	1.396	1.815	-14.184	15.739	-4.825	** 2.259	-2.626	3.532	0.784	0.549
LS_UNEMPLOYED	Reference person is unemployed (1/0)	2.209	2.250	-3.899	2.896	-4.468	*** 0.827	2.205	2.812	-0.802	1.000
DH0006	Number of adults in the household	0.163	0.367	-0.709	1.384	0.190	0.453	-0.169	0.733	-0.394	** 0.195
DH0007	Number if children in the household	0.003	0.571	-0.080	0.868	-0.428	0.298	0.006	0.894	-0.223	0.269
HG0800_MORE	Income is expected to grow more than prices (1/0)	5.280	** 2.431	1.404	3.581	1.432	1.578	1.502	1.612	-0.244	0.530
HG0800_LESS	Income is expected to grow more less prices (1/0)	0.051	1.187	2.022	3.406	-1.661	1.014	7.436	* 3.902	-0.260	0.368
HG0700_HIGH	Income was above normal during the year of the survey (1/0)	1.886	2.194	0.720	3.218	1.424	1.668	8.009	6.765	-0.620	0.617
HG0700_LOW	Income was below normal during the year of the survey (1/0)	-2.800	*** 1.070	2.666	3.022	-0.656	0.803	-0.671	1.587	0.356	0.501
Number of observations		831		812		1776		3023		2219	
Fstat (instrumental variables)		33.983		79.550		11.197		5.623		22.800	

Table B2: Baseline results: Marginal propensity to consume out of wealth at the mean – OLS, IV panel and cross-section estimates, full table

	Panel			Cross-section			Nb of obs.
	(1)	(3)		(3)	(4)		
	OLS	Baseline model IV - 8 instr.		1st wave	2nd wave		
Belgium							
MPC	0.010 ***		0.012 ***	0.003 ***	0.004 ***		831
Std. Error	0.002		0.003	0.001	0.001		
CI robust to weak instruments		[.00826, .020438]					
Fstat		34.0					
Cyprus							
MPC	0.002 **		0.002 ***	0.000	0.001		812
Std. Error	0.001		0.001	0.000	0.000		
CI robust to weak instruments		[.001935, .003493]					
Fstat		79.6					
Germany							
MPC	0.004 ***		0.004 **	0.000	0.000		1776
Std. Error	0.001		0.002	0.001	0.001		
CI robust to weak instruments		[.0016, .009717]					
Fstat		11.2					
Spain							
MPC	0.004 **		0.013 ***	0.003 ***	0.005 ***		3023
Std. Error	0.002		0.003	0.000	0.001		
CI robust to weak instruments		[.010599, .024113]					
Fstat		5.6					
Italy							
MPC	0.022 ***		0.015 **	0.009 ***	0.008 ***		2219
Std. Error	0.003		0.006	0.001	0.001		
CI robust to weak instruments		[.004051, .023338]					
Fstat		22.8					

Notes: Control variables for panel regressions (columns 1 to 3): age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), household composition (number of adults and number of children) and questions on income (is income in the reference period normal/above normal/below normal, is income in the next year expected to rise below/above price). The control variables in the panel regressions are measured in Wave 1. Control variables for the cross-section regressions (columns 4 and 5): age (6 categories), situation on the labour market (employed, self-employed, retired, unemployed, other), education, household composition (number of adults and number of children) and questions on income.

Confidence intervals robust to weak instruments following [Andrews \(2018\)](#) are computed thanks to the Stata package `twostepweakiv` ([Sun \(2018\)](#)). We use the LC-confidence intervals.

Table B3: Marginal propensity to consume out of wealth across the net wealth distribution – IV panel estimates, full table

		Belgium	Cyprus	Germany	Spain	Italy
Benchmark: 8 IV						
D(W/Y) * p0-p49	MPC	0,066 ***	-0,003	0,013	0,011	0,015
	Std. Err.	(0,023)	(0,006)	(0,018)	(0,011)	(0,012)
	CI robust to weakiv	[.045429, ...]	[-.012884, .007743]	[.000123, ...]	[-.011127, .043628]	[-.010789, .03493]
	<i>Fstat</i>	3,287	6,705	6,456	8,524	10,017
Number of households	330	324	596	1031	949	
D(W/Y) * p50-p69	MPC	0,085 ***	0,034 ***	0,004	0,034 ***	0,035 **
	Std. Err.	(0,016)	(0,007)	(0,009)	(0,008)	(0,014)
	CI robust to weakiv	[.077546, .131289]	[.027542, .033022]	[... ,-.001754] U [.032873, ...]	[.023904, .050036]	[.008745, .058315]
	<i>Fstat</i>	9,888	5,149	3,119	9,630	13,441
Number of households	176	171	311	496	457	
D(W/Y) * p70-p89	MPC	0,023 ***	0,002	0,039 ***	0,013 *	0,020
	Std. Err.	(0,007)	(0,004)	(0,007)	(0,008)	(0,014)
	CI robust to weakiv	[.007896, .035815]	[-.011274, .007789]	[.030888, .060545]	[-.000026, .023685]	[-.008982, .044068]
	<i>Fstat</i>	14,548	7,068	8,224	17,656	16,126
Number of households	211	186	489	642	513	
D(W/Y) * p90-p100	MPC	0,010 ***	0,002 ***	0,004 ***	0,007 ***	0,014
	Std. Err.	(0,003)	(0,001)	(0,001)	(0,002)	(0,009)
	CI robust to weakiv	[.006613, .016121]	[... ,-.002424] U [.001638, .005827]	[.002017, .006492]	[.003615, .011766]	[-.002551, .026656]
	<i>Fstat</i>	21,641	9,621	21,124	10,055	9,917
Number of households	114	131	380	854	300	
Other controls		yes	yes	yes	yes	yes
Number of households		831	812	1776	3023	2219

Control variables for the panel regressions: age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), household composition (number of adults and number of children) and questions on income (is income in the reference period normal/above normal/below normal, is income in the next year expected to rise below/above price). The controls in the panel regression are measured in Wave 1. Confidence intervals robust to weak instruments following [Andrews \(2018\)](#) are computed thanks to the Stata package `twostepweakiv` ([Sun \(2018\)](#)). In almost all cases, we use the LC-confidence intervals. In some rare cases, the LC-confidence intervals is not informative and we opt for the K-confidence intervals when it is more informative (Cyprus for the group p90-p100).

Table B4: MPC out of housing and financial wealth – OLS and IV panel estimates, full table

	Belgium	Cyprus	Germany	Spain	Italy
Panel A: OLS estimates (Panel)					
Housing wealth					
MPC	0,013	*** 0,005	*** 0,004	*** 0,009	*** 0,024
Std. Err	0,003	0,001	0,001	0,003	0,004
Financial wealth					
MPC	0,005	0,003	0,011	*** 0,004	0,022
Std. Err	0,003	0,004	0,002	0,003	0,010
Panel B: IV estimates (Panel - 8 instruments)					
Housing wealth					
MPC	0,020	*** 0,003	*** 0,005	** 0,015	*** 0,015
Std. Err	0,006	0,001	0,002	0,005	0,006
CI robust to weak instruments	[-.023394, ...]	.003033	... U [.000415, ...]	[.005962, ...]	[.00279, .015066]
Fstat	12,624	41,193	6,399	4,381	25,819
SW Fstat	18,626	59,175	5,739	5,375	34,240
Financial wealth					
MPC	0,003	0,018	* 0,011	0,023	0,107
Std. Err	0,006	0,010	0,009	0,014	0,033
CI robust to weak instruments	[-.007887, .014264]	.018371	[... , .026148]	[... , .078685]	[.107092, .172206]
Fstat	595,638	37,530	9,003	14,817	14,520
SW Fstat	838,492	47,027	10,121	10,954	20,413
Other controls	Yes	Yes	Yes	Yes	Yes
Number of households	831	812	1 776	3 023	2 219

Note: The IV estimates display the standard F statistics (Fstat) and the Sanderson-Windmeijer F-statistics (SWFstat) from the first-stage regressions. Control variables for the panel regressions: age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), household composition (number of adults and number of children) and questions on income (is income in the reference period normal/above normal/below normal, is income in the next year expected to rise below/above price). The controls in the panel regression are measured in Wave 1. Financial wealth is all financial assets owned by the household. It includes: sight accounts, saving accounts, mutual funds, bonds, non-self-employment private business, shares, managed accounts, private lending, voluntary pension plans or whole life insurance contracts, and ‘other’ financial assets. Housing wealth is sum of the household’s main residence’s value, and the other real estate property’s value.

Confidence intervals robust to weak instruments following [Andrews \(2018\)](#) are computed thanks to the Stata package twostepweakiv ([Sun \(2018\)](#)). We use the LC-confidence intervals.

Table B5

B5.a: Robustness: Marginal propensity to consume out of wealth at the mean – IV panel with country-specific instrument selection

	Country-specific selection of instruments		Full set of instruments	Number of obs.
	(1)	(2)	(3)	
	IV - 8 instr.	IV - 14 instr.	IV - 14 instr.	
Belgium				
MPC	0,012 ***	0,009 ***	0,009 ***	831
Std. Error	0,003	0,002	0,002	
CI robust to weak instruments	[.007206, .018477]	[.006133, .011584]	[.006574, .011584]	
Fstat	66,4	63,7	41,9	
Cyprus				
MPC	0,003 ***	0,003 ***	0,002 ***	812
Std. Error	0,001	0,001	0,001	
CI robust to weak instruments	[.001382, .003671]	[.001156, .003873]	[.003614, .00437]	
Fstat	158,1	122,3	49,2	
Germany				
MPC	0,005 **	0,004 ***	0,004 ***	1 776
Std. Error	0,002	0,002	0,001	
CI robust to weak instruments	[.002123, .011013]	[.001776, .006749] U [.011721, ...]	[.003453, .004568]	
Fstat	25,0	19,3	12,0	
Spain				
MPC	0,012 ***	0,010 ***	0,009 ***	3 023
Std. Error	0,003	0,003	0,003	
CI robust to weak instruments	[.009095, .022317]	[.008707, .018761]	[.011954, .018861]	
Fstat	9,4	23,3	12,6	
Italy				
MPC	0,015 **	0,015 **	0,015 ***	2 219
Std. Error	0,006	0,006	0,006	
CI robust to weak instruments	[.004156, .023496]	[.005095, .022609]	[.00416, .024744]	
Fstat	45,5	48,1	20,8	

In columns 1) and 2) the endogenous independent variable is estimated on a restricted set of instruments in the first-stage regression. For each country, we select the most relevant instruments (pvalue < 0.10) to estimate the first stage.

Control variables: age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), household composition (number of adults and number of children) and questions on income (is income in the reference period normal/above normal/below normal, is income in the next year expected to rise below/above price). The controls in the panel regression are measured in Wave 1. Confidence intervals robust to weak instruments following [Andrews \(2018\)](#) are computed thanks to the Stata package `twostepweakiv` ([Sun \(2018\)](#)). We use the LC-confidence intervals. In some rare cases, the LC-confidence intervals is not informative and we opt for the K-confidence intervals when it is more informative (Germany).

B5.b: Robustness: Marginal propensity to consume out of housing and financial wealth – IV panel estimates with 14 instruments

	Belgium	Cyprus	Germany	Spain	Italy
Housing wealth					
MPC	0,013 ***	0,003 ***	0,003 **	0,013 ***	0,015 **
Std. Error	0,004	0,001	0,001	0,003	0,006
CI robust to weak instruments	[.007096, .024372]	.003297	[-.001863, .005154]	[.000642, ...]	[.002532, .014997]
Fstat	13,405	45,443	9,039	18,087	19,199
SW Fstat	16,142	153,707	9,106	17,091	23,112
Financial wealth					
MPC	0,003	0,009	0,016 **	0,008	0,107 ***
Std. Error	0,005	0,007	0,007	0,012	0,032
CI robust to weak instruments	[-.014071, .011169]	[.008593, .019787]	[-.01179, .043494]	entire grid	[.106571, .163671]
Fstat	69,871	92,086	18,270	9,226	19,753
SW Fstat	45,533	99,869	21,311	6,326	24,394
Other controls	Yes	Yes	Yes	Yes	Yes
Number of households	831	812	1 776	3 023	2 219

Note: see [Table B4](#).

Table B6: Marginal propensity to consume out of wealth across the net wealth distribution – OLS estimates

	Belgium	Cyprus	Germany	Spain	Italy
	OLS	OLS	OLS	OLS	OLS
p0-p49					
MPC	0,007	0,004	0,010 *	0,026 ***	0,032 ***
Std. Err	0,006	0,004	0,006	0,006	0,007
Number of households	330	324	596	1031	949
p50-p69					
MPC	0,025 **	0,013 ***	0,001	0,033 ***	0,037 ***
Std. Err	0,011	0,005	0,005	0,006	0,009
Number of households	176	171	311	496	457
p70-p89					
MPC	0,019 ***	0,004 *	0,013 ***	0,020 ***	0,018 ***
Std. Err	0,004	0,002	0,003	0,004	0,007
Number of households	211	186	489	642	513
p90-p100					
MPC	0,008 ***	0,001 *	0,003 ***	0,003 **	0,011
Std. Err	0,002	0,001	0,001	0,001	0,007
Number of households	114	131	380	854	300
Other controls	yes	yes	yes	yes	yes
Total households	831	812	1 776	3 023	2 219

Table B7: Marginal propensity to consume out of net housing wealth, illiquid financial assets and net liquid financial assets

	Belgium	Cyprus	Germany	Spain	Italy
Panel A (8 instruments model)					
Net housing wealth					
MPC	0,021 ***	0,003 **	0,005 **	0,015 ***	0,019 ***
Std. Err	0,006	0,001	0,002	0,005	0,007
CI robust to weak instruments	[.00007, ...]	[-.004097, .006978]	entire grid	entire grid	entire grid
Fstat	12,1	34,0	5,1	4,8	25,3
SW Fstat	22,7	53,6	4,7	4,3	11,8
Net liquid assets					
MPC	0,003	0,001	0,026 **	0,020 *	0,115 ***
Std. Err	0,006	0,023	0,013	0,011	0,039
CI robust to weak instruments	[-.016575, .022471]	[-.050081, .051844]	entire grid	entire grid	entire grid
Fstat	595,3	43,3	6,7	16,0	12,4
SW Fstat	566,9	81,9	7,5	4,0	14,0
Illiquid financial assets					
MPC	-0,026	0,064 **	0,032	-0,004	0,076
Std. Err	0,086	0,031	0,098	0,021	0,185
CI robust to weak instruments	entire grid	entire grid	entire grid	entire grid	entire grid
Fstat	3,3	2,7	1,3	1,9	3,0
SW Fstat	4,1	18,9	2,9	2,8	3,9
Other controls	Yes	Yes	Yes	Yes	Yes
Number of households	831	812	1 776	3 023	2 219

MPC (IV estimates – instruments based on the 8 assets decomposition) estimated country by country. See the definitions in [Appendix A](#).

Statistically significant at ***1%, **5% and *10%. Other control variables: changes between Wave 2 and Wave 1 in age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), and household composition (number of adults and number of children).

Net Housing wealth: housing wealth [DA1100+ DA1120] minus mortgage debt [DL1110 + DL1120].

Other gross assets: Non-housing real assets owned by the household. It includes the value of household's vehicles [DA1130], valuables [DA1131], and the value of self-employment businesses [DA1140].

Net liquid financial assets: Liquid assets owned by the household minus non-collateralized debt. Liquid assets include deposits [DA2101], mutual funds [DA2102], bonds [DA2103], shares [DA2105], and managed accounts [DA2106]. Non collateralized debt is total debt [DL1000] minus mortgage debt [DL1110 + DL1120].

Illiquid financial assets: non-self-employment private business [DA2104], private lending [DA2107], voluntary pension plans or whole life insurance contracts [DA2109], and other assets [DA2018].

Table B8: MPC Financial and Housing Assets, First Quartile of Net Wealth

	Belgium	Cyprus	Germany	Spain	Italy
Panel A: OLS estimates (Panel)					
Housing wealth					
MPC	0.013	0.005	0.012 **	0.026 ***	0.036 ***
Std. Err	0.010	0.004	0.005	0.006	0.007
Financial wealth					
MPC	0.116 ***	-0.051	0.091	0.076	-0.342
Std. Err	0.008	0.249	0.058	0.166	0.273
Panel B: IV estimates (Panel - 8 instruments)					
Housing wealth					
MPC	0.064	-0.003	0.011	0.012	0.016
Std. Err	0.047	0.008	0.025	0.018	0.012
CI robust to weak instruments	entire grid	[-.015397, .009411]	entire grid	entire grid	[... , .097691]
Fstat	7.639	30.881	1.621	15.867	16.457
SW Fstat	11.977	33.846	2.172	19.426	21.405
Financial wealth					
MPC	1.458	0.026	-2.842	3.302	2.472
Std. Err	1.239	0.391	8.825	2.858	4.809
CI robust to weak instruments	entire grid	[-.619013, .671656]	entire grid	[... , -6.0352] U [.967591, ...]	entire grid
Fstat	4.692	65.354	0.119	1.512	0.593
SW Fstat	13.159	92.195	0.081	1.734	2.653
Other controls	Yes	Yes	Yes	Yes	Yes
Number of households	330	324	596	1 031	949

MPC (IV estimates – instruments based on the 8 assets decomposition) estimated country by country. See the definitions in [Appendix A](#). Statistically significant at ***1%, **5% and *10%. Other control variables: changes between Wave 2 and Wave 1 in age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), and household composition (number of adults and number of children).

Table B9: MPC Financial and Housing Assets, Second Quartile of Net Wealth

	Belgium	Cyprus	Germany	Spain	Italy
Panel A: OLS estimates (Panel)					
Housing wealth					
MPC	0.062	*** 0.013	** -0.002	0.035 ***	0.039 ***
Std. Err	0.009	0.006	0.004	0.008	0.009
Financial wealth					
MPC	-0.009	-0.007	0.012	0.006	-0.119
Std. Err	0.046	0.205	0.054	0.028	0.090
Panel B: IV estimates (Panel - 8 instruments)					
Housing wealth					
MPC	0.121	*** 0.048	*** 0.015	0.031 ***	0.036 **
Std. Err	0.022	0.015	0.016	0.008	0.014
CI robust to weak instruments	[.06932, .277184]	entire grid	[-.111295, ...]	[.017105, .065021]	[.012975, .070956]
Fstat	11.503	20.773	4.558	28.401	21.922
SW Fstat	17.221	7.056	7.012	42.826	32.580
Financial wealth					
MPC	-0.207	* 3.717	-0.026	0.083	0.416
Std. Err	0.121	4.032	0.093	0.061	0.456
CI robust to weak instruments	[... , -.105389] U [.199244, .605421] U [.808509, ...]	[-18.5561, -9.01059] U [-2.64689, ...]	entire grid	[.032789, .533815]	[.116632, ...]
Fstat	2.126	10.164	1.208	3.473	3.305
SW Fstat	3.531	8.882	2.352	13.155	7.341
Other controls		Yes	Yes	Yes	Yes
Number of households		176	171	311	496

MPC (IV estimates – instruments based on the 8 assets decomposition) estimated country by country. See the definitions in [Appendix A](#). Statistically significant at ***1%, **5% and *10%. Other control variables: changes between Wave 2 and Wave 1 in age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), and household composition (number of adults and number of children).

Table B10: MPC Financial and Housing Assets, Third Quartile of Net Wealth

	Belgium		Cyprus		Germany		Spain		Italy	
Panel A: OLS estimates (Panel)										
Housing wealth										
MPC	0.023	***	0.004		0.014	***	0.021	***	0.021	***
Std. Err	0.008		0.003		0.004		0.005		0.008	
Financial wealth										
MPC	0.077	**	0.012		0.092	***	0.040		0.136	
Std. Err	0.034		0.031		0.031		0.024		0.095	
Panel B: IV estimates (Panel - 8 instruments)										
Housing wealth										
MPC	0.022	*	0.000		0.052	***	0.015		0.025	*
Std. Err	0.013		0.004		0.014		0.010		0.015	
CI robust to weak instruments	entire grid		entire grid		entire grid		entire grid		[.00056, .049552]	
Fstat	25.885		20.199		10.443		10.723		37.876	
SW Fstat	6.937		22.475		2.571		18.055		49.336	
Financial wealth										
MPC	0.212		0.452		-0.397		-0.240		0.549	*
Std. Err	0.372		0.423		0.548		0.643		0.331	
CI robust to weak instruments	entire grid		[... -1.61861] U [.106911, ...]		entire grid		[... , .285136] U [1.33576, ...]		[.010136, 1.35614]	
Fstat	2.393		0.645		0.679		0.703		6.698	
SW Fstat	2.480		1.521		1.052		1.271		14.135	
Other controls	Yes		Yes		Yes		Yes		Yes	
Number of households	211		186		489		642		513	

MPC (IV estimates – instruments based on the 8 assets decomposition) estimated country by country. See the definitions in [Appendix A](#). Statistically significant at ***1%, **5% and *10%. Other control variables: changes between Wave 2 and Wave 1 in age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), and household composition (number of adults and number of children).

Table B11: MPC Financial and Housing Assets, Fourth Quartile of Net Wealth

	Belgium		Cyprus		Germany		Spain		Italy
Panel A: OLS estimates (Panel)									
Housing wealth									
MPC	0.013	***	0.004	***	0.004	***	0.006	***	0.012
Std. Err	0.002		0.001		0.001		0.002		0.008
Financial wealth									
MPC	0.037	***	0.070	***	0.013	***	0.005		-0.038
Std. Err	0.013		0.014		0.004		0.006		0.047
Panel B: IV estimates (Panel - 8 instruments)									
Housing wealth									
MPC	0.014	***	0.004	***	0.004	**	0.012	***	0.011
Std. Err	0.004		0.001		0.002		0.003		0.011
CI robust to weak instruments	entire grid		[.001805, .006316]		[-.001487, .016268]		[-.006491, .019679]		[... , .053083]
Fstat	24.007		354.523		20.240		12.877		22.536
SW Fstat	35.782		534.522		16.048		22.818		27.146
Financial wealth									
MPC	0.037		0.075	***	0.009		0.009		0.032
Std. Err	0.033		0.017		0.014		0.013		0.383
CI robust to weak instruments	entire grid		[.047713, .101894]		entire grid		[-.012414, .040942]		entire grid
Fstat	0.700		9.818		2.135		11.709		0.860
SW Fstat	1.114		14.600		2.559		20.010		1.295
Other controls	Yes		Yes		Yes		Yes		Yes
Number of households	114		131		380		854		300

MPC (IV estimates – instruments based on the 8 assets decomposition) estimated country by country. See the definitions in [Appendix A](#). Statistically significant at ***1%, **5% and *10%. Other control variables: changes between Wave 2 and Wave 1 in age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), and household composition (number of adults and number of children).

Table B12: Robustness: gross income (HFCS variable) instead of disposable income
(Imputed from SILC)

	Belgium	Cyprus	Germany	Spain	Italy
Panel A: Panel regression with 8 instruments					
Gross wealth					
MPC	0,042 ***	0,010 ***	0,009 **	0,012 ***	0,013
Std. Err	0,013	0,001	0,004	0,002	0,018
CI robust to weak instruments	[.016974, .047952]	[.007617, .013106]	[.003564, .015791]	[.010641, .017912]	[-.033085, .029003]
Fstat	28,9	25,8	9,6	14,7	10,5
Other controls	yes	yes	yes	yes	yes
Number of households	827	804	1 776	3 017	2 211
Panel B: Panel regression by wealth group with 8 instruments					
p0-p49					
MPC	0,094 ***	0,044 ***	0,191 *	0,033 **	-0,037
Std. Err	0,027	0,004	0,108	0,014	0,029
CI robust to weak instruments	[.061949, .0918]	[.037121, .055393]	[.04751, .2161]	[.014971, .08327]	[-.124388, -.005472]
Fstat	41,240	47,230	11,597	12,600	5,073
Number of households	327	318	596	1027	941
p50-p69					
MPC	0,071 ***	0,069 ***	0,025	0,025 ***	0,010
Std. Err	0,011	0,026	0,021	0,007	0,035
CI robust to weak instruments	[.054625, .082162]	[.05805, .087734]	null set	[.019071, .03871]	[-.11556, .061544]
Fstat	39,340	8,286	10,591	11,936	7,332
Number of households	175	169	311	496	457
p70-p89					
MPC	0,043 ***	0,010 ***	0,042 ***	0,011 *	0,001
Std. Err	0,011	0,001	0,007	0,007	0,009
CI robust to weak instruments	[.029763, .04678]	[.008301, .010847]	[.033285, .067192]	null set	[-.01777, .017801]
Fstat	35,643	318,589	7,891	31,033	13,175
Number of households	211	186	489	641	513
p90-p100					
MPC	0,009 ***	0,004 ***	0,008 ***	0,006 ***	0,020
Std. Err	0,003	0,002	0,003	0,001	0,014
CI robust to weak instruments	[-.003759, .01345]	null set	[.004647, .01289]	[.003363, .008799]	[-.026626, .036029]
Fstat	12,952	8,405	24,008	18,053	7,114
Number of households	114	131	380	853	300
Other controls	yes	yes	yes	yes	yes
Total number of households	827	804	1776	3017	2211

Table B13: Heterogeneity across ages - IV estimates

	Belgium	Cyprus	Germany	Spain	Italy
Panel A (8 instruments model)					
D(W/Y) * 25-39					
MPC	0,006	0,003	0,013 **	0,036	-0,026
Std. Err	0,013	0,002	0,006	0,046	0,027
CI robust to weak instruments	[-.014676,-.007812]	[.000535,.004782]	... U [.008028,.036738]	[...,-.106698] U [.13467, ...]	[-.133179,-.005532]
Fstat	1175,3	62,1	17,9	5,7	7,0
Number of households	115	234	293	331	213
D(W/Y) * 40-59					
MPC	0,012 *	0,001 *	0,003 *	0,015 ***	0,022 ***
Std. Err	0,006	0,001	0,001	0,005	0,006
CI robust to weak instruments	[.005749, ...]	[.000619,.003135]	[.000501,.005203]	[.011112,.025364]	[.009692,.031864]
Fstat	59,1	68,9	18,4	13,2	21,5
Number of households	418	431	771	1349	1055
D(W/Y) * 60-75					
MPC	0,010 ***	0,003 **	0,005 **	0,010 ***	0,003
Std. Err	0,002	0,001	0,003	0,003	0,011
CI robust to weak instruments	[.008811,.013642]	[-.001767,.001029] U [.002509, ...]	[.002189,.012222]	[.007217,.022036]	[-.019442,.018738]
Fstat	26,0	302,7	12,2	4,6	14,9
Number of households	298	147	712	1343	951
Panel B (14 instruments model)					
D(W/Y) * 25-39					
MPC	0,006	0,003 *	0,012 **	0,024	-0,026
Std. Err	0,011	0,002	0,005	0,018	0,016
CI robust to weak instruments	[-.021715,.027778]	[.000158,.00467]	[.001037,.021546]	[...,-.002101] U [.007814,.049954] U [.079699, ...]	[-.069693,-.012067]
Fstat	1122,8	79,9	67,8	96,2	11,4
Number of households	115	234	293	331	213
D(W/Y) * 40-59					
MPC	0,013 **	0,001	0,004 **	0,005	0,022 ***
Std. Err	0,006	0,001	0,002	0,006	0,006
CI robust to weak instruments	[.008179,.019442]	[-.002632,.001057] U [.003033,.005141]	[.004453,.017206]	[...,.023122]	[.009709,.032178]
Fstat	264,3	43,8	7,7	17,7	21,4
Number of households	418	431	771	1349	1055
D(W/Y) * 60-75					
MPC	0,009 ***	0,003 **	0,004 **	0,009 ***	0,003
Std. Err	0,002	0,001	0,001	0,003	0,010
CI robust to weak instruments	[.006085,.012335]	[...,-.000991] U [.002553,.011217]	[.00108, ...]	[.007484,.02129]	[-.016225,.01916]
Fstat	19,3	22,8	1160,0	7,0	13,7
Number of households	298	147	712	1343	951
Other controls	yes	yes	yes	yes	yes
Number of households	831	812	1776	3023	2219

Estimated MPC and robust standard errors. Fstat: standard F statistics from the first-stage regressions. SWFstat: Sanderson-Windmeijer F statistics.

Control variables: changes between Wave 2 and Wave 1 in age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), and household composition (number of adults and number of children).

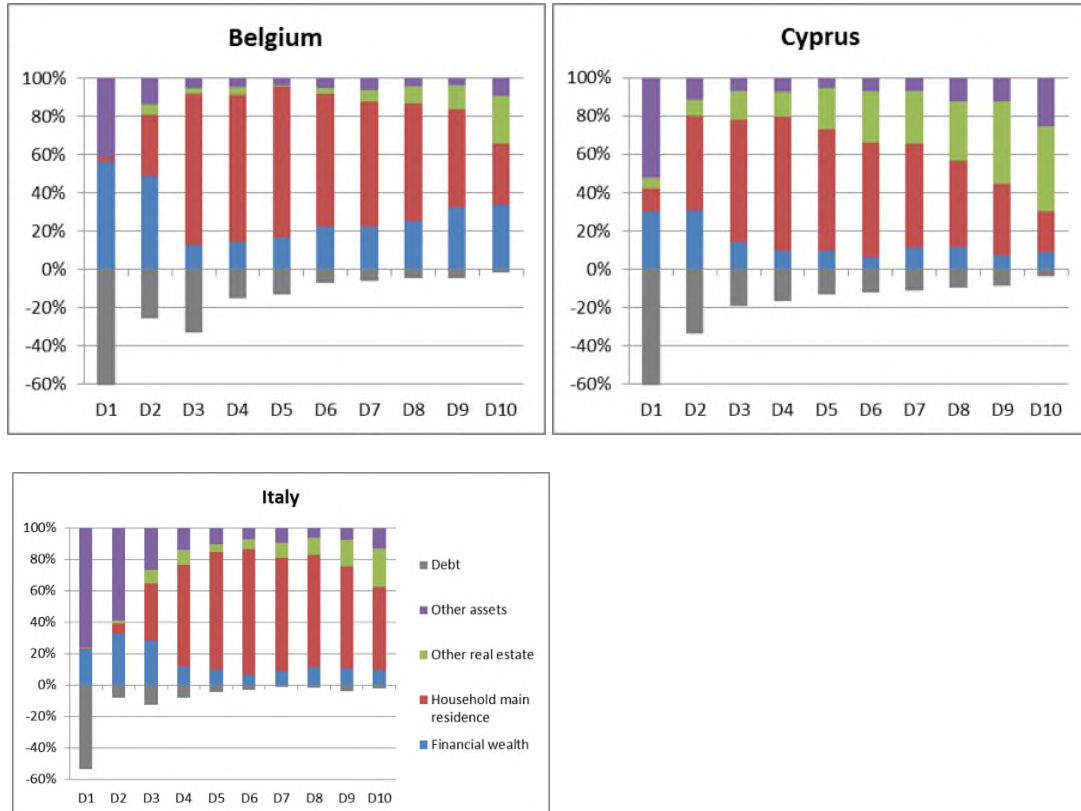
Table B14: Estimated MPC by category of consumption expenditure and by net wealth groups (IV estimates)

		Food and non-alcoholic beverages	Alcoholic beverages, tobacco and narcotics	Clothing and footwear	Housing, water, electricity, gas and other fuels	Furnishings, household equipment and routine household maintenance	Health	Transport	Communication	Recreation and culture	Education	Restaurants and hotels	Miscellaneous goods and services	F-stats	# obs
Belgium	p0-p49	0,0128	*** 0,0019	0,0054	* 0,0217	*** 0,0095	* 0,0037	0,0008	0,0032	0,0111	-0,0003	0,0026	0,0073	* 3,2871	339
	p50-p69	0,0131	*** 0,0028	** 0,0010	0,0290	*** 0,0064	* 0,0035	0,0427	0,0017	* 0,0057	0,0015	* 0,0030	0,0117	*** 9,8880	176
	p70-p89	0,0016	*** 0,0012	0,0013	0,0096	*** 0,0019	0,0022	0,0169	*** 0,0014	** 0,0054	-0,0004	0,0035	** 0,0080	*** 14,5478	215
	p90-p100	0,0017	*** 0,0000	0,0006	** 0,0027	** -0,0001	0,0008	* 0,0035	** 0,0002	0,0006	-0,0002	0,0001	0,0017	* 21,6408	115
Germany	p0-p49	0,0070	0,0011	0,0080	* 0,0355	*** 0,0023	-0,0014	0,0178	-0,0003	0,0091	0,0002	-0,0032	-0,0055	6,4559	596
	p50-p69	0,0018	0,0006	-0,0005	0,0182	0,0015	-0,0004	0,0033	0,0006	0,0012	-0,0002	-0,0021	0,0015	3,1186	311
	p70-p89	0,0059	*** 0,0001	0,0026	** 0,0233	*** 0,0022	** 0,0010	0,0070	* 0,0016	*** 0,0088	*** -0,0002	0,0004	0,0057	*** 8,2236	489
	p90-p100	0,0004	** 0,0001	0,0003	*** 0,0016	* 0,0002	0,0000	0,0020	0,0002	** 0,0008	** 0,0003	** 0,0003	0,0008	** 21,1241	380
Spain	p0-p49	0,0036	* 0,0011	0,0000	0,0181	*** -0,0032	0,0008	0,0037	-0,0001	0,0022	0,0004	0,0019	0,0021	* 8,5238	1031
	p50-p69	0,0110	*** 0,0004	0,0024	** 0,0219	*** 0,0051	*** 0,0021	* 0,0055	0,0011	* 0,0012	0,0000	0,0045	* 0,0042	*** 9,6301	496
	p70-p89	0,0058	*** 0,0004	0,0011	0,0155	*** 0,0025	0,0009	0,0076	0,0013	*** 0,0013	0,0002	0,0033	*** 0,0010	17,6557	642
	p90-p100	0,0019	*** 0,0003	* 0,0005	* 0,0038	*** 0,0008	*** 0,0005	0,0016	*** 0,0003	*** 0,0006	* 0,0000	0,0012	** 0,0008	*** 10,0550	854
Italy	p0-p49	0,0160	*** -0,0022	* -0,0008	0,0665	*** -0,0019	-0,0051	-0,0090	** -0,0004	-0,0005	0,0000	-0,0019	0,0012	10,0171	1033
	p50-p69	0,0103	** -0,0003	0,0004	0,0240	*** -0,0061	-0,0062	* 0,0019	-0,0008	0,0094	0,0014	0,0002	-0,0011	13,4406	484
	p70-p89	0,0025	-0,0014	0,0061	0,0200	*** -0,0061	** -0,0044	* 0,0132	-0,0014	0,0027	0,0001	0,0017	-0,0015	16,1257	532
	p90-p100	0,0065	* 0,0003	0,0007	0,0093	** -0,0008	-0,0008	0,0009	0,0003	0,0008	0,0000	-0,0006	-0,0011	9,9171	307

MPC (IV estimates – instruments based on the 8 assets decomposition) estimated country by country and by category of consumption expenditures. Statistically significant at ***1%, **5% and *10%. Control variables: changes between Wave 2 and Wave 1 in age and age² of the reference person, employment status (whether the reference person is retired (Yes/No), unemployed (Yes/No)), and household composition (number of adults and number of children).

C Additional figures

Figure C1: Heterogeneity in assets composition and in debt across countries and by net wealth decile (% of total assets), for Belgium, Cyprus and Italy



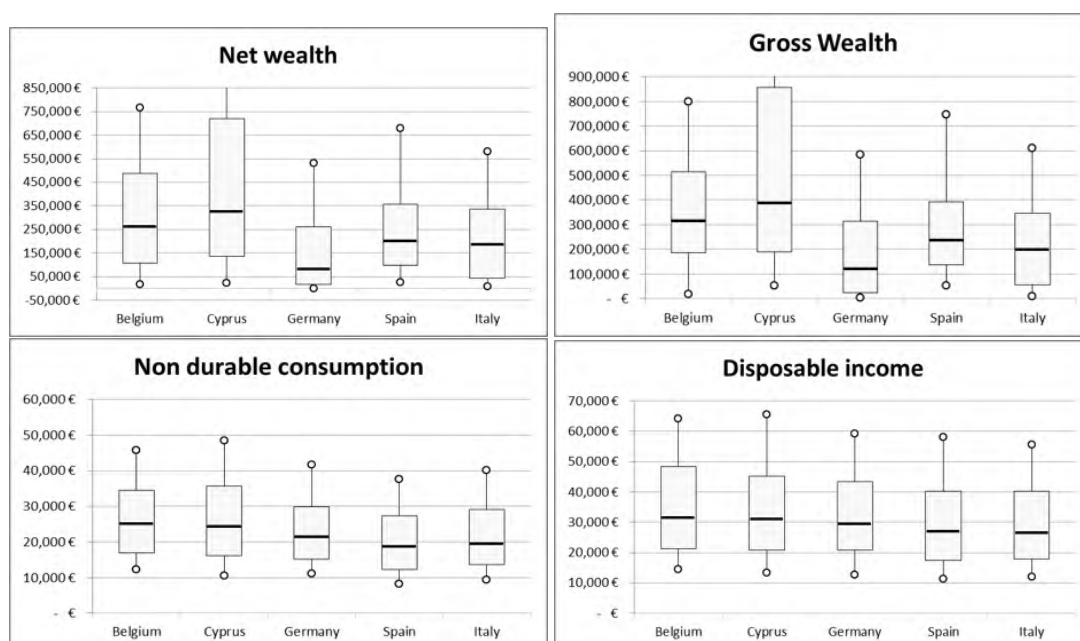
The vertical axis is limited to - 60%. The percentage of debt in total assets for the first net wealth decile (D1) amounts to 460% in Belgium, 200% in Cyprus, 447% in Germany and 129% in Spain. Figures based on the Wave 1 of the HFCS and computed on the estimation sample.

Financial wealth: all financial assets owned by the household (sight accounts, saving accounts, mutual funds, bonds, non-self-employment private business, shares, managed accounts, private lending, voluntary pension plans or whole life insurance contracts, and 'other' financial assets).

Other assets: household's vehicles, valuables, and the value of self-employment businesses.

Debt: all types of debts (mortgages and non-collateralized debt).

Figure C2: The distributions of net wealth, non-durable consumption and disposable income (median, Q1, Q3, P10, P90)



The vertical axis is limited to - 60%. The percentage of debt in total assets for the first net wealth decile (D1) amounts to 460% in Belgium, 200% in Cyprus, 447% in Germany and 129% in Spain. Figures based on the Wave 1 of the HFCS and computed on the estimation sample.

Financial wealth: all financial assets owned by the household (sight accounts, saving accounts, mutual funds, bonds, non-self-employment private business, shares, managed accounts, private lending, voluntary pension plans or whole life insurance contracts, and 'other' financial assets).

Other assets: household's vehicles, valuables, and the value of self-employment businesses.

Debt: all types of debts (mortgages and non-collateralized debt).



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