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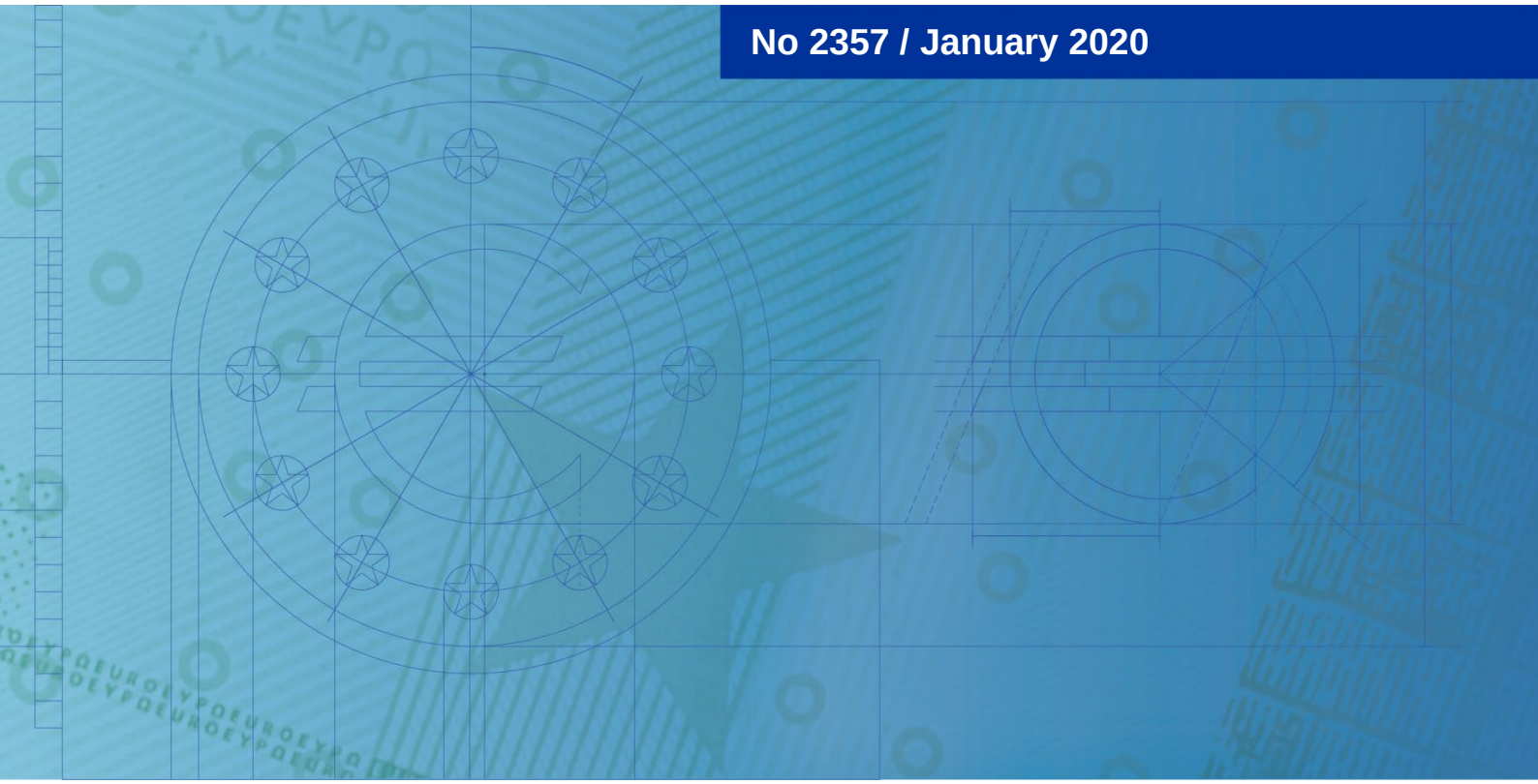
Wealth effect on consumption during the sovereign debt crisis: households heterogeneity in the euro area



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Household Finance and Consumption Network (HFCN)

This paper contains research conducted within the Household Finance and Consumption Network (HFCN). The HFCN consists of survey specialists, statisticians and economists from the ECB, the national central banks of the Eurosystem and a number of national statistical institutes.

The HFCN is chaired by Ioannis Ganoulis (ECB) and Oreste Tristani (ECB). Michael Haliassos (Goethe University Frankfurt), Tullio Jappelli (University of Naples Federico II) and Arthur Kennickell act as external consultants, and Juha Honkkila (ECB) and Jiri Slacalek (ECB) as Secretaries.

The HFCN collects household-level data on households' finances and consumption in the euro area through a harmonised survey. The HFCN aims at studying in depth the micro-level structural information on euro area households' assets and liabilities. The objectives of the network are:

1) understanding economic behaviour of individual households, developments in aggregate variables and the interactions between the two;
2) evaluating the impact of shocks, policies and institutional changes on household portfolios and other variables;
3) understanding the implications of heterogeneity for aggregate variables;
4) estimating choices of different households and their reaction to economic shocks;
5) building and calibrating realistic economic models incorporating heterogeneous agents;
6) gaining insights into issues such as monetary policy transmission and financial stability.

The refereeing process of this paper has been co-ordinated by a team composed of Pirmin Fessler (Oesterreichische Nationalbank), Michael Haliassos (Goethe University Frankfurt), Tullio Jappelli (University of Naples Federico II), Juha Honkkila (ECB), Jiri Slacalek (ECB), Federica Teppa (De Nederlandsche Bank) and Philip Vermeulen (ECB).

The paper is released in order to make the results of HFCN research generally available, in preliminary form, to encourage comments and suggestions prior to final publication. The views expressed in the paper are the author's own and do not necessarily reflect those of the ESCB.

Abstract

This paper studies the heterogeneity of the marginal propensity to consume out of wealth (MPC) both across and within countries. We estimate the MPC based on a cross-country harmonized household level dataset which combines surveys on wealth, income and consumption. We use panel regressions and an instrumental variable approach. First, our panel-based MPC estimates are very similar to those obtained on aggregate data and show substantial heterogeneity across countries. The wealth effect is coming both from housing and financial assets, while the main asset channel varies between countries. Second, the MPC is higher for low-wealth households, whatever the country. Third, we find some asymmetries across countries regarding the reaction to losses versus gains. Fourth, higher MPC is obtained for the two main consumption expenditure categories. Fifth, we find evidences that housing prices shock decreases consumption inequality while financial wealth shocks have a limited effect on consumption inequality.

Cl**assification: D12, E21, C21**

Keywords: consumption, marginal propensity to consume out of wealth, policy distributive effects, household surveys

Non-technical summary

The wealth effect on consumption is one crucial channel for monetary policy transmission. A growing literature shows that the marginal propensity to consume out of wealth may differ across households depending on the type of the shocks, on households' asset composition and indebtedness. This potential heterogeneity may have significant policy implications especially regarding the effectiveness of monetary policy transmission as well as their distributional consequences within a monetary union like the Euro area.

This paper studies the heterogeneity in the marginal propensity to consume out of wealth both within and across five Euro area countries (Belgium, Cyprus, Germany, Spain and Italy) over the period 2010-2014. Consequently, we cover a wide cross-country heterogeneity in terms of country size and economic situations in the Euro area.[1] Indeed, there was a huge cross-country heterogeneity in asset price developments over 2010-2014, a period that we are able to cover with our microdata set.

We use an instrumented panel regression approach based on household level information. It allows us to investigate various dimensions of heterogeneity in the marginal propensity to consume out of wealth across households and across countries, as well as to deal with the endogeneity issues arising from unobservable individual heterogeneity and savings behaviours. We build a unique panel dataset combining individual data from wealth surveys (Household Finance and Consumption Survey, ECB), income surveys (Survey on Income and Living Conditions, Eurostat) and consumption surveys (Household Budget Surveys, National Statistical Institutes).

First, we find significant marginal propensity to consume out of wealth that are in line with macro-based estimates (Guerrieri and Mendicino, 2018; Slacalek 2009). The MPC out of

[1] This list of countries is driven by data constraints. Our empirical analysis is based on country-by country panel regressions based on household level data. Overall, the GDP of these countries amounts to 60% of the Euro area GDP in 2014. 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).

wealth levels at 4.6 cents in Italy, meaning that one additional euro of wealth is associated with 4.6 cents of additional annual consumption. The MPC is about 2.3 cents in Belgium, 1.6 cent in Spain, while it is small in Germany and in Cyprus (less than one cent). The wealth effect on consumption is coming both from housing and financial assets in most countries, while the main asset channel varies between countries. As an extension and robustness check, we are able to account for permanent income in our analysis, and still find significant wealth effects on consumption for all countries.

Second, 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. This pattern remains unchanged when considering detailed expenditures items instead of total non-durable consumption expenditure.

Third, we document differences across countries regarding the asymmetries in consumption reaction. We find some evidences that MPC out of financial wealth losses are larger than MPC out of financial wealth gains in Spain.

Fourth, we find significant wealth effects on most of the categories of consumption for all countries. Higher MPC is obtained in all countries for the two main consumption categories in terms of shares of total non-durable consumption which are also necessities ("Housing, water, electricity, gas and other fuels" and "Food and non-alcoholic beverages"). At the opposite, the wealth effect on "education" or on "restaurants and hotels" is not statistically significant.

Fifth, we conduct a simple simulation exercise to assess the effect on consumption of an exogenous shock on assets values. We find that housing prices shock decreases consumption inequality while financial wealth shocks have a limited effect on consumption inequality.

I. Introduction

In a context of rising wealth and income inequalities, non-conventional monetary policy measures that were implemented after the 2008 financial crisis raise new concerns regarding monetary transmission mechanisms, and its heterogeneous effect across households (Auclert, 2019; Coibion et al., 2017; Cloyne et al., 2018; Kaplan et al., 2018). The wealth effect on consumption is one crucial channel for monetary policy transmission. A growing literature shows that depending on the type of the shocks, on households' asset composition and indebtedness, the marginal propensity to consume out of wealth may differ across households.[2] There is also an extensive literature based on aggregate data, and adopting a cross-country perspective.[3] Much less is known about how these household level differences in consumption reactions may vary across countries,[4,5] while this potential cross-country heterogeneity may have significant policy implications especially regarding the effectiveness of monetary policy transmission as well as their distributional consequences within a monetary union like the Euro area.

This paper studies the heterogeneity in the marginal propensity to consume out of wealth both within and across five Euro area countries (Belgium, Cyprus, Germany, Spain and Italy) over the period 2010-2014. We then cover a wide cross-country heterogeneity in

[2] See among others: Attanasio et al. 2009, Browning et al., 2013; Campbell and Cocco 2007; Christelis et al., 2015, Disney et al. 2010; Mian et al. 2013, Fagereng et al., 2018; Fuster al., 2018.

[3] There 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. These papers also shed light on differences in housing and financial wealth effects, which also varies across countries.

[4] The 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 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.

[5] Another recent strand of the literature estimates the marginal propensity to consume out of wealth or income based on structural models which incorporate elements of microeconomic heterogeneity (Cf. Carroll et al., 2014; Carroll et al., 2017; or Ampudia et al. 2018).

terms of country size and economic situations in the Euro area.[6] After the 2008 financial crisis, the Euro area was facing the sovereign debt crisis over 2011-2012 which induced a divergence in financing conditions according to several dimensions such as credit risks (Gilchrist and Mojon, 2018; Lane, 2012), sovereign bond (Ehrmann and Fratzscher, 2017) or corporate bonds (Horny et al., 2018). From 2012, series of non-conventional monetary policy were implemented to ease euro area financial conditions and to foster economic recovery. There was a huge cross-country heterogeneity in asset price developments over 2010-2014, a period that we are able to cover with our microdata set. Cyprus, Spain and Italy were facing large drops in some asset prices: in house prices, domestic shares, and government bonds (for Spain), while in Belgium and Germany, all asset prices were increasing over the period (Table 1). Cyprus, Spain and Italy are also countries where consumption dropped, while it was moderately increasing in Belgium and Germany. Such pattern may then partly reflect the effect of wealth shocks on consumption. However, these countries also differ on wealth inequality and household asset composition (see HFCN, 2016a), which is likely to induce differences in consumption reactions to asset prices shocks.

[INSERT TABLE 1]

We estimate the marginal propensity to consume out of wealth for Belgium, Cyprus, Germany, Spain, and Italy, using an instrumented panel regression approach based on household level information. It allows us to investigate various dimensions of heterogeneity in the marginal propensity to consume out of wealth across households and across countries, as well as to deal with the endogeneity issues arising from unobservable individual heterogeneity

[6] This list of countries is driven by data constraints. Our empirical analysis is based on country-by country panel regressions based on household level data. Overall, the GDP of these countries amounts to 60% of the Euro area GDP in 2014. 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).

and savings behaviours. To our knowledge, this paper is the first one to provide micro-based estimates of the marginal propensity to consume out of wealth for several countries using a harmonized household level approach in terms of data sources and empirical strategy.

We build a unique panel dataset combining individual data from wealth surveys (Household Finance and Consumption Survey, ECB), income surveys (Survey on Income and Living Conditions, Eurostat) 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. It also includes some questions about consumption and gross income. In order to measure total non-durable consumption and disposable income, we perform statistical matching with two other household level data sources: the Household Budget Surveys (for non-durable consumption) and the Survey on Income and Living Conditions (for disposable income). We observe household level changes in wealth between the years 2010 and 2014 for most of the countries.

Regarding the estimation strategy, we tackle endogeneity issues related to potential omitted variables and to active saving/dissaving by using an instrumented panel regression approach. Our instruments are based on aggregate asset prices developments and on households' asset composition. Within country, the instruments vary with household detailed asset composition, which allows us to provide country-specific MPC estimates and to study both housing and financial wealth effects.

Our main results are as follows.

First, we find significant marginal propensity to consume out of wealth that are in line with macro-based estimates (Guerrieri and Mendicino, 2018; Slacalek 2009). The MPC out of wealth levels at 4.6 cents in Italy, meaning that one additional euro of wealth is associated with 4.6 cents of additional annual consumption. The MPC is about 2.3 cents in Belgium, 1.6

cent in Spain, while it is small in Germany and in Cyprus (less than one cent). The wealth effect on consumption is coming both from housing and financial assets in most countries, while the main asset channel varies between countries. Concerning the estimation methods, our results strongly advocate for using panel data with instrumented wealth shocks and not using cross-sectional data, otherwise a downward bias is observed in the panel OLS estimates for all countries. As an extension and a robustness check, we are able to account for permanent income in our analysis, and still find significant wealth effects on consumption for all countries.

Second, 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. This pattern remains unchanged when considering detailed expenditures items instead of total non-durable consumption expenditure.

Third, we document differences across countries regarding the asymmetries in consumption reaction. In Cyprus, we obtain statistically significant coefficients for financial wealth which are the same for losses and gains within wealth groups. It is not the case for Spain: we find some evidences that MPC out of financial wealth losses are larger than MPC out of financial wealth gains.

Fourth, using the detailed categories of non-durable consumption expenditures provided by the Household Budget Surveys, we find significant wealth effects on most of the categories of consumption for all countries. Higher MPC is obtained in all countries for the two main consumption categories[7] in terms of shares of total non-durable consumption which are necessities ("Housing, water, electricity, gas and other fuels" and "Food and non-alcoholic beverages"). At the opposite, the wealth effect on "education" or on "restaurants and hotels" is not statistically significant.[8]

[7] As defined by the Classification of individual consumption by purpose (COICOP).
[8] Except for Spain.

Fifth, we conduct a simple simulation exercise[9] to assess the effect on consumption of an exogenous shock on assets values. We find that housing prices shock decreases consumption inequality while financial wealth shocks have a limited effect on consumption inequality.

This paper is organized as follows. Section 2 presents the data we use and Section 3 details our empirical strategy. The results are commented in Section 4. The results of the simulation exercise of an asset price shock on consumption inequality are presented in Section 5. Section 6 concludes.

2. Wealth, consumption and income at the household level

2.1. Data sources

One main difficulty in the empirical literature is to rely on a household level dataset including reliable information on consumption[10], wealth and income and allowing to identify wealth shocks (Cooper and Dynan, 2016). Some papers use consumption surveys merged with local housing prices (e.g., Attanasio et al. 2009, Campbell and Cocco 2007, Disney et al. 2010), reported changes in spending and reported wealth losses and gains (Christelis et al. 2015), 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), or longitudinal wealth surveys including some questions about consumption (Banks et al., 2013).

In order to investigate the heterogeneity in the MPC across and within countries, household level and cross-country harmonized information on wealth, consumption and income are required. To this aim, we combine wealth, consumption and income surveys. Our main data source is the Eurosystem Household Finance and Consumption Survey which is a

[9] This exercise does not account for changes in household behaviors, or for general equilibrium effects.
[10] See Browning et al. (2014) on the measurement of household consumption expenditures based on micro-data.

harmonized wealth survey for Euro area countries with a panel component for some of them. In order to measure total non-durable consumption and disposable income, we perform statistical matching with two other household level data sources: the Household Budget Surveys and the Survey on Income and Living Conditions.

Wealth survey

Our main data source is the Household Finance and Consumption Survey (HFCS, ECB) which 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. A panel component is available for some countries.

Consumption measure

The measure of consumption is a crucial issue. While the HFCS only collects information on some item expenditures without providing a measure of total non-durable consumption, the Household Budget Surveys (HBS) provide the best available household level information about consumption distribution. These surveys collect 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 linked with the HFCS as they do not survey the same sample of households. Nevertheless, we can 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 data[11] 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 in Appendix A and Figure A1).

Using this rank hot-deck imputation based on HBS data, we are also able to break down consumption into detailed items of the Classification of Individual Consumption by Purpose (COICOP).

[11] 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. The 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.
[13] We use the function implemented in the R package StatMatch (D'Orazio, 2017).
[14] More 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).

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 form the SILC to HFCS households. We use gross income which is available in both sources to rank 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). For most of them 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 necessary cleaning on extreme values (see the detail in the Data Appendix). In the end, our estimation sample includes from 812 households in Cyprus to 3,023 households in Spain. The comparison between the descriptive statistics for the main

[15] We 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 dramatically impacted in terms of cross-country comparisons (Table B.4 in Appendix B). Based on gross income, the MPC estimates tend however to be larger at the mean. 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.

[16] See Table A.1 in the Data Appendix for the few differences across countries.

variables based on the initial sample and the ones obtained after cleaning do not reveal crucial differences (Table A2 in Appendix A).

2.3. Heterogeneity in wealth and consumption across and within countries

Our data are in line with well-known facts about the distributions of consumption, wealth and income (Figure 1). 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.[17]

[INSERT FIGURE 1]

There is also a huge heterogeneity within and across countries regarding net wealth composition (Figure 2). In particular, the share of housing assets[18] 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 patterns across countries. 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.[19]

[17] See for instance Brindusa et al (2018) for Spain.
[18] Housing assets refers to household's main residence and other real estate properties.
[19] The 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 (2017) for a discussion and other references)

[INSERT FIGURE 2]

In all countries of our sample, we observe 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 3). Such heterogeneity may partly reflect debt behaviors and saving decisions over the period. When focusing only on the value of total assets (gross wealth), we also observe gains and losses across households. However, these figures are driven both by assets price developments and by saving behaviors.

[INSERT FIGURE 3]

To document the pure effect[20] of asset price changes on household wealth, we compute counterfactual wealth losses/gains at the household level based on the differences between the value of the household total assets in Wave 1 and its simulated value considering country specific aggregate prices developments between Wave 1 and Wave 2 displayed in Table 1 (we use later this counterfactual changes in wealth as an instrument, see Section 3). Heterogeneity within country in these counterfactual gains and losses thus reflects differences in the households' wealth composition. In order to compute the counterfactual gains/losses, we decompose the household's wealth into 8 types of assets defined according to the associated aggregate prices (housing assets, deposits, governments bonds, non-financial corporation's bonds, financial corporation's bonds, domestic shares, worldwide shares, and other assets, see Table 1 and Table A5 in Appendix A).

[20] The "pure" effect refers to changes in wealth related to prices developments and not related to saving/dissaving decisions.

The counterfactual gains/losses in wealth at the household level (ΔCW_h^i) are defined as:

$$\Delta CW_h^i = \left(\sum_{i=1}^{8} Sw_h^i\right)_{t=2} - \left(\sum_{i=1}^{8} Aw_h^i\right)_{t=1} \qquad (1)$$

where Aw_h^i is the actual wealth of category *i* owned at period 1 by household *h* and Sw_h^i is the simulated wealth component *i* for household *h* at period 2. It is simulated by applying the asset price changes over the period:

$$Sw_{h,t=2}^i = Aw_{h,t=1}^i * \frac{p_{t=2}^i}{p_{t=1}^i} \qquad (2)$$

with $p_{t=2}^i$ the price of the asset i at period 2, and $p_{t=1}^i$ the price of the asset i at period 1.

[INSERT TABLE 2]

Due to differences in portfolio and in assets prices movements, we observe heterogeneous wealth shocks within and across countries (Table 2). The counterfactual changes in wealth differ both in terms of sign and magnitude. In countries facing drop in some assets prices (Cyprus, Spain and Italy, see Table 1), we observe both households facing losses and other ones experiencing gains. For these countries, the average shock is negative, both for the whole population as well as when considering separately wealthy people (above 70th percentile of net wealth), and less wealthy ones (below the 70th percentile of net wealth). High-wealth people face on average larger negative shocks in Italy (-8.9% versus -5.0% for the low-wealth group) and in Spain (-18.1% versus -17.1% for the low-wealth group), while in Cyprus the average shocks do not differ between high-wealth and low-wealth people (about -9.5%). However, in Cyprus we observe both larger positive and negative shocks for low-wealth people than for high-wealth people.

In Belgium and Germany, all asset prices have increased over the period (Table 1). On average, in Germany, the size of the shocks does not differ among low-wealth and high-

wealth people (+13.4%) while in Belgium high-wealth people were experiencing larger gains (+8.8%) than low-wealth people (+7.8%).

These differences in wealth levels and composition, as well as the heterogeneity in wealth shocks are likely to lead to differences in the marginal propensity to consume out of wealth across and within countries.

3. Empirical strategy

Our estimation strategy is based on an instrumented panel regression approach. We are thus able to control for individual unobserved heterogeneity that might vary systematically across households and contaminate the true relationship between consumption and wealth (Paiella, 2009; Disney et al. 2010). We consider a consumption function based on the life cycle model where individuals use wealth accumulation to smooth consumption over their life cycle. Current consumption is then proportional to total wealth (i.e. the sum of real non-human wealth and real human wealth, the latter being defined as the present value of expected future income)[21]. Our baseline specification is:

$$\frac{C_{h,t}}{Y_{h,t}} = \beta_0 + \beta_1 \frac{W_{h,t}}{Y_{h,t}} + \gamma Z_{h,t} + e_h + u_{h,t} \qquad (3)$$

Where $C_{h,t}$, $Y_{h,t}$ and $W_{h,t}$ stand respectively for consumption, disposable income and wealth for a given household *h* at time *t*. $Z_{h,t}$ is a list of control variables (age and other demographics) and e_h is the household fixed effect accounting for time invariant omitted variables (such as risk and time preferences) and $u_{h,t}$ is an error term. β_1 denotes the marginal propensity to consume out of wealth (or wealth effect).

[21] Due to data limitations, our baseline specification does not account for changes in permanent income. We investigate however the robustness of our result when a measure of permanent income is discussed in Section 4.3.

Equation (3) is estimated country by country using the first differences estimator (Equation 3'):

$$\Delta \frac{C_h}{Y_h} = \beta_1 \Delta \frac{W_h}{Y_h} + \gamma \Delta Z_h + \vartheta_h \qquad (3')$$

Where Δ is the first difference operator; $C_{h,}$, Y_h and W_h stand respectively for consumption, disposable income and wealth for a given household *h,* Z_h denotes a list of control variables (age and age² of the reference person, whether the reference person is retired (Yes/No), unemployed (Yes/No), and the household composition (number of adults and number of children[22]) and ϑ_h an error term. Compared to estimates based on cross-sectional data, we are thus able to account for the endogeneity issue arising from the time-invariant individual heterogeneity.

There is however another endogeneity issue due to the fact that the household consumption and wealth may be simultaneously driven by a common factor (simultaneity bias), such as household expectations about future growth. To handle this problem, we adopt an instrumental variable approach based on variations in aggregate asset prices (cf. Banks et al., 2012, Bottazzi et al. 2017). We build simulated household wealth components in Wave 2 considering the detailed asset composition[23] in Wave 1 and applying aggregate prices growth on each detailed wealth components between Wave 1 and Wave 2, as already considered in Section 2.3 (see the details of the construction of the instruments in Appendix A.2). This approach relies on the assumption that aggregate asset prices variations are exogenous at the household level and mostly driven by the effect of the sovereign debt crisis and by non-conventional monetary policy measures. Thus, the difference between the household total

[22] This list of control variables includes the statistically significant variables we obtained after having tested a larger number of control variables.
[23] Ideally, one would use the household wealth composition before Wave 1. This is however not possible with our dataset.

assets value in Wave 1 and its simulated value in Wave 2 reflects these prices variations and is not driven by saving decisions or portfolio reallocations over the period.

The first stage regression is as follows:

$$\Delta \frac{W_h}{Y_h} = \alpha_0 + \sum_{i=1}^{I} \alpha_1^i \Delta \frac{CW_h^i}{Y_h} + \omega \Delta Z_h + \mu_h \qquad (4)$$

where Δ is the first difference operator; $\Delta \frac{CW_h^i}{Y_h}$ stands for the changes in the counterfactual value of the *ith* wealth components (divided by income) of the household *h*. $Z_{h,t}$ is the list of control variables previously defined and μ_h an error term.

The counterfactual change in the wealth to income ratio is based on the household's wealth decomposition into 8 types of assets defined in Section 1.3 and on the associated aggregate prices. It is defined as:

$$\Delta \frac{CW_h^i}{Y_h} = \left(\frac{\sum_{i=1}^{8} Sw_h^i}{Y_h} \right)_{t=2} - \left(\frac{\sum_{i=1}^{8} Aw_h^i}{Y_h} \right)_{t=1} \qquad (5)$$

where Aw_h^i is the actual wealth of category *i* owned at period 1 by household *h* and Sw_h^i is the simulated wealth component *i* for household *h* at period 2, simulated by applying the asset price changes over the period as previously defined by Equation 2. For robustness checks, we also consider the HFCS total wealth broken down by 14 asset categories (instead of the 8 previous categories, i.e. we decompose real wealth into five assets and financial wealth into nine assets, see Table A5 in Appendix A).

4. Results

4.1. Main results

Mean MPC by country

We find statistically significant estimates for the marginal propensity to consume out of wealth (see Table 3). While most existing microdata based papers find low MPC based on

individual data, we obtain a striking result based on our panel dataset: considering our baseline regression (column 3), the MPC estimates are in line with the macro-based ones (Guerrieri and Mendicino, 2018; Slacalek 2009). [24]

[INSERT TABLE 3]

According to our IV estimates, the MPC out of wealth levels at 4.6 cents in Italy, meaning that one additional euro of wealth is associated with 4.6 cents of additional annual consumption. The MPC is about 2.3 cents in Belgium, 1.6 cent in Spain, while it is small in Germany and in Cyprus (less than one cent)[25].

The F-statistic from the first stage is above the standard threshold in most cases (except Spain in column 3, where it is however close to 10), and indicates that there is no weak instrument issue (see also the detailed results from the first-stage regression, Table B.1 in Appendix B[26]). The MPC estimates are not dramatically affected when considering a larger number of instruments (Table 1, column 2). The first stage F-stat increases in some countries (Spain, Belgium, and Germany), while it decreases for Cyprus.[27] We compute the Andersen

[24] We 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 dramatically impacted in terms of cross-country comparisons (Table B.4 in Appendix B). Based on gross income, the MPC estimates tend however to be larger at the mean. 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.

[25] It is even not statistically significant in Cyprus.

[26] The instrument based on housing prices is significantly and positively correlated with the wealth to income ratio for all countries. The correlation of the other instruments related to financial assets with the wealth to income ratio varies across country. We find a significant negative correlation in Cyprus for the instrument based on the interest rate on deposits while it is positive in Germany (and not statistically significant in the other countries). The coefficient of the instrument based on corporate bonds is statistically significant and negative in Germany and in Italy (and not statistically significant in other countries). One also finds a significant negative correlation with financial bonds in Cyprus and a positive one in Germany. For cross-country comparison purposes, we nevertheless decide to stick with the same list of instrumental variables for the five countries.

[27] We also test for a reduced number of instruments. Considering one aggregated instrument for total wealth instead of the assets decomposition does not dramatically affect the results (see Table B.5a. in Appendix B),

and Rubin confidence interval, which is robust to weak instrument issues. It shows that whatever the number of instruments, the average MPC is statistically significant.

This instrumental strategy seems to be crucial; otherwise a downward bias is observed in the panel OLS estimates for all countries (Table 3, column 1). Our results strongly advocate for using panel data with instrumented wealth shocks and not using cross-sectional data. In Table 3 (columns 3 and 4), we also report OLS estimates based on cross-sectional regressions for Wave 1 and Wave 2.[28] These cross-sectional estimates are stable across waves; they are 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 from the literature.

MPC out of financial and housing wealth

We investigate the MPC heterogeneity across asset types. For this purpose, we distinguish between housing and financial assets (Table 4). According to our IV estimates, the wealth effect on consumption is coming both from housing and financial assets in most countries[29], while the main asset channel varies between countries.

The marginal propensity to consume out of housing assets ranges from 1.1 in Cyprus to 4.4 cents in Italy; the marginal propensity to consume out of financial wealth is not statistically significant in Belgium while it reaches 16.4 cents in Italy.

[INSERT TABLE 4]

however, due to the lack of variability of this aggregated instrument, it deteriorates the first stage F-statistic in some cases, especially for Belgium.

[28] Obviously, we are not able to estimate IV regression using the cross-sectional data, because our instruments are based on the variations of wealth and asset prices between Wave 1 and Wave 2.

[29] The marginal propensity to consume out of financial assets is significant in Cyprus, Italy, Spain and Germany (at the 10% level for this latter) and not significant in Belgium.

We also report 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 endogeneous 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 financial wealth in Italy and Spain and to a lesser extend for housing wealth in Spain. As robustness tests, we also consider IV regressions with our 14 instruments instead of the 8 used in the baseline (see Table B2 in Appendix B, Panel A). Our conclusions are not affected. Only the estimated coefficient for financial wealth in Italy turns out to be not statistically significant. [30]

The main asset channel is not the same depending on the country. For instance, in Cyprus, 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 studied period across country: Belgium and Germany experienced increases in house prices (respectively + 7.0% and +10.0%), while in the other countries house prices were sharply declining (-10.1% in Cyprus, -22.7% in Spain and -11.9% in Italy, cf. Table 1). Asymmetries in households' reaction to gains versus losses may explain part of this heterogeneity. In Subsection 4.3, asymmetries in reaction to total wealth or financial wealth shocks are further explored for the countries where we observed both households facing losses and other ones experiencing gains over the period. Unfortunately, because the counterfactual gains/losses in housing wealth are computed based on country-specific house

[30] Using 14 instruments instead of 8 instruments tends to deteriorate the F-statistics for Cyprus and Germany, while it increases it for Spain and Belgium. When considering only two instruments by aggregating the simulated values of financial assets on the one hand and the simulated values of real assets on the other hand, the F-statistics becomes lower for all countries but Spain, and some estimated MPC turn out to be not statistically significant. In particular in Italy, the statistical significance of the MPC out of housing and financial wealth depends on the number of instruments: they are both statistically significant and positive when considering 8 assets and turn out to be non-statistically significant with two assets (for housing wealth) or 14 assets (for financial assets), (Table B2 in Appendix B).

prices[31], we are not able to investigate asymmetries in consumption reaction to housing wealth shocks.

Some papers suggest that the marginal propensity to consume out of wealth of liquid assets net of debt should be higher than for illiquid financial assets (Muellbauer et al., 2016, Chauvin and Muellbauer, 2018). We follow these papers and consider an alternative regression where we split the financial wealth into net liquid assets (net of non-collateralized debt) and illiquid financial assets, and control for housing wealth net of mortgage debt (Table B.4 in Appendix B.). This regression confirms the previous results regarding the marginal propensity to consume out of housing wealth. We find a statistically significant marginal propensity to consume out of net liquid assets in Germany and in Italy and out of illiquid financial assets in Cyprus. [32] The high MPC obtained for illiquid financial assets in Cyprus (30 cents) may reflect the very specific shocks households were facing, with both huge price shocks (see Table 1) and uncertainty on their asset value (Brown et al., 2017).

The role of housing as collateral for mortgages could also lead to heterogeneous MPC out of housing wealth: higher increases in housing prices, everything else being equal, may relax financing constraints for households that have contracted mortgages.

This cross-country heterogeneity may also reflect differences in credit institutions: 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. 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 also induce differences in the marginal propensity to consume out of wealth. Although interesting research avenues would be to investigate in a more detailed way these sources of

[31] For instance, regional prices variations would be needed. Because there is no harmonized information on households' localization within country in the HFCS (for anonymization purpose), asymmetries in consumption reaction to housing wealth cannot be further explored with our data.
[32] At the 10% level for Italy and for Cyprus.

cross-country heterogeneity, we are not able to do so in this paper given the limited number of countries in our sample.

4.2.Heterogeneity across the net wealth distribution

From a theoretical point of view, uncertainty about wealth and income as well as liquidity constraints may lead the marginal propensity to consume out of wealth to decline as wealth or income increase (Carroll and Kimball, 1996, 2006).[33] Some papers provide evidence of higher MPC for low-wealth households considering transitory income shocks (Carroll et al., 2014; Carroll et al. 2017), fiscal stimulus (Jappelli and Pistaferri, 2014) or asset return shocks (Ampudia et al., 2018; Di Maggio et al. 2018). In order to investigate such heterogeneity across the net wealth distribution, we consider a more flexible specification where we allow the MPC to vary across the net wealth distribution. Starting from equation (3'), we introduce an index function I_h^j reflecting that household *h* belongs to the *j* net wealth group in wave 1; and we interact it with the wealth to income ratio.

We estimate the following regression:

$$\Delta \frac{C_h}{Y_h} = \sum_{j=1}^{J} \beta_1^j \Delta \frac{W_h}{Y_h} * I_h^j + \gamma \Delta Z_h + \vartheta_h \qquad (6)$$

Where Δ is the first difference operator; $C_{h,}$, Y_h and W_h stand respectively for consumption, disposable income and wealth for a given household *h,* Z_h denotes the list of control variables already considered in equation (3'), and ϑ_h is an error term. β_1^j denotes the propensity to consume out of wealth for the j^{th} wealth group. We consider four wealth groups on the basis of the net wealth percentiles in Wave 1 defined within country: below median net wealth, 50th

[33] Age 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. (2018) 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 B.7 in Appendix B).

to 69th percentiles, 70th to 89th percentiles and the top ten percentiles. The results of the IV regressions are presented in Table 5.[34] We consider in turn the total assets decomposition into 8 categories (baseline) or into 14 categories.[35]

[INSERT TABLE 5]

Our results show that the marginal propensity to consume out of wealth is higher for low-wealth people than for the wealthy ones. Such a pattern is observed for all countries, even if for some wealth groups the MPC turns out to be not statistically significant (below median wealth in Germany, and it is statistically significant only at the 10% level for the top wealth group in Cyprus). For instance in Belgium, , the marginal propensity to consume out of wealth decreases from 4.9 to 6.5 cents for people below median net wealth to 1.2 to 1.5 cents for people in the top ten net wealth deciles. For Italy, we find that the MPC decreases from 6.4 cents in bottom deciles to 2.4 cents in the upper tail of net wealth distribution. Such results are in line with Jappelli and Pistaferri (2014) that show that the average MPC declines sharply with cash-on-hand.

The standard first-stage F-Statistics and the Sanderson-Windmeijer ones indicate that the strength of the instrument varies depending on the country and on the wealth group. In particular, we observe a weaker correlation in Cyprus (except in the top ten percentiles), in Belgium, in top percentiles in Spain and Italy and to a lesser extent in bottom percentiles in Germany.[36]

[34] OLS estimates are available in Appendix B (Table B.3).
[35] We then interact our instruments with each of these 4 wealth groups, which lead to 8*4=32 instruments or to 14*4=56 instruments.
[36] As robustness tests, we also consider summing up the detailed simulated assets values into one instrumental variable for each wealth groups. The results are not dramatically impacted, even if it tends to deteriorate the correlation between the instruments and the endogenous explanatory variable (see Table B.6b. in Appendix B).

4.3. Accounting for changes in permanent income

Following the Permanent income/life-cycle hypothesis, consumption should also be affected by permanent income shocks. Based on our data, it is not possible to build a measure of permanent income based on income spells. However, similarly to the SCF, the HFCS does ask whether household's income over the last 12 months was unusally high or low compared to what is expected in a "normal" year, or whether it was about normal. In order to check whether our main results regarding the wealth effect on consumption hold when accounting for permanent income shocks, we follow Carroll (2000) and restrict the analysis to the subsample of households who reported that their income was about normal, both in wave 1 and in wave 2. Note that this income may differ in wave 1 and in wave 2, if the households faced a permanent income shock in between. Given that we estimate a first difference equation, it leads us to estimate equation (3') on the subsample of households who reported that their income was about normal, both in wave 1 and in wave 2. These households account for about one third of the initial estimation sample (in Cyprus and in Spain), more than 40% in Germany and to about 70% in Belgium and in Italy.

[INSERT TABLE 6]

Overall, these results confirm the significant wealth effects on consumption already obtained for the five countries without accounting for permanent income shocks. In other words, during the sovereign debt crisis households in these euro area countries experienced wealth shocks, in addition to permanent income shocks, which led them to adapt their consumption. In most cases, the confidence intervals do not allow to conclude to statistical differences in the marginal propensity to consume out of wealth with or without accounting for permanent income shocks. This is however not the case for Italy where we find a significantly lower

marginal propensity to consume out of wealth when accounting for permanent income shocks (2.8 cents, Table 6) compared with the one obtained without accounting for permanent income shocks (4.6 cents, Table 3, column 3). This result holds also when disaggregating total wealth into housing and financial wealth. It is then in line with Rodano and Rondinelli (2014) who find that during the sovereign debt crisis Italian households where hit by a severe negative permanent income shock. Our results show that, even when accounting for this permanent income shocks, wealth effects on consumption remain significant for Italy.

4.4. Heterogeneity depending on the type of the wealth shocks

There are some papers studying the asymmetric reactions of consumption to transitory income shocks (Bunn et al. 2018; Christelis et al. 2017) and showing that consumption reacts more to negative shocks than to positive ones. There is less evidence regarding the asymmetric effects of wealth shocks. Based on aggregate data, Aspergis and Miller (2006) find evidence that stock-market value affects consumption asymmetrically showing that, negative news on the stock market affect more consumption than positive ones. We take advantage of differences in households' wealth composition and in assets prices developments to investigate whether the type of wealth shocks (gains or losses) induces some heterogeneity in the marginal propensity to consume out of wealth. Such an analysis can only be conducted for the three countries (Cyprus, Spain, and Italy) where we observe both households having faced losses while other ones have experienced gains (see Table 2). As already considered in Section 2.3, we define a wealth loss (resp. a wealth gain) for a given household when we observe a negative (resp. a positive) counterfactual change in its wealth considering his asset composition in Wave 1 and the aggregate asset prices developments at the country level between Wave 1 and Wave 2 (see Equation 1 and Equation 2). Using the counterfactual

losses/gains instead of the actual ones allows us to focus only on the effect of exogeneous price variations and thus to avoid any endogeneity issue related to active saving/dissaving decisions.

We then estimate separately for households facing losses and for those experiencing wealth gains a regression like Equation (6), which allows us to account for heterogeneous marginal propensity to consume out of wealth across the net wealth distribution. For parsimony reasons, we now consider only two wealth groups: the "high wealth" (including and above the 70^{th} percentile) and the "low-wealth" (below the 70^{th} percentile) which is the reference group. We consider in turn total wealth shocks and financial wealth shocks (Table 7).

[INSERT TABLE 7]

First, we confirm the decreasing marginal propensity to consume out of wealth along the net wealth distribution, that was already observed without disentangling positive and negative shocks (Table 5). For instance, among households facing losses in Cyprus, the MPC out of wealth for the low-wealth people is 2.8 euros. The specific-coefficient for high wealth people is -2.4 euros, meaning that the overall MPC for the high wealth group is only about 40 cents. Such a pattern is also obtained for Spain and Italy, both for total wealth and for financial wealth (when statistically significant) as well as for households experiencing gains.

Second, we find some differences across countries regarding the asymmetries in consumption reaction. In Cyprus, we obtain statistically significant coefficients for financial wealth which are the same for losses and gains within wealth groups. It is not the case for Spain: we find some evidences that MPC out of financial wealth losses are larger than MPC out of financial wealth gains.

4.5. Heterogeneity by consumption items

Our original dataset allows us to investigate which categories of non-durable consumption expenditures are the more affected by the wealth effect. We rely on the classification of individual consumption by purpose (COICOP – 2 digits) to estimate the average MPC out each consumption category. Table 8a shows the estimated average MPC for each consumption category together with the average share of each consumption category in total non-durable consumption at the country level.

[INSERT TABLE 8a]

Overall, we find significant wealth effects on most of the categories of consumption for all countries. Moreover, the weighted MPC on non-durable consumption which is simply computed from the MPC estimated for the detailed categories of consumption and the share of each category of consumption expenditure (last column of Table 8a) are in line with the ones directly estimated on total non-durable consumption (between 3 and 5 cents).

Higher MPC is obtained for the two main consumption categories which are necessities. The share of "Housing, water, electricity, gas and other fuels" in non-durable consumption amounts to 19% in Belgium to 34% in Italy and the MPC for this category is higher than 0.7 cents for all countries (0.78 cents in Germany to 2.94 cents in Italy). "Food and non-alcoholic beverages" represents more than 10% of total non-durable consumption (from 13% in Germany to 22% in Italy), and the associated MPC ranges between 0.18 cent in Germany and 1.73 cent in Italy. At the opposite, the wealth effect for the other goods which are luxuries is limited: for instance, the wealth effect on "education" or on "restaurants and hotels" is statistically significant only for Spain (and in Italy at the 10% level for education) and is less than 0.1 cent.

In Table 8b, we allow the MPC to vary across the net wealth distribution by estimating Equation 5 for each category of consumption expenditure. The first-stage estimate is then similar to the one discussed in the Sub-section 4.2. These estimates confirm the decreasing pattern of the marginal propensity to consume out of wealth along the net wealth distribution for the detailed category of consumption expenditures especially when statistically significant estimates are obtained i.e. for "Food and non-alcoholic beverage", "Housing, water, electricity, gas and other fuels". These results are clearly in line with the Engel curve prediction for necessities, with higher MPCs for less affluent households.

[INSERT Table 8b]

5. Wealth and consumption inequalities

Based on our estimates, we investigate how heterogeneous MPC and wealth inequality would affect consumption inequality. We conduct a simple simulation exercise[37] to assess the effect of an exogenous shock on assets values on consumption. We consider in turn a 10% increase in deposits, in shares or in housing assets at the household level; and we report in Table 9, 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 5).

[INSERT TABLE 9]

Overall we find that a housing prices shock decreases consumption inequality 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

[37] This 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.

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 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 2), who also exhibit higher MPC out of wealth than high-wealth people. There is however some cross-country heterogeneity. In particular, the effect of housing prices on consumption inequality in far much limited in Germany than in the other countries due to the lower homeownership rate.[38] 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.

6. 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, when the Euro area was facing the sovereign debt crisis and its consequences. Endogeneity issues related to omitted variables and to active saving/dissaving are tackled by using an instrumented panel regression approach. Our

[38] 44% for Germany while it ranges between 70% (Belgium) and 83% (Spain) for the other countries

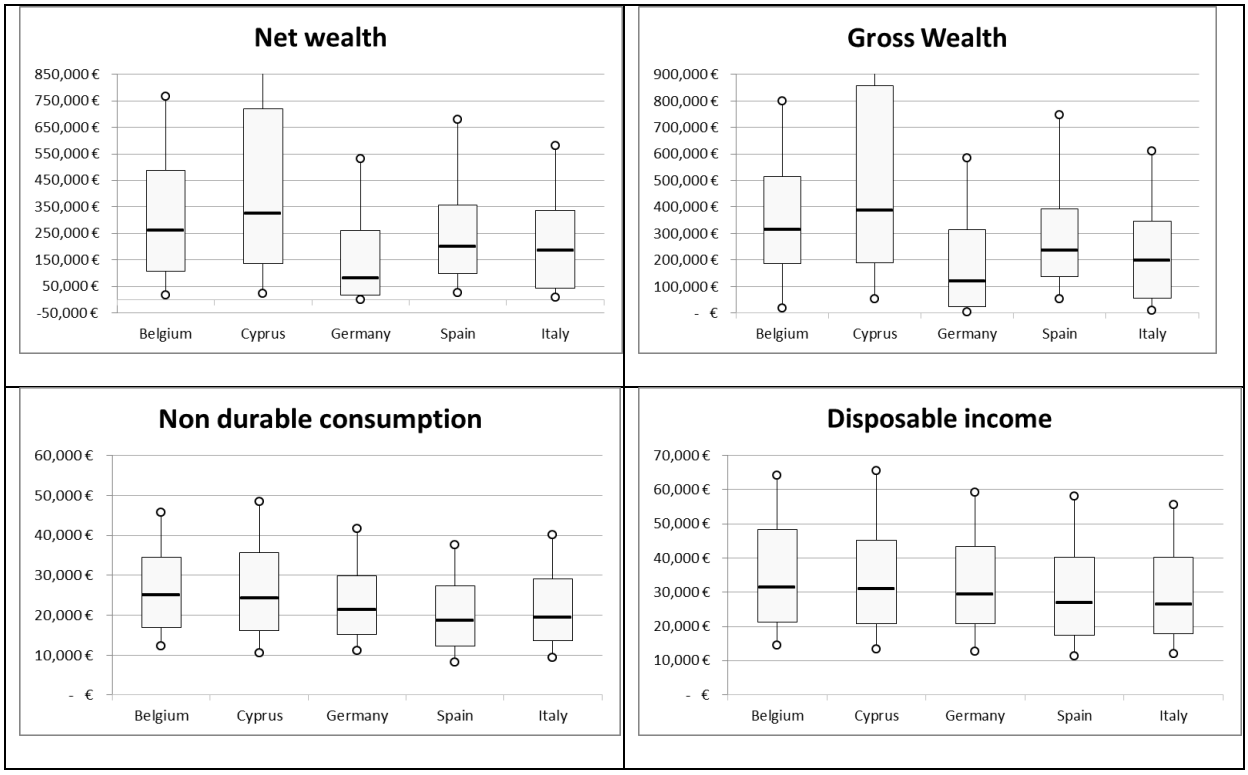
instruments are based on aggregate price developments and on households' asset composition.

Our results highlight various elements of heterogeneity in the wealth-consumption transmission channel. With our instrumental variable strategy, we find average MPC that are in line with macro-based estimates and which vary from 4.6 cents in Italy to less than one cent in Cyprus and Germany. For all countries we find higher MPC for low-wealth people than for the wealthy ones. While we also find significant wealth effect on consumption on most of the detailed categories of non-durable consumption expenditures, higher MPC are obtained in all countries for the two main consumption categories (in terms of share of total non-durable consumption). We also find some asymmetries across countries regarding the reaction to losses versus gains: while there are no differences in Cyprus, we find some evidence in Spain that MPC out of financial losses are larger than MPC out of financial gains.

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 limited effect on consumption inequality. Here again, there is some cross-country heterogeneity. In particular, the effect of housing prices on consumption inequality in far much limited in Germany than in the other countries due to the lower German homeownership rate.

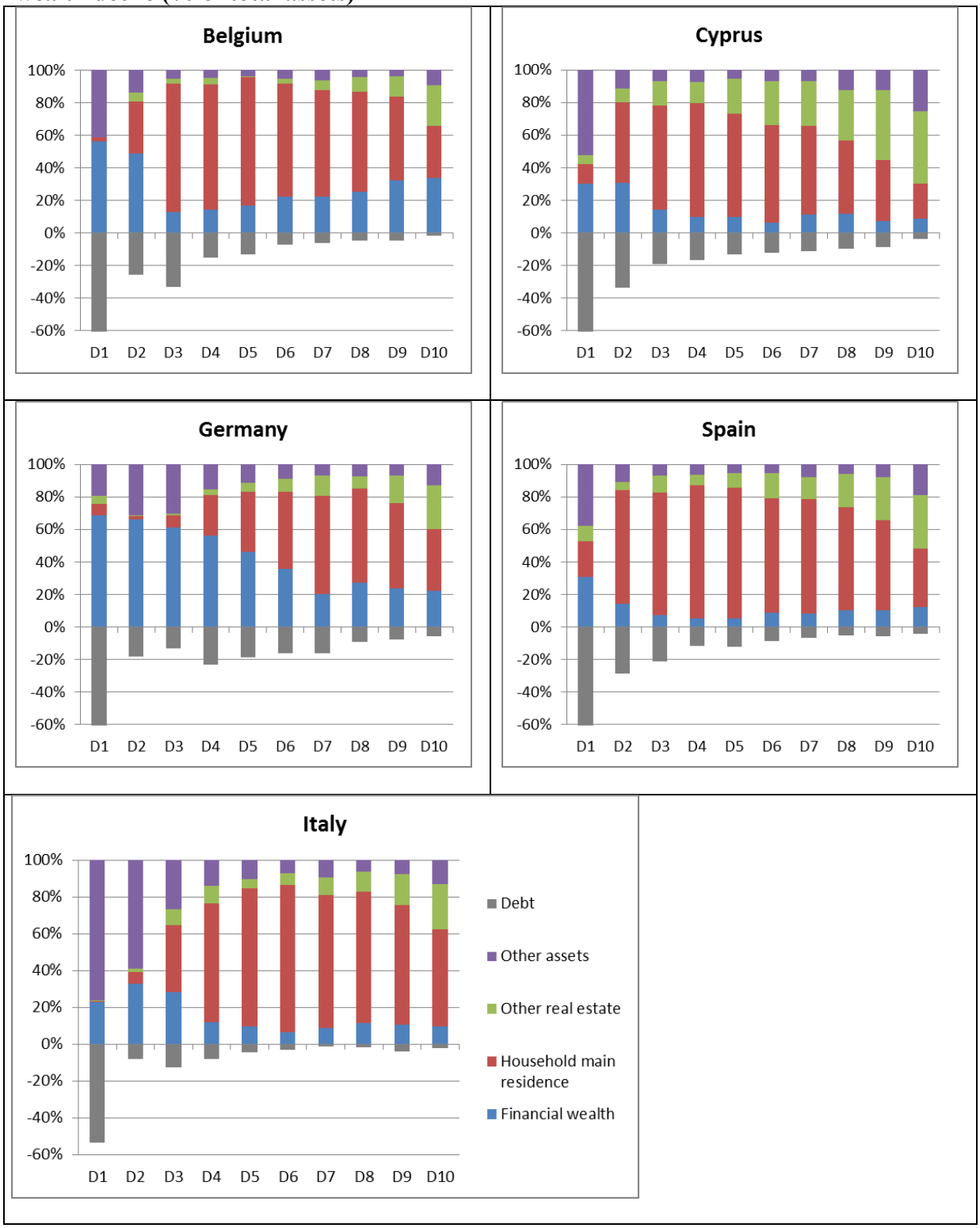
From a methodological point of view, our results strongly advocate for using panel dataset with instrumented wealth shocks rather than cross-sectional data, since the latter shows a downward bias in the estimates. Developing the collect of household level information on wealth and consumption in a panel 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 investigate the sources of the cross-country heterogeneity (such as differences in tax regimes, social security systems, functioning of credit markets, etc.).

Figure 1. The distributions of net wealth, non-durable consumption and disposable income (median, Q1, Q3, P10, P90)



Figures computed on the estimation sample. Sources: HFCS, SILC and HBS. Weighted statistics. P90 for net wealth (res. Gross wealth) in Cyprus amounts to 1,669,241 euros (resp. 1,777,267 euros).

Figure 2. Heterogeneity in assets composition and in debt across countries and by net wealth decile (% of total assets)

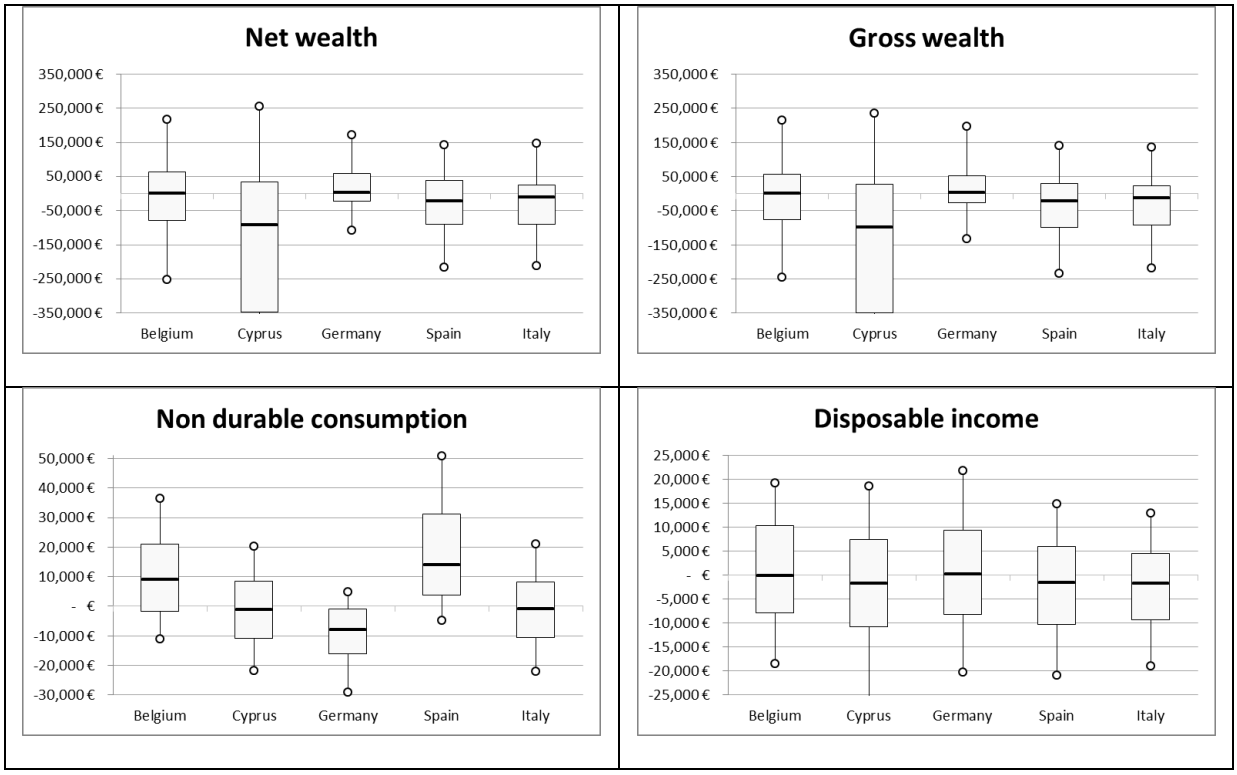


The vertical axis is limited to - 60%. The percentage of debt in total assets for the first net wealth decile (D1) amounts to 460% in Belgium, 200% in Cyprus, 447% in Germany and 129% in Spain. Figures based on the wave 1 of the HFCS and computed on the estimation sample.

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 3. Distribution of the changes in net wealth, non-durable consumption and disposable income 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. P10 for net wealth (resp. gross wealth) in Cyprus is -889,976 euros (resp. -814,945 euros).

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	7.0	-10.1	10.0	-22.7	-11.9
Domestic shares	14.4	-87.7	48.4	-33.6	-9.5
Government bonds	13.2	7.2	4.6	-7.5	9.4
Interest rates on deposits	12.0	16.3	5.9	8.3	10.1
Financial corporation bonds	8.6	8.6	12.7	7.1	8.6
Non-financial corporation bonds	5.3	5.3	9.0	5.4	5.3
Foreign companies	42.1	42.1	46.2	28.5	42.1
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 word equities index.
Households' consumption: final household consumption expenditure. Growth rate adjusted by inflation (IPCH). Source: Eurostat

Table 2. Distribution of counterfactual gains/losses in wealth

Percentiles	Belgium			Cyprus			Germany			Spain			Italy		
	All	Low-wealth	High-wealth	All	Low-wealth	High-wealth	All	Low-wealth	High-wealth	All	Low-wealth	High-wealth	All	Low-wealth	High-wealth
p1	0.1	0.0	5.8	-47.9	-55.7	-32.5	0.2	0.0	7.0	-24.3	-23.6	-26.3	-11.9	-11.9	-11.9
P5	4.6	2.5	6.5	-23.9	-24.3	-21.5	2.0	1.0	8.1	-22.7	-22.6	-23.0	-11.6	-11.6	-11.6
P10	6.4	6.0	6.9	-16.7	-17.3	-15.6	5.2	3.4	8.8	-22.5	-22.5	-22.6	-11.4	-11.3	-11.4
P25	7.0	6.9	7.4	-11.5	-11.5	-11.3	8.3	6.3	9.8	-21.9	-21.9	-21.9	-10.7	-10.6	-10.8
P50	7.8	7.6	8.2	-9.8	-9.7	-9.8	10.5	10.0	11.7	-20.5	-20.5	-20.6	-9.1	-8.3	-9.8
P75	9.2	8.8	9.7	-6.6	-5.9	-7.3	16.8	17.4	15.7	-16.5	-17.0	-15.6	-1.1	0.8	-8.1
P90	11.0	11.2	10.8	0.1	0.8	-1.5	25.8	27.8	21.0	-6.5	0.0	-9.9	3.4	4.6	-4.8
P95	12.0	12.1	11.8	3.8	9.5	2.2	32.2	35.5	24.3	1.8	4.4	-6.3	5.6	6.5	-2.6
P99	14.4	14.1	23.0	14.7	15.1	4.1	46.3	47.3	33.7	8.3	8.3	3.2	8.9	9.1	2.7
Min	0.0	0.0	3.3	-77.4	-77.4	-76.8	0.0	0.0	0.1	-33.6	-33.6	-30.8	-11.9	-11.9	-11.9
Max	27.9	27.9	25.6	16.3	16.3	5.3	48.4	48.4	46.1	8.3	8.3	8.0	15.2	15.2	5.8
Mean	8.1	7.8	8.8	-9.6	-9.5	-9.6	13.4	13.4	13.5	-17.4	-17.1	-18.1	-6.2	-5.0	-8.9
Std	2.6	2.6	2.5	9.7	11.3	6.8	9.1	10.2	5.7	7.5	8.2	5.9	5.9	6.5	3.0
#observations	845	506	339	812	417	395	1,776	942	834.0	3,023	1,502	1,521	2,356	1,486	870

Counterfactual gains/losses computed from household level wealth composition in wave 1 and using the aggregate price developments between wave 1 and wave 2 displayed in Table 1. The percentages account for country-specific inflation developments between wave 1 and wave 2.

"High-wealth": households whose net wealth is equal or above the 70th percentile.
"Low-wealth": households whose net below the 70th percentile.

Table 3. Baseline results: Marginal propensity to consume out of wealth at the mean – OLS, IV panel and cross-section estimates

	Panel						Cross-section			
	(1)		(2)		(3)		(4)		(5)	
	Baseline model									
	OLS		IV - 14 instr.		IV - 8 instr.		1st wave		2nd wave	
	MPC	Std. Err.	MPC	Std. Err.	MPC	Std. Err.	MPC	Std. Err.	MPC	Std. Err.
Belgium	0.009 ***	0.002	0.017 ***	0.004	0.023 ***	0.006	0.003 ***	0.001	0.003 ***	0.001
			[0.015 ; 0.023]		[0.019 ; 0.028]					
			Fstat	*34.2*	*Fstat*	*12.8*				
Cyprus	0.002 **	0.001	0.004	0.002	0.005 *	0.003	0.000	0.001	0.000	0.000
			[0.004 ; 0.006]		[0.005 ; 0.008]					
			Fstat	*4.9*	*Fstat*	*25.4*				
Germany	0.004 ***	0.001	0.008 ***	0.003	0.008 ***	0.003	0.000	0.001	0.000	0.001
			[0.007 ; 0.010]		[0.006 ; 0.010]					
			Fstat	*439.3*	*Fstat*	*88.7*				
Spain	0.004 **	0.002	0.012 ***	0.004	0.016 ***	0.005	0.003 ***	0.000	0.005 ***	0.001
			[0.014 ; 0.018]		[0.014 ; 0.018]					
			Fstat	*15.1*	*Fstat*	*9.4*				
Italy	0.021 ***	0.003	0.047 ***	0.006	0.046 ***	0.006	0.009 ***	0.001	0.008 ***	0.001
			[0.046 ; 0.058]		[0.045 ; 0.057]					
			Fstat	*27.7*	*Fstat*	*33.6*				

Estimated MPC and standard errors. The IV panel regressions (columns 2 and 3) also display in brackets the Andersen-Rubin confidence interval and the F statistics from the first-stage regressions.
Control variables for panel regressions (columns 1 to 3): 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).
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, and household composition (number of adults and number of children).

Number of observations: Belgium (845), Cyprus (812), Germany (1,776), Spain (3,023) and Italy (2,356).

Table 4. Marginal propensity to consume out of housing and financial wealth – OLS and IV panel estimates

		Belgium	Cyprus	Germany	Spain	Italy
OLS estimates (Panel)						
Housing wealth	MPC	0.012 ***	0.005 ***	0.004 ***	0.009 ***	0.023 ***
	Std. Err.	(0.003)	(0.001)	(0.001)	(0.003)	(0.003)
Financial wealth	MPC	0.004	0.003	0.011 ***	0.004	0.021 **
	Std. Err.	(0.003)	(0.004)	(0.002)	(0.003)	(0.009)
Other controls		Yes	Yes	Yes	Yes	Yes
IV estimates (Panel - 8 instruments)						
Housing wealth	MPC	0.025 **	0.011 **	0.016 ***	0.015 **	0.044 ***
	Std. Err.	(0.010)	(0.004)	(0.004)	(0.007)	(0.006)
	Fstat	*20.7*	*21.6*	*16.5*	*10.5*	*33.3*
	SW Fstat	*6.0*	*51.1*	*15.9*	*5.5*	*18.1*
Financial wealth	MPC	0.017	0.032 **	0.010 *	0.026 ***	0.164 **
	Std. Err.	(0.013)	(0.015)	(0.005)	(0.009)	(0.078)
	Fstat	*8.1*	*19.8*	*74.3*	*3.6*	*5.6*
	SW Fstat	*3.5*	*29.4*	*50.3*	*3.2*	*6.5*
Other controls		Yes	Yes	Yes	Yes	Yes
Number of households		845	812	1,776	3,023	2,356

Estimated MPC and robust standard errors in parentheses. The IV estimates also display the standard F statistics (Fstat) and the Sanderson-Windmeijer F- statistics (SWFstat) from the first-stage regressions.

Control variables for the cross-section regressions: age (6 categories), situation on the labour market (employed, self-employed, retired, unemployed, other), education, and household composition (number of adults and number of children).Control variables for panel regressions: 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).

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.

Table 5. Marginal propensity to consume out of wealth across the net wealth distribution –IV panel estimates

		Belgium		Cyprus		Germany		Spain		Italy	
Specification: number of instruments		14*4 instr.	8*4 instr.	14*4 instr.	8*4 instr.	14*4 instr.	8*4 instr.	14*4 instr.	8*4 instr.	14*4 instr.	8*4 instr.
Δ(W/Y) * p0-p49	MPC	**0.049** **	**0.065** ***	**0.019**	**0.035** ***	**0.046** **	**0.036**	**0.056** ***	**0.057** ***	**0.062** ***	**0.064** ***
	Std. Err.	(0.020)	(0.019)	(0.012)	(0.010)	(0.018)	(0.022)	(0.011)	(0.013)	(0.012)	(0.013)
	Fstat	*66.1*	*4.8*	*6.5*	*5.6*	*9.6*	*21.2*	*58.9*	*9.5*	*31.7*	*8.8*
	SW-Fstat	*71.8*	*5.4*	*6.9*	*6.1*	*10.1*	*27.7*	*63.3*	*10.7*	*33.1*	*9.8*
Δ(W/Y) * p50-p69	MPC	**0.076** ***	**0.075** ***	**0.036** ***	**0.036** ***	**0.028** **	**0.032** ***	**0.058** ***	**0.062** ***	**0.066** ***	**0.070** ***
	Std. Err.	(0.013)	(0.013)	(0.009)	(0.009)	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)	(0.014)
	Fstat	*10.3*	*6.4*	*5.9*	*8.8*	*8.2*	*5.4*	*8.6*	*6.6*	*32.9*	*16.3*
	SW-Fstat	*11.2*	*7.4*	*6.3*	*9.7*	*8.7*	*11.6*	*10.4*	*8.4*	*37.9*	*25.4*
Δ(W/Y) * p70-p89	MPC	**0.027** ***	**0.027** ***	**0.012** **	**0.013** *	**0.034** ***	**0.039** ***	**0.026** ***	**0.027** ***	**0.041** **	**0.043** **
	Std. Err.	(0.007)	(0.007)	(0.006)	(0.008)	(0.005)	(0.006)	(0.008)	(0.008)	(0.018)	(0.018)
	Fstat	*211.0*	*4.5*	*5.2*	*6.2*	*13.4*	*7.9*	*18.0*	*12.5*	*6.3*	*8.8*
	SW-Fstat	*154.6*	*6.0*	*5.5*	*6.8*	*14.2*	*16.3*	*19.9*	*14.3*	*9.2*	*13.7*
Δ(W/Y) * p90-p100	MPC	**0.012** ***	**0.015** ***	**0.003**	**0.004** *	**0.006** ***	**0.006** ***	**0.008** ***	**0.011** ***	**0.023** ***	**0.024** ***
	Std. Err.	(0.003)	(0.004)	(0.002)	(0.002)	(0.001)	(0.002)	(0.003)	(0.004)	(0.006)	(0.006)
	Fstat	*32.7*	*2.6*	*22.1*	*27.3*	*50.8*	*60.7*	*3.2*	*2.0*	*7.8*	*5.4*
	SW-Fstat	*34.1*	*3.5*	*23.1*	*29.6*	*53.8*	*80.4*	*3.6*	*2.4*	*9.7*	*7.1*
Other controls		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of households		845	845	812	812	1,776	1,776	3,023	3,023	2,356	2,356

Estimated MPC and robust standard errors in parentheses (except for Cyprus where robust FStat are above 4,000. For this country, and in order to be conservative, we report non robust Std Err.) 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).

Net wealth groups are defined according to the net wealth decile of the households at the country level.

Table 6. Robustness: accounting for permanent income

			Robustness: subsample with permanent income					Results without accounting for permanent income shocks (full sample)
Specification			**Belgium**	**Cyprus**	**Germany**	**Spain**	**Italy**	
Baseline Model IV- 8 intr.	Total gross wealth	**MPC**	**0.031** ***	**0.006** ***	**0.011** ***	**0.020** ***	**0.028** ***	Table 3 - column 3
		Std. Err.	0.007	0.002	0.004	0.006	0.004	
		Fstat	*22.3*	*45.0*	*33.9*	*15.8*	*90.9*	
Housing and Financial wealth- IV - 8 instr.	Housing wealth	**MPC**	**0.048** ***	**0.004** ***	**0.008**	**0.030** ***	**0.028** ***	Table 4
		Std. Err.	0.014	0.002	0.006	0.005	0.005	
		Fstat	*28.2*	*45.3*	*9.2*	*19.5*	*71.7*	
		SW Fstat	*2.4*	*43.2*	*2.2*	*22.0*	*34.1*	
	Financial wealth	**MPC**	**0.009**	**0.062** ***	**0.042** **	**0.015**	**0.076** *	
		Std. Err.	0.010	0.015	0.018	0.018	0.040	
		Fstat	*11.7*	*23.7*	*5.6*	*2.8*	*3.5*	
		SW Fstat	*7.6*	*37.8*	*2.5*	*3.3*	*3.9*	
Number of households			600	275	775	1051	1610	

Table 6 (continued). Robustness: accounting for permanent income

			Robustness: subsample with permanent income					Results without accounting for permanent income shocks (full sample)
Specification			**Belgium**	**Cyprus**	**Germany**	**Spain**	**Italy**	
By net wealth groups - IV - 8 instr.	p0-p49	**MPC**	**0.0839 *** **	**0.031 * **	**0.013**	**0.038 * **	**0.033 *** **	Table 5
		Std. Err.	0.016	0.011	0.010	0.021	0.006	
		Fstat	*37.4*	*2.6*	*221.6*	*1.6*	*18.0*	
		SW-Fstat	*41.0*	*2.8*	*239.8*	*2.3*	*20.1*	
	p50-p69	**MPC**	**0.095 *** **	**0.028 ** **	**0.018**	**0.049 *** **	**0.071 *** **	
		Std. Err.	0.016	0.007	0.013	0.017	0.025	
		Fstat	*4.2*	*11.8*	*1.9*	*5.9*	*5.8*	
		SW-Fstat	*7.1*	*12.9*	*6.9*	*7.0*	*8.8*	
	p70-p89	**MPC**	**0.030 *** **	**0.008**	**0.041 *** **	**0.030 *** **	**0.023 * **	
		Std. Err.	0.009	0.005	0.007	0.003	0.012	
		Fstat	*4.4*	*7.2*	*2.6*	*44.6*	*11.8*	
		SW-Fstat	*7.8*	*8.0*	*7.6*	*50.5*	*17.5*	
	p90-p100	**MPC**	**0.017 ** **	**0.005 *** **	**0.007 *** **	**0.008 * **	**0.021 *** **	
		Std. Err.	0.007	0.001	0.003	0.004	0.007	
		Fstat	3.4	*19.8*	8.9	20.8	13.8	
		SW-Fstat	4.0	*21.8*	17.9	24.0	18.0	
	Number of households		600	275	775	1,051	1,610	

Subsamples restricted to households who reported that their income was about normal both in wave 1 and in wave 2. Estimated MPC and robust standard errors in parentheses (except for Cyprus where robust FStat are above 4,000. For this country, and in order to be conservative, we report non robust Std Err). 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 age^2 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 wealth groups are defined according to the net wealth decile of the households at the country level.

Table 7. Marginal propensity to consume from negative versus positive wealth shocks depending on the net wealth groups – IV estimates (8 assets decomposition)

		Cyprus				Spain				Italy			
		Losses		Gains		Losses		Gains		Losses		Gains	
		Total wealth	Financial wealth	Total wealth	Financial wealth	Total wealth	Financial wealth	Total wealth	Financial wealth	Total wealth	Financial wealth	Total wealth	Financial wealth
Δ(W/Y)	**MPC**	**0.028** ***	**0.025** ***	**0.003**	**0.025** ***	**0.062** ***	**0.057** ***	**-0.162**	**0.060** ***	**0.068** ***	**0.045** *	**-0.031**	**0.066** ***
	Std. Err.	0.006	0.006	0.018	0.009	0.010	0.014	0.128	0.011	0.010	0.024	0.089	0.010
	Fstat	*41.9*	*15.5*	*1189.7*	*45.3*	*28.1*	*8.8*	*165.8*	*39.0*	*36.5*	*18.8*	*24.2*	*36.0*
	SW-Fstat	*452.5*	*331.3*	*8.1*	*19.5*	*30.1*	*10.4*	*19.7*	*37.6*	*36.7*	*24.7*	*1.3*	*34.8*
Δ(W/Y) * high wealth	**MPC**	**-0.024** ***	**-0.021** ***	**0.000**	**-0.020** **	**-0.049** ***	**-0.036** **	**0.167**	**-0.055** ***	**-0.037** ***	**-0.008**	**0.044**	**-0.034** ***
	Std. Err.	0.006	0.007	0.019	0.009	0.011	0.015	0.128	0.011	0.012	0.030	0.090	0.012
	Fstat	*8.5*	*2.5*	*3239.7*	*30.2*	*5.1*	*6.5*	*256.6*	*9.3*	*6.5*	*4.4*	*60.5*	*6.5*
	SW-Fstat	*384.7*	*298.2*	*11.2*	*19.4*	*33.9*	*11.1*	*19.2*	*47.4*	*39.5*	*26.6*	*19.6*	*38.7*
Other controls		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of households		734	519	78	293	2,841	1,174	182	1,849	1,864	266	492	2,090

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).
Gains: Subsample of households with counterfactual gains in total wealth or in financial wealth between wave 1 and wave 2. Losses: Subsample of households with counterfactual losses in total wealth or in financial wealth between wave 1 and wave 2. Counterfactual gains/losses are computed based on household wealth composition in wave 1 and on the country-specific asset prices developments.
High-Wealth is a dummy variable to one if the household net wealth is equals or above the 70th percentile.

Table 8.a. Estimated average MPC by category of consumption expenditure (IV estimates) and share of each category of consumption expenditures in total non-durable consumption

	Food and non-alcoholic beverages		Alcoholic beverages, tobacco and narcotics		Clothing and footwear		Housing, water, electricity, gas and other fuels	
	MPC	Share	MPC	Share	MPC	Share	MPC	Share
Belgium	0.0036 ***	14%	0.0004	2%	0.0014 ***	4%	0.0087 ***	29%
Germany	0.0018 ***	13%	0.0002 *	2%	0.0004	4%	0.0078 ***	32%
Spain	0.0033 ***	17%	0.0004 ***	2%	0.0007 ***	5%	0.0080 ***	33%
Italy	0.0173 ***	22%	0.0020 ***	2%	0.0028 **	6%	0.0294 ***	34%

	Furnishings, household equipment and routine household maintenance		Health		Transport		Communication	
	MPC	Share	MPC	Share	MPC	Share	MPC	Share
Belgium	0.0011	6%	0.0011 ***	5%	0.0059 ***	12%	0.0009 ***	3%
Germany	0.0006 *	4%	0.0004 ***	4%	0.0039 *	12%	0.0005 ***	3%
Spain	0.0005 **	4%	0.0007 **	3%	0.0012 **	10%	0.0005 ***	3%
Italy	0.0039 **	4%	0.0034 *	3%	0.0035 **	10%	0.0023 ***	2%

	Recreation and culture		Education		Restaurants and hotels		Miscellaneous goods and services	
	MPC	Share	MPC	Share	MPC	Share	MPC	Share
Belgium	0.0021 **	8%	0.0001	0%	0.0011	6%	0.0035 ***	6%
Germany	0.0018 ***	10%	0.0000	1%	0.0006	5%	0.0009 *	5%
Spain	0.0005 ***	6%	0.0001 **	1%	0.0008 ***	8%	0.0010 *	8%
Italy	0.0081 ***	5%	0.0003 *	1%	0.0007	4%	0.0052 ***	4%

	F-stats	# obs	Total non durable consumption Weighted MPC	Share
Belgium	12.83	845	0.05	100%
Germany	88.68	1,776	0.04	100%
Spain	9.38	3,023	0.03	100%
Italy	33.62	2,356	0.04	100%

Estimated MPC (IV estimates – instruments based on the 8 assets decomposition). 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).

Share is the average share of each category of consumption expenditure by country (computed on wave 1). Weighted MPC (total non-durable consumption) is the sum of the estimated MPC multiplied by the share of the category by country on all categories of consumption expenditure.
Fstat: standard F statistics from the first-stage regressions.

Table 8.b. 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
Belgium	p0-p49	0.0137 ***	0.0025	0.0002	0.0260 ***	0.0010	0.0031	0.0165
	p50-p69	0.0121 ***	0.0021 **	0.0047 ***	0.0331 ***	0.0087 ***	0.0053 *	0.0177
	p70-p89	0.0058 ***	0.0003	0.0022 *	0.0137 ***	0.0032	0.0022 **	0.0088 **
	p90-p100	0.0021 ***	0.0002	0.0010 **	0.0050 ***	0.0001	0.0004	0.0040 ***
Germany	p0-p49	0.0127 **	0.0021	0.0026 ***	0.0406 ***	0.0065	0.0014	-0.0005
	p50-p69	0.0107 ***	0.0020 *	0.0017	0.0353 ***	0.0007	-0.0034	0.0515
	p70-p89	0.0076 ***	0.0004	0.0037 ***	0.0296 ***	0.0060 ***	0.0018	0.0031
	p90-p100	0.0013 ***	0.0001 *	0.0002	0.0060 ***	0.0003 *	0.0004 ***	0.0028 *
Spain	p0-p49	0.0139 ***	0.0017 **	0.0042	0.0411 ***	0.0012	0.0049 *	0.0045
	p50-p69	0.0123 ***	0.0013 ***	0.0027 ***	0.0352 ***	0.0046 ***	0.0046	0.0037 **
	p70-p89	0.0053 ***	0.0005 *	0.0001	0.0168 ***	0.0011 **	0.0004	0.0024 *
	p90-p100	0.0023 ***	0.0003 ***	0.0005 ***	0.0045 ***	0.0002	0.0004 *	0.0008
Italy	p0-p49	0.0255 ***	0.0019	0.0022	0.0553 ***	0.0082	0.0088	0.0010
	p50-p69	0.0192 ***	0.0039 **	0.0029 *	0.0342 ***	0.0062	0.0053	0.0045
	p70-p89	0.0112 *	-0.0001	0.0069	0.0229 ***	0.0020	-0.0021	0.0063
	p90-p100	0.0111 ***	0.0015 **	0.0014 **	0.0098 ***	0.0017 **	0.0010	0.0029 ***

Table 8.b. (continued)

		Communication	Recreation and culture	Education	Restaurants and hotels	Miscellaneous goods and services	F-stats	SW F-stats	# obs
Belgium	p0-p49	0.0033 ***	0.0091 *	0.0003	0.0016	0.0096 ***	4.82	5.42	845
	p50-p69	0.0032 ***	0.0100 *	0.0006	0.0023	0.0107 ***	6.38	7.40	
	p70-p89	0.0018 ***	0.0053	0.0003	0.0010	0.0056 ***	4.47	5.98	
	p90-p100	0.0004 **	0.0008	0.0001	0.0009	0.0021 **	2.58	3.48	
Germany	p0-p49	0.0031 **	0.0104 *	-0.0004	0.0008	-0.0010	21.20	27.65	1,776
	p50-p69	0.0021 ***	0.0076 **	-0.0003	0.0021	0.0082 ***	5.35	11.60	
	p70-p89	0.0018 ***	0.0111 ***	0.0006 **	0.0033 ***	0.0061 ***	7.92	16.28	
	p90-p100	0.0003 ***	0.0014 ***	0.0000	0.0004	0.0006 *	60.73	80.35	
Spain	p0-p49	0.0017 **	0.0031 **	0.0002	0.0052 **	0.0046 ***	9.50	10.67	3,023
	p50-p69	0.0016 ***	0.0023 **	0.0006 **	0.0055 **	0.0074 ***	6.58	8.44	
	p70-p89	0.0012 *	0.0004	0.0001	0.0012 *	0.0023 ***	12.55	14.32	
	p90-p100	0.0003 ***	0.0003 **	0.0000	0.0004 **	0.0005	2.05	2.42	
Italy	p0-p49	0.0041 ***	0.0075 *	0.0002 *	0.0012	0.0068 **	8.79	9.80	2,356
	p50-p69	0.0020 *	0.0162 ***	0.0013	0.0024	0.0075 ***	16.32	25.43	
	p70-p89	0.0019 **	0.0186 ***	0.0003	0.0023 **	0.0088	8.76	13.72	
	p90-p100	0.0013 ***	0.0018 *	-0.0001	0.0000	0.0020 *	5.43	7.14	

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 age^2 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 9. Simulation exercise: price shock on wealth and consumption inequalities

		Before shock (euros)		After shock (%) With a 10% increase in					
				Deposits		Shares		Housing wealth	
		Consumption	Net wealth	Consumption	Net wealth	Consumption	Net wealth	Consumption	Net wealth
	Mean	27,959	394,124	0.59%	1.22%	0.05%	0.17%	4.07%	6.97%
	Median	25,092	261,663	0.54%	2.48%	0.00%	0.00%	5.07%	10.26%
Belgium	Share Top10/Share B50	0.72	2.67	-1.73%	-0.85%	-0.06%	0.32%	-3.55%	-6.18%
	Gini	0.28	0.54	-0.41%	0.09%	-0.05%	0.09%	-2.55%	-1.42%
	Theil	0.15	0.89	-0.95%	1.43%	-0.10%	0.51%	-5.92%	-5.01%
	Mean Top10/Mean B50	3.62	13.40	-0.43%	-0.25%	-0.06%	0.32%	-3.46%	-3.42%
	Mean	27,718	722,385	0.17%	0.42%	0.03%	0.12%	3.29%	7.89%
	Median	24,179	326,477	0.28%	0.00%	0.00%	0.01%	4.02%	11.98%
Cyprus	Share Top10/Share B50	0.79	5.47	0.16%	-0.32%	0.00%	0.04%	-3.10%	-5.33%
	Gini	0.31	0.65	-0.11%	-0.08%	0.00%	0.01%	-2.47%	-1.07%
	Theil	0.18	1.55	-0.27%	-0.22%	0.02%	-0.01%	-5.38%	-4.05%
	Mean Top10/Mean B50	4.03	28.06	-0.11%	-0.37%	0.00%	0.04%	-3.24%	-4.57%
	Mean	24,644	244,307	0.27%	1.00%	0.03%	0.19%	1.52%	7.27%
	Median	21,246	80,400	0.27%	2.74%	0.00%	0.75%	1.19%	10.95%
Germany	Share Top10/Share B50	0.75	12.98	-0.06%	-2.75%	0.15%	-0.01%	-1.22%	-3.16%
	Gini	0.29	0.73	-0.21%	-0.34%	0.00%	0.01%	-0.70%	-0.52%
	Theil	0.18	4.50	-0.49%	-1.65%	0.00%	-0.13%	-1.93%	-2.89%
	Mean Top10/Mean B50	3.77	65.17	-0.23%	-3.12%	0.04%	0.02%	-0.81%	-2.70%
	Mean	21,456	310,424	0.28%	0.63%	0.02%	0.08%	4.36%	8.70%
	Median	18,659	200,375	0.44%	0.81%	0.00%	0.00%	4.71%	10.68%
Spain	Share Top10/Share B50	0.84	2.64	-0.25%	-0.30%	0.02%	0.07%	-4.79%	-5.02%
	Gini	0.32	0.54	-0.18%	-0.04%	0.00%	0.03%	-3.53%	-1.62%
	Theil	0.20	1.12	-0.42%	-0.22%	0.01%	0.27%	-7.09%	-4.90%
	Mean Top10/Mean B50	4.23	13.21	-0.29%	-0.15%	-0.01%	0.13%	-4.81%	-4.95%
	Mean	23,058	263,050	0.27%	0.48%	0.02%	0.04%	4.06%	8.08%
	Median	19,383	187,093	0.47%	0.50%	0.00%	0.00%	6.42%	8.37%
Italy	Share Top10/Share B50	0.84	3.09	0.24%	-0.94%	-0.01%	0.01%	-3.21%	-0.80%
	Gini	0.32	0.56	-0.18%	-0.16%	-0.01%	0.01%	-2.99%	-0.19%
	Theil	0.20	0.95	-0.37%	-0.60%	-0.01%	0.01%	-6.13%	-2.81%
	Mean Top10/Mean B50	4.24	15.48	-0.08%	-0.45%	-0.01%	0.01%	-3.88%	-0.58%

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 0.59%. To compute this effect, we take the estimated value of consumption and add the increase in consumption as estimated by our empirical model (Table 5, specification with 8 instruments).

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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.[39]

The references period differ across countries (see Table A.1 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 these 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.

[INSERT TABLE A1]

[INSERT TABLE A2]

❖ Main Definitions

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

[39] Netherlands are not included in Eurostat HBS micro-data, while the age of the reference is not available for Malta wave 1.

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).

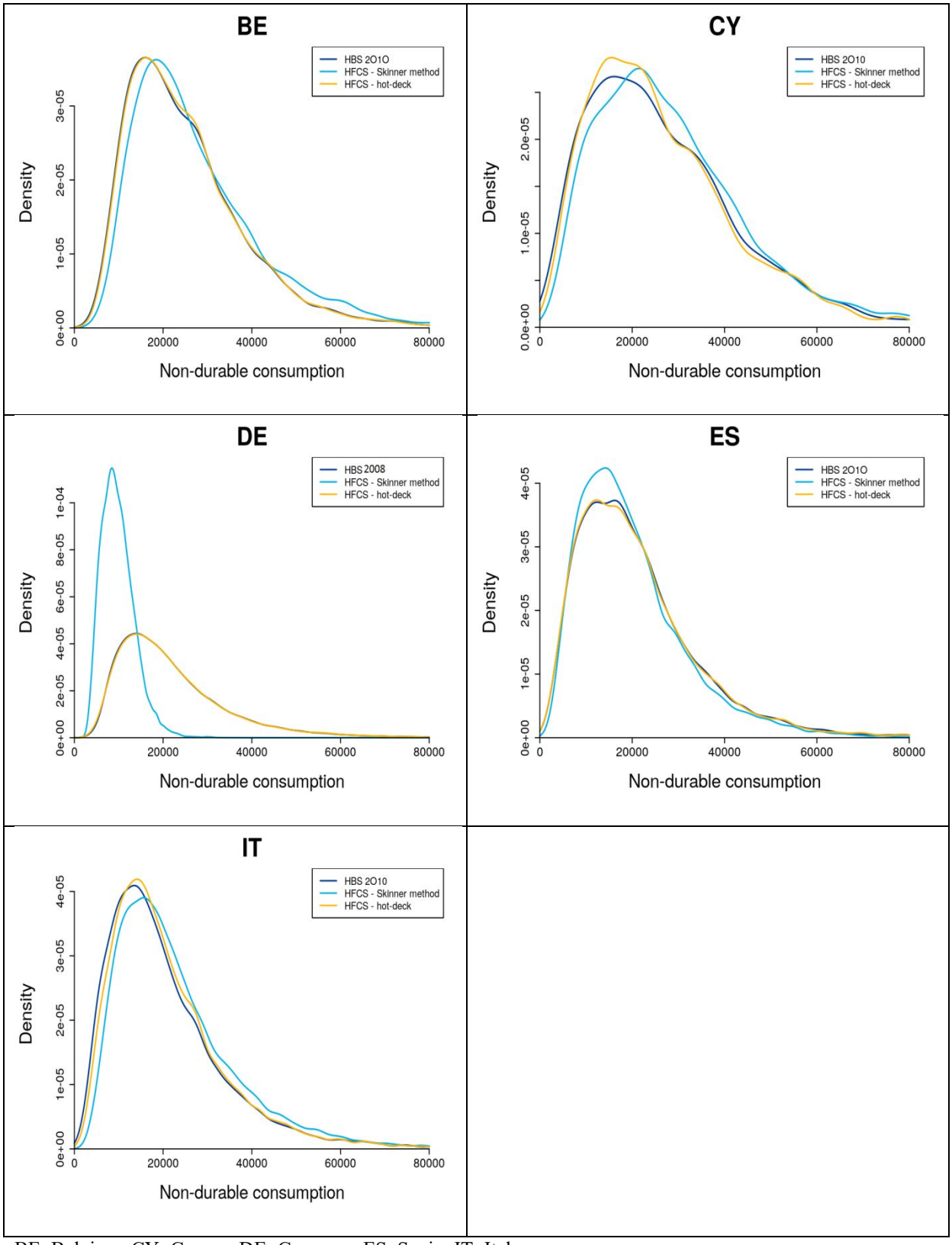
❖ **Instrumental variables**

We compute counterfactual wealth changes that households would have experienced between the two periods without any active saving, dissaving or portfolio reallocation behavior. For each type of assets declared to be held by the household in the first wave of HFCS, we compute the simulated value of this asset at the date of the second wave of HFCS, based on aggregate price variations for this type of assets between the two periods. We thus obtain, for each type of asset, a simulated wealth component that would have been held by the household without any active saving/dissaving or reallocation behavior.

Our baseline regressions are conducted considering 8 instruments. They are defined by decomposing total wealth into 8 asset categories based on the corresponding aggregate price. (See Table A4). We then apply the asset prices detailed in Table A.6a and A.6b. For deposits, we compute the simulated wealth at period 2 by applying a yearly average interest rate on actual deposits at period 1, for each year separating the two periods.

As robustness tests, we alternatively consider the 14 asset categories (see Table A4) based on the HFCS asset decomposition. We also test a lower number of instruments by aggregating all detailed counterfactuals asset values (1 instrument) or by aggregating housing assets and financial assets (two instruments).

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 A.1. 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	Inititial sample	After cleaning
Belgium	2010	2014	1,005	845
Cyprus	2010	2014	893	812
Germany	2011	2014	2,112	1,776
Spain	2009	2012	3,701	3,023
Italy	2010	2014	2,984	2,356

Table A.2. Panel descriptive statistics - main variables: Initial sample versus estimation sample

	Net wealth		Gross wealth		Non durable consumption		Disposable income		Net wealth / Disposable income		Gross wealth / Disposable income		Consumption / 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
Mean (€)	377,284	377,326	417,209	418,441	40,941	40,867	39,689	40,565	8.40	10.55	10.00	11.39	1.39	1.15
Median (€)	263,500	266,260	303,700	310,353	34,266	34,266	31,997	32,802	6.57	6.74	7.66	7.99	1.07	1.06
Std dev	566,070	547,268	575,272	554,972	25,718	24,818	27,893	27,987	72.52	13.81	68.47	13.70	7.73	0.53
Q1	112,500	129,302	175,100	194,000	23,683	23,708	21,681	22,239	2.83	3.13	4.30	4.51	0.77	0.77
Q3	451,400	455,410	486,218	490,000	50,630	50,940	52,480	52,920	13.54	13.77	14.24	14.26	1.43	1.39
# obs	891	845	891	845	891	845	891	845	891	845	891	845	891	845
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
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
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
Mean (€)	243,698	248,288	253,819	258,836	24,073	24,264	31,945	32,924	6.22	7.83	6.57	8.15	0.99	0.99
Median (€)	157,824	162,775	165,857	173,455	20,621	20,719	25,632	26,859	5.67	5.84	6.11	6.22	0.78	0.76
Std dev	366,855	354,948	376,413	365,171	15,441	15,433	31,727	31,740	74.31	8.77	74.37	8.82	5.13	0.78
Q1	38,000	50,200	44,000	61,466	13,550	13,675	16,404	17,590	1.64	2.04	1.97	2.31	0.50	0.49
Q3	305,000	310,000	310,000	315,272	29,976	30,258	39,251	40,015	10.45	10.45	10.65	10.65	1.28	1.25
# obs	2,484	2,356	2,484	2,356	2,484	2,356	2,484	2,356	2,477	2,356	2,477	2,356	2,477	2,356

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 wave2. 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

	Non-durable consumption		Disposable income	
Country	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.

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 A.6.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	*BEL 20 - PRICE INDEX*	*FTSE ALL WORLD E - PRICE INDEX*	*FTSE GLOBAL GOVT. BG ALL MATS.(E) - CLEAN PRICE INDEX*	Bank interest rates - deposits from households - BE	House price index - BE
Cyprus	*FTSE CYPRUS SE20 - PRICE INDEX*	*FTSE ALL WORLD E - PRICE INDEX*	*FTSE GLOBAL GOVT. EUROZONE ALL MATS.(E) - CLEAN PRICE INDEX*	Bank interest rates - deposits from households -CY	House price index - CY
Germany	*DAX 30 PERFORMANCE - PRICE INDEX*	*FTSE ALL WORLD E - PRICE INDEX*	*FTSE GLOBAL GOVT. BD ALL MATS.(E) - CLEAN PRICE INDEX*	Bank interest rates - deposits from households- DE	House price index - DE
Spain	*IBEX 35 - PRICE INDEX*	*FTSE ALL WORLD E - PRICE INDEX*	*FTSE GLOBAL GOVT. ES ALL MATS.(E) - CLEAN PRICE INDEX*	Bank interest rates - deposits from households- ES	House price index - ES
Italy	*FTSE MIB INDEX - PRICE INDEX*	*FTSE ALL WORLD E - PRICE INDEX*	*FTSE GLOBAL GOVT. IT ALL MATS.(E) - CLEAN PRICE INDEX*	Bank interest rates - deposits from households - IT	House price index - IT
Source	Datastream	Datastream	Datastream	ECB (sdw)	Eurostat

Table A.6.b. Prices index for corporate bonds

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

Table B1. First-stage regression (equation 2) – Baseline model (8 instruments)

	Belgium		Cyprus		Germany		Spain		Italy	
	Coeff.	Std. dev.	Coeff.	Std. dev.	Coeff.	Std. dev.	Coeff.	Std. dev.	Coeff.	Std. dev.
Instrument housing prices	1.116 ***	(0.273)	1.595 ***	(0.508)	0.817 ***	(0.179)	1.221 ***	(0.368)	0.946 ***	(0.067)
Instrument interest rates on depostits	0.533	(0.594)	-8.464 **	(4.155)	1.649 **	(0.691)	2.264	(1.486)	-0.346	(0.556)
Instrument corporate bonds prices	0.098	(0.497)	0.348	(0.624)	-1.085 **	(0.475)	-0.274	(0.231)	-0.563 **	(0.240)
Instrument government bonds prices	1.786	(1.175)	7.966	(5.760)	-2.676	(2.379)	-0.944	(7.103)	-0.161	(2.244)
Instrument financial bonds prices	-0.345	(0.397)	-5.972 **	(2.778)	7.251 ***	(1.921)	-0.618	(4.090)	-2.811	(2.286)
Instrument domestic shares prices	0.850	(1.031)	1.568	(1.079)	-0.020	(0.332)	0.095	(1.264)	0.576	(0.583)
Instrument foreign shares prices	-0.406	(1.562)	-22.975	(19.777)	1.540	(1.240)	0.000	(0.000)	-1.782	(2.029)
Instrument constant prices	1.243	(1.424)	1.774	(4.494)	0.842	(0.682)	1.717	(2.173)	-0.236	(0.791)
Δ Age	0.778	(0.513)	-0.333	(1.584)	0.330	(0.301)	-0.456	(0.615)	0.202	(0.146)
Δ Age²	-0.009 **	(0.004)	-0.003	(0.015)	-0.004	(0.003)	0.003	(0.006)	-0.002	(0.001)
Δ Retired	0.962	(1.365)	19.543 **	(9.811)	0.215	(0.844)	-2.873	(2.926)	0.287	(0.415)
Δ Unemployed	-0.564	(1.552)	-0.943	(4.421)	-0.098	(0.617)	-1.130	(1.179)	-0.987	(0.982)
Δ # adults	0.433	(0.592)	-1.639	(2.280)	1.623 ***	(0.527)	-0.193	(1.300)	0.274	(0.303)
Δ # children	0.270	(0.621)	1.982	(2.246)	2.010 ***	(0.743)	0.636	(1.651)	0.135	(0.281)
Constant	0.411	(1.001)	-2.526	(1.932)	0.822 *	(0.459)	4.097 ***	(1.083)	0.415 **	(0.209)
Number of observations	845		812		1,776		3,023		2,356	
Fstat (instrumental variables)	12.83		25.45		88.68		9.38		33.62	

Table B2. Robustness: IV estimates of MPC out of housing wealth and financial wealth with 14 instruments versus two aggregated instrument (instead of the decomposition of wealth into 8 assets)

		Belgium	Cyprus	Germany	Spain	Italy
Panel A: IV Panel regressions with 14 instruments						
Housing wealth	MPC	0.022 ***	0.011 **	0.020 ***	0.013 **	0.050 ***
	Std. Err.	0.008	0.005	0.005	0.006	0.007
	Fstat	*54.4*	*10.4*	*9.4*	*18.7*	*35.8*
	SW Fstat	*12.5*	*66.0*	*9.0*	*17.3*	*23.4*
Financial wealth	MPC	0.005	0.041 ***	0.006	0.014 **	-0.059
	Std. Err.	0.008	0.014	0.004	0.007	0.039
	Fstat	*19.6*	*15.9*	*99.6*	*13.9*	*3.1*
	SW Fstat	*9.2*	*23.0*	*44.5*	*13.6*	*3.1*
Other controls		Yes	Yes	Yes	Yes	Yes
Panel B: IV panel regressions with 2 instruments						
Housing wealth	MPC	-0.040	0.065 **	0.010	0.017 *	-0.625
	Std. Err.	0.106	0.030	0.007	0.011	1.115
	Fstat	*14.2*	*6.5*	*29.7*	*16.7*	*2.5*
	SW Fstat	*0.2*	*11.1*	*17.0*	*30.3*	*0.4*
Financial wealth	MPC	0.048	0.015 **	0.018 ***	0.017 **	0.058 ***
	Std. Err.	0.042	0.007	0.006	0.007	0.020
	Fstat	*14.6*	*4.5*	*9.5*	*16.6*	*83.8*
	SW Fstat	*0.2*	*7.8*	*9.6*	*13.0*	*3.7*
Other controls		Yes	Yes	Yes	Yes	Yes
Number of households		845	812	1,776	3,023	2,356

Table B.3. Marginal propensity to consume out of wealth across the net wealth distribution –OLS estimates

	Belgium		Cyprus		Germany		Spain		Italy	
	OLS		OLS		OLS		OLS		OLS	
	MPC	Std. Err.	MPC	Std. Err.	MPC	Std. Err.	MPC	Std. Err.	MPC	Std. Err.
p0-p49	0.006	0.006	0.004	0.004	0.009	0.006	0.026 ***	0.006	0.031 ***	0.006
p50-p69	0.024 **	0.006	0.011 **	0.004	0.001	0.005	0.031 ***	0.006	0.036 ***	0.009
p70-p89	0.014 ***	0.004	0.004 *	0.002	0.013 ***	0.003	0.019 ***	0.004	0.014 **	0.007
p90-p100	0.007 ***	0.002	0.001 *	0.001	0.003 ***	0.001	0.002 **	0.001	0.010	0.007
Other controls	yes		yes		yes		yes		yes	
Number of households	845		812		1,776		3,023		2,356	

Table B.4. Marginal propensity to consume out of net housing wealth, illiquid financial assets and net liquid financial assets

	BE		CY		DE		ES		IT	
	MPC	Std. Err.	MPC	Std. Err.	MPC	Std. Err.	MPC	Std. Err.	MPC	Std. Err.
Net housing wealth	0.027 ***	0.009	0.011 **	0.005	0.015 ***	0.004	0.016 **	0.007	0.042 ***	0.009
Fstat		*14.5*		*17.0*		*22.6*		*8.3*		*33.4*
SW-Fstat		*8.2*		*16.3*		*9.0*		*3.8*		*4.7*
Net liquid assets	0.020	0.015	-0.025	0.045	0.020 **	0.010	0.029	0.021	0.134 *	0.074
Fstat		*9.6*		*8.1*		*25.8*		*5.0*		*3.6*
SW-Fstat		*9.5*		*10.4*		*29.7*		*1.7*		*6.7*
Illiquid financial assets	0.012	0.042	0.308 *	0.158	-0.068	0.199	0.026	0.038	-0.577	0.733
Fstat		*0.7*		*2.1*		*1.4*		*3.0*		*2.4*
SW-Fstat		*1.5*		*13.2*		*4.3*		*1.2*		*2.8*
Other controls	Yes		Yes		Yes		Yes		Yes	
Number of households	845		812		1,776		3,023		2,356	

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 B.5. Robustness: gross income (HFCS variable) instead of disposable income (Imputed from SILC)

	Belgium		Cyprus		Germany		Spain		Italy	
	IV		IV		IV		IV		IV	
	MPC	Std. Err.	MPC	Std. Err.	MPC	Std. Err.	MPC	Std. Err.	MPC	Std. Err.
Equation 1'										
Gross wealth	0.048 ***	0.008	0.012 *	0.006	0.014 ***	0.004	0.016 ***	0.005	0.072 ***	0.010
Fstat		*406.3*		*16.2*		*11.8*		*17.7*		*13.9*
Other controls	yes		yes		yes		yes		yes	
Equation 5: wealth groups heterogeneity										
p0-p49	0.093 ***	0.021	0.034 ***	0.004	0.209 **	0.091	0.104 ***	0.009	0.130 ***	0.016
Fstat		*102.5*		*265.7*		*3.3*		*19.9*		*15.1*
SW-Fstat		*113.0*		*293.0*		*4.2*		*22.4*		*17.6*
p50-p69	0.070 ***	0.010	0.078 ***	0.010	0.060 ***	0.016	0.051 ***	0.009	0.132 ***	0.043
Fstat		*42.5*		*113.4*		*5.9*		*9.8*		*9.8*
SW-Fstat		*46.9*		*125.1*		*7.4*		*12.0*		*14.1*
p70-p89	0.036 ***	0.004	0.014 ***	0.005	0.038 ***	0.006	0.043 ***	0.010	0.054 ***	0.014
Fstat		*179.8*		*376.6*		*5.5*		*33.2*		*4.9*
SW-Fstat		*113.0*		*293.0*		*4.2*		*22.4*		*17.6*
p90-p100	0.018 ***	0.005	0.002 *	0.001	0.010 ***	0.002	0.010 ***	0.003	0.059 ***	0.014
Fstat		*20.9*		*177.3*		*17.1*		*4.4*		*23.6*
SW-Fstat		*23.0*		*195.4*		*21.4*		*5.5*		*35.7*
Other controls	yes		yes		yes		yes		yes	
Number of households	841		804		1,776		3,017		2,346	

Table B.6.a. Robustness: IV estimates of mean MPC with one aggregated instrument for total wealth (instead of the 8 or 14 assets decomposition)

	Belgium	Cyprus	Germany	Spain	Italy
MPC	0.027 ***	0.008 *	0.009 **	0.017 ***	0.052 ***
Std.Err.	0.009	0.004	0.004	0.005	0.007
Fstat	*8.3*	*3.9*	*28.7*	*17.0*	*79.3*
Other controls	Yes	Yes	Yes	Yes	Yes
Number of households	845	812	1,776	3,023	2,356

Table B.6.b. Robustness: IV estimates of MPC by wealth groups with one aggregated instrument for total wealth

Wealth group		Belgium	Cyprus	Germany	Spain	Italy
p0-p49	MPC	0.092 ***	0.046 ***	0.127	0.064 ***	0.074 ***
	Std.Err.	0.017	0.012	0.224	0.014	0.016
	Fstat	*14.2*	*7.7*	*2.1*	*38.3*	*43.6*
	SW-Fstat	*51.0*	*33.3*	*0.2*	*142.4*	*173.4*
p50-p69	MPC	0.082 ***	0.049 ***	0.059 ***	0.063 ***	0.077 ***
	Std.Err.	0.015	0.012	0.013	0.012	0.016
	Fstat	*15.7*	*7.8*	*7.4*	*35.2*	*39.6*
	SW-Fstat	*64.1*	*24.4*	*32.6*	*164.8*	*181.9*
p70-p89	MPC	0.032 ***	0.048 ***	0.040 ***	0.029 ***	0.060 **
	Std.Err.	0.008	0.018	0.006	0.008	0.024
	Fstat	*16.9*	*1.9*	*13.2*	*32.0*	*5.3*
	SW-Fstat	*63.2*	*4.8*	*57.9*	*135.9*	*30.2*
p90-p100	MPC	0.020 **	0.005 *	0.007 ***	0.013 ***	0.025 ***
	Std.Err.	0.008	0.003	0.002	0.004	0.005
	Fstat	*2.4*	*1.7*	*6.9*	*3.4*	*6.9*
	SW-Fstat	*9.8*	*7.0*	*33.2*	*15.3*	*21.3*
Other controls		yes	yes	yes	yes	yes
Number of households		845	812	1,776	3,023	2,356

Table B7. Heterogeneity across ages - IV estimates (8 assets decomposition)

		Belgium	Cyprus	Germany	Spain	Italy
Δ(W/Y) * 25-39	MPC	-0.014	-0.006	0.020 **	0.059 *	0.009
	Std. Err.	0.015	0.010	0.010	0.030	0.027
	Fstat	*2218.0*	*10.8*	*9.9*	*27.2*	*5.2*
	SW-Fstat	*2488.6*	*12.6*	*67.2*	*37.3*	*10.7*
Δ(W/Y)	MPC	0.024 ***	0.014	0.006 **	0.022 ***	0.051 ***
	Std. Err.	0.007	0.009	0.002	0.005	0.011
	Fstat	*2086.1*	*16.5*	*99.1*	*23.3*	*20.8*
	SW-Fstat	*747.1*	*3.1*	*60.2*	*10.2*	*6.4*
Δ(W/Y) * 60-75	MPC	-0.009	-0.011	0.001	-0.009	-0.011
	Std. Err.	0.008	0.009	0.003	0.007	0.013
	Fstat	*21.9*	*9.2*	*36.3*	*2.6*	*11.4*
	SW-Fstat	*567.9*	*8.7*	*96.1*	*12.4*	*18.0*
Other controls		yes	yes	yes	yes	yes
Number of households		845	812	1,776	3,023	2,356

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).

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