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Private wealth and pensions across European countries

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Abstract

We estimate the effect of mandatory pension wealth on net wealth at the household level for seven euro area countries. We innovate investigating the heterogeneity across households and across countries using data from a cross-country harmonized wealth survey (Household Finance and Consumption Survey-wave 2) combined with estimates of pension wealth (OECD pension models). We consider pension wealth indicators defined by country at the birth cohort level for various wage levels and retirement ages. Identification is provided by legislation variations across country and by non-linarites in pension scheme and differences in pension enrolment across individuals within country.

Pooling all countries together, we find a significant displacement effect of pension on net wealth: each euro of pension wealth is associated with a 62-72 cents decline in private net wealth at the mean.

We also find huge heterogeneity across countries and across the wealth distribution. For France, Belgium and Portugal significant displacement effects of pension wealth on net wealth are obtained in the bottom or in the middle of the distribution. Belgium and France are also countries where a negative significant effect of pension wealth on the probability to hold real estate properties is found. For Luxembourg and Germany we find opposite effects: pension wealth crowds in financial wealth in the bottom deciles.

JEL codes: D31, D91, H55

Keywords: Wealth, Social Security, Pensions, Life Cycle

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How do pensions affect households' savings? This issue is highly relevant to policy makers worrying about pension financial imbalances and facing population ageing. There is however no consensus in the literature to what extent mandatory pensions offset private wealth. From the theoretical point of view, the effect of pensions on savings is ambiguous (Feldstein 1974; Blau 2016). In the life-cycle framework, pension benefits might diminish people's need to save during their working life to smooth consumption over the life cycle ("crowding out" effect). Still, people with strong preferences for leisure may prefer both to retire earlier and to accumulate more private wealth to finance old-age needs ("crowding in" effect). Other preferences (such as risk aversion, patience) may also induce very small to larger crowding out effects (Blau, 2016).

This paper estimates the effect of mandatory pension wealth on private wealth at the household level for seven Euro area countries. Empirical evidence on this issue is mixed (e.g. Feldstein, 1974; Hubbard, 1986; Gale, 1998; Attanasio and Rohwedder, 2003; Attanasio and Brugiavini, 2003; Gale and Phillips, 2006; Engelhardt and Kumar, 2011; Alessie, et al., 2013). Recent papers based on household level data show the heterogeneity of the pension wealth effect across the population depending on wealth or on education levels. To the aim of the paper, we estimate a reduced form equation of wealth accumulation based on the life-cycle framework (Gale, 1998, Hurd, *et al*., 2012; Alessie, *et al*., 2013; Engelhardt and Kumar, 2011). Our estimates are based on cross-section data referring to the year 2014. The identification strategy is based on the cross-country differences in pension scheme as in Alessie et al. (2013) and Hurd et al. (2012). We also provide country specific results, taking advantage of non-linarites in pension schemes at the country level and on differences in pension enrolment across individuals within countries.

An innovative aspect of the paper is that the empirical analysis is based on the wealth cross-country harmonized Household Finance and Consumption Survey (HFCS, see

Eurosystem Household Finance and Consumption Network, 2016) making it possible to us to investigate the heterogeneity of the displacement effect for several European countries across the wealth distribution and for a various range of assets. Moreover in doing so we cover a broader portion of the life-cycle compared to previous cross-country studies which using surveys on health and retirement (such as SHARE, ELSA) focused on the elderly (above 55). We are thus able to cover households during their working life when they take important decisions regarding savings and wealth accumulation.

Our empirical analysis is based on household level information on seven Euro area countries (Belgium, Germany, France, Greece, Italy, Luxembourg and Portugal) extracted from the Household Finance and Consumption Survey. These countries differ both in terms of household wealth distributions (Eurosystem Household Finance and Consumption Network, 2016) and in terms of pensions (OECD, 2011; 2013a, 2015). The Household Finance and Consumption Survey provides harmonised household level information on net wealth, income, socio-demographics and some information on pension entitlement.[1] The pension wealth indicators for the mandatory pension schemes for private-sector workers which is assigned to the households observed in the HFCS is estimated with the OECD pension model.[2] The main characteristics we take into account to assign the pension wealth to an individual in a given country are age, gender, income (as a percentage of the average income of the age group), at what age he expects to retire, whether he has public pension plans and whether he has occupational pension plans. We define the pension wealth indicators by country at the birth cohort level for various wage levels. Identification within country is then

[1] The HFCS wave 2 covers 20 European Union member states. We restrict our analysis to 9 countries because part of the key variables are missing for the other ones (missing variables in the HFCS or pension indicators not computed by OECD), or because of too small sample size.

[2] Both public pensions (i.e. involving payments from government or from social security institutions) and private pensions are simulated. The main national scheme for private-sector employees is modelled in both cases.

provided by legislation variations across scheme and by differences in pension enrolment across individuals.

With reference to the modelling, the literature has highlighted that unobserved heterogeneity in household saving behaviour is a crucial issue as it can bias crowd-out estimates (see for instance Engelhardt and Kumar, 2011). For example, the measurement of pension wealth using wages and retirement age expectations observed at the individual level may bias the estimates if an unobservable factor (such as preference for leisure) affect both the determinants of pension wealth and savings.[3] To solve this problem, one can get rid of differences in characteristics of recipients, which may be endogenous, and focus solely on the variations in benefits that arise from pension schemes. Such an approach is used by Engelhardt and Kumar (2011) who use institutional differences across countries and groups of people to build instrumental variables.[4] In our case, the pension wealth indicators computed with the OECD pension models is mainly defined based on differences between groups of people (depending on their income decile, age, etc.). The main source for heterogeneity at the individual level comes from the individual expectations about the age at which they expect to retire (provided by the HFCS) and that we use to impute the individual's pension wealth. An instrumented pension wealth measure is thus considered. Instead of considering the individual's expectations on her retirement age to compute individual pension wealth, we assign each individual the country specific normal retirement age.

Our main results are as follows.

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[3] The actual pension benefit depends on three main components: the rules of the pension system; the wage profile and the length of the career. The last two may be endogenous. For example, if individuals have a high level of preference for leisure, it can induce simultaneously low wages and early retirement. These two elements affect simultaneously pension and savings: lower wages induce lower pension; early retirement increase the need for wealth accumulation to finance the retirement spell. In that case, we may overestimate the offset.

[4] Another strand of the literature use exogenous shocks to identify the offset effect. See for example Attanasio and Brugiavini (2003) or Bottazzi et al. (2006) using Italian pension reforms or Attanasio and Rohwedder (2003) using U.K. reforms.

First, we find a significant displacement effect of pension on net wealth when pooling all countries together (and controlling for country fixed effects). According to our IV estimates, each euro of pension wealth is associated with a 62 cents decline in private net wealth at the mean. Such a result is in line with previous results obtained by Alessie *et al*. (2013) for European countries or by Engelhardt and Kumar (2011) for the United States. Focusing on financial assets, the displacement effect amounts to 81 cents at the mean. We also find that pension wealth lowers the probability to hold real estate properties.

Second, we find huge heterogeneity across countries and across the wealth distribution by estimating IV quantile regressions country by country. Significant estimated coefficients are mostly obtained at the bottom and in the middle of the wealth distribution while at the top of the distribution, the confidence intervals are large and include zero. For France, Belgium and Portugal significant displacement effects of pension wealth on net wealth are obtained in the bottom or in the middle of the distribution. Belgium and France are also countries where a negative significant effect of pension wealth on the probability to hold real estate properties is obtained. For Luxembourg and Germany we find opposite effects. Our estimates show that in these two countries, pension wealth crowd in financial wealth in the bottom deciles of the distribution.

The paper is structured as follows. Section 2 describes the empirical model. The data and the method used to impute individual pension wealth in the HFCS are presented in Section 3. The results are presented in Section 4. Some conclusions are drawn in Section 5.

2. Empirical model

Following Gale (1998) and Alessie et al. (2013), we derive the empirical equation from a simple life-cycle model (See appendix A). We estimate a reduced-form equation of

wealth accumulation where non-pension wealth at age A is a function of earnings and pension wealth. Pension wealth is adjusted by the Gale's Q factor[5]. Our empirical model writes:

$$W_i = \beta_0 + \beta_1 Y_i + \beta_2 Q * P_i + \gamma Z_i + u_i \qquad (1)$$

With i the individual index, W_i the non-pension wealth, Y_i the income, P_i the pension wealth (mandatory pensions for the private sector), Q the Gale's Q factor (with r=2%), X_i are additional controls aiming to account for the life-cycle patterns, differences in preferences (i.e. risk aversion, time preferences, non-homothetic preferences), and other wealth accumulation motives than financing the retirement period (such as precautionary savings, bequest motives, etc.). The control variables are age, gender, household composition, education, credit constraints, gifts and inheritances received; and, u_i is the error term.

The error term u is defined, for $X = (1, Y, P, Z)$ as:

- $E(u|X) = 0$ in the case of standard OLS
- $q_\tau(u_\tau|X) = 0$ with q_τ the conditional τ-quantile for the quantile regressions.

We first estimate a baseline specification using OLS. This provides the mean effect of pension wealth on private savings. However, there may be heterogeneous effects across the wealth distribution as various factors may induce heterogeneity in the effect of pensions across households. First, borrowing and liquidity constraints may affect savings by preventing constrained households to adjust their personal wealth to pension wealth as much as they would like to do. The effect of pensions may differ therefore between constrained/unconstrained households (Gale and Philips, 2006). Second, as pensions are not good substitute for other net wealth as regards precautionary saving or bequest motives,

[5] It is now well-known in the empirical literature (Gale, 1998, Engelhardt and Kumar, 2011; Hurd et al. 2012; Alessie et al. 2013) that simply regressing private wealth against wealth (and controlling for earnings) lead to a downward bias estimates because the wealth effects of pension on the saving path is not taken into account.

heterogeneity in savings behavior across households, depending on their savings motive, may arise. Third, household net wealth composition varies a great deal over the net wealth distribution (Campbell, 2006, and see Arrondel et al. for an illustration on Euro area countries) and liquid assets may be more sensitive to variations in pension wealth than illiquid/less liquid ones. Last, as financial literacy and the propensity to plan affect household savings (Lusardi and Mitchell, 2014; Americks et al., 2003), the effect of pension on savings may be heterogeneous across education levels. For these reasons, more flexible specifications with heterogeneous effects have to be considered. One of those we adopt is quantile regression.

Pension wealth individual heterogeneity may bias the estimates if unobservable factors (such as preference for leisure) affect both the determinants of pension wealth and savings. Our pension wealth variable is computed using gender, year of birth, the number of years of contribution, the mean earning history and the individual's expectation about the age he/she expects to retire (see Section 3). To purge from individual heterogeneity coming from retirement expectations, we use an instrumented pension wealth measure in the spirit of Engelhardt and Kumar (2011). Instead of considering the individual's expectations on her retirement age, we assign each individual the country specific normal retirement age to build our instrumented pension wealth variable. In the end, we perform OLS, IV, quantile and IV quantile regressions[6] to estimate the effect of pension wealth on net (non-pension wealth) or on financial assets. We also consider the effect on the probability to hold real estate properties by estimating probit and IV probit models.

[6] Quantile IV regressions are estimated using the CQIV stata module to perform censored quantile instrumental variables regression developed by Victor Chernozhukov (MIT), Ivan Fernandez-Val (Boston University), Sukjin Han (Yale University) and Amanda Kowalski (Yale University).

3. Data

We combine a cross-country household wealth survey (the Household Finance and Consumption Survey) with pension wealth indicators at the individual level computed by the OECD. Our data refers to the year 2014.

3.1. Sources

Household Finance and Consumption survey

Household level information about wealth, income and socio-demographic variables are derived from the second wave of the Household Finance and Consumption Survey (HFCS), a cross-section survey covering 20 European countries. The year 2014 is the reference period for most of the countries. The survey methodology ensures country-representativeness and cross-country comparability.[7] This survey is then a unique source for harmonised household level information on wealth and income for Euro area countries.

We conduct our empirical analysis for seven of these countries, i.e. Belgium, Germany, France, Greece, Italy, Luxembourg and Portugal. Other countries are excluded due to: too small sample size (after the selection of our subsample), because some crucial information for our empirical analysis are missing (expected retirement age in the HFCS or in the OECD pension simulations for some countries) or because the reference year in the HFCS does not correspond to the available information on pension simulations[8].

OECD Pension model

[7] see Eurosystem Household Finance and Consumption Network (2016) for the methodological framework of the HFCS.

[8] We exclude Spain because the HFCS wave 2 data refers to the year 2011 while the pension simulations we are using are available for the year 2014.

Pension wealth is computed from the OECD Pension Model (see OECD, 2015; 2013a for a detailed description). Pension wealth is defined as the discounted sum of all future pension benefits taking into account residual life expectancy and indexation of pension benefits in each country. The methodology and assumptions are harmonised, allowing direct cross-country comparisons of pension systems. Pension entitlements are, for this paper, computed under pension rules of 2014. The pension models provide pension wealth for basic, minimum and the main national mandatory pension schemes for private-sector workers.[9] Moreover, the model considers a single set of assumption concerning the economic variables that affect pension wealth (economic growth, wage growth and inflation). These assumptions are as follows: price inflation of 2.5% per year, real earnings growth of 2% per year, discount rate of 2% per year. In order to compute life expectancy, country-specific projections of mortality rate by age and sex from the United Nations Population Database for the year of retirement are used. The pension wealth is computed in each country for men and women considering various multiples of average earnings and various retirement ages.

To assign pension wealth computed from the OECD pension model to the households surveyed in the HFCS, we use these individual characteristics (which are also available in the HFCS) along with the information on whether the individuals declare in the HFCS to be eligible in the future to public and private pension wealth.

3.2 Sample selection

From the main dataset, we select a sample of reference persons, who are in employment, and aged between 30 and 54 years. We exclude younger and older reference person to abstract from cross-country heterogeneity in terms of entry into the labour market or

[9] both public pensions (i.e. involving payments from government or from social security institutions) and private pensions.

transition from employment to retirement[10]. We also exclude self-employed people because their pension wealth is not estimated with the OECD pension models.

In the end, our sample includes 10,695 individuals with country specific samples from 532 individuals for Belgium to 3,700 individuals for France. Sample descriptive statistics for the main variables are presented in Table 1. Due to the sample selection, individuals in our sample are wealthier, have higher wages and are more often homeowner than the country-representative figures[11].

[INSERT TABLE 1]

3.3. Matching household wealth and other individual characteristics from the HFCS with the pension wealth from the OECD model

In order to assign the pension wealth computed from the OECD model to an individual in our HFCS sub-sample, we consider the following personal information available in the HFCS:

- gender and age,
- wage income (as a multiple of the average income of his age group).
- the age at which the individuals expects to retire,
- whether he has public or private pension plans.

3.4. Definition of the main variables

Variables in equation (1) are defined as follows.

[10] See for instance the cross-country heterogeneity in employment rates for people aged 25-29. http://ec.europa.eu/eurostat/statistics-explained/index.php/Being_young_in_Europe_today_-_labour_market_-_access_and_participation#Characteristics_of_youth_in_employment

[11] See Eurosystem Household Finance and Consumption Network (2016).

W_i: Wealth is measured as the household's net wealth reported in the HFCS. Net wealth is defined as gross wealth less liabilities at the household level— where gross wealth includes all kind of assets of the households: real assets (household main residence, other real estate properties, vehicles, valuables) and financial assets. In order to account for cross-country heterogeneity in terms of households' composition, we choose to adjust wealth for the number of consumption units.[12] We also consider other dependent variables to focus on specific assets: financial assets on the one hand, a dummy variable equals to one when the households hold real estate properties.

P_i: Pension wealth is the discounted sum of future pension benefits (computed at the individual's expected retirement age). The pension wealth is based on the main national scheme for private-sector employees and accounts of the following characteristics of each individual in the sample: age, gender, relative income (compared to the average income of the same demographic group), expected retirement age and on having public and/or private pension plans. We instrument the pension wealth variable to avoid endogeneity bias arising from unobservable individual heterogeneity that may affect both pension wealth and savings behaviour (see sub-section 3.3 below). We assign each individual the country specific normal retirement age[13] instead of considering the individual's expectations on the age at which he expects to retire.

Y_i: is the current wage individuals reported in the HFCS. In this respect it is useful to note that the HFCS is a cross-section survey which does not allow constructing a reliable measure of past and future earnings of individuals without making strong assumptions. For

[12] Number of consumption units in the household, according to the OECD modified scale: 1 unit for the first household member, 0.5 for each additional household member aged 14 and more, and 0.3 per additional household member aged 13 or less.

[13] We assign the following normal retirement ages: 67 for Belgium, 65 for Germany, 67 for France, 67 for Greece, 67 for Italy, 65 for Luxembourg, 66 for Portugal.

example, concerning the individual career, only information on current work income and on total time in employment is available. We then introduce the current gross wage income as explanatory variable and add various control variables to capture the individual heterogeneity in life-cycle income (age and education of the reference person, number of children in the household, number of adults, inheritance received).

Z_i: Our set of control variables includes: age, gender and education of the reference person, the household composition (number of consumption units), a dummy variable for substantial gifts and inheritances received, and a dummy variable for credit constraints.

4. Results

4.1. Baseline results

We first estimate equation (1) on the pooled sample of 7 countries where we add country fixed effects as control variables. In this case, the identification of the effect of pension wealth on savings is mostly provided by the differences in the pension schemes between countries. Table 2 displays the estimated coefficients estimated by OLS and IV regressions when considering net wealth or financial wealth as dependent variables. The last columns provide Probit and IV Probit estimates for the probability to hold real estate property.

[INSERT TABLE 2]

When pooling all observations together, we find a significant displacement effect of mandatory pensions on net wealth using both OLS and IV regressions. According to the IV estimates, this displacement effect is about 62 cents for one additional euro on adjusted pension wealth. A significant displacement effect on financial wealth is also obtained with OLS and IV estimates (81 cents with IV estimates). Concerning the probability to hold real

estate property, while the probit estimates are non-significant, the IV probit are significant and show that pension wealth lowers the probability to hold real estate property.

These results are in line with previous papers showing the displacement effects of pension wealth on household net wealth in European countries (see Alessie et al. 2013; Hurd et al., 2012).

4.2. Heterogeneity across the wealth distribution and across country

We go one step further and try to investigate cross-country heterogeneity by running country-by-country regressions. At the country level, identification is provided by the non-linearity in the pension schemes and by the differences in pension enrolments across individuals. Country specific OLS and IV estimates are non-significant in most cases (See the results in Table B1 in the Appendix). The only exception is Italy where we find a significant displacement effect of pension wealth on net wealth (with OLS regression only) and on financial wealth (both with OLS and IV regressions). The estimated offset on financial wealth is around 30 cents at the mean (32 cents with OLS and 28 with IV regression).

The estimates provided above are based on mean-regression estimators and are sensitive to extreme values, while household wealth is well-known to be unequally distributed. Indeed, previous papers have shown that heterogeneous behaviours along the wealth distribution need to be accounted for when estimating the effect of pension on wealth (Engelhardt and Kumar, 2011; Alessie et al., 2013). We then turn to quantile and IV quantile regressions. Because there is a strong heterogeneity across country in the household wealth distributions (see graph B1 in the appendix B), we prefer not pooling the observations and stick to country specific regressions. Accounting for heterogeneous effects along the wealth distribution provides further insights. First, significant estimates are obtained for several countries and for various wealth deciles. However, significant estimated coefficients are mostly obtained at the bottom

and in the middle of the wealth distribution while at the top of the distribution, the confidence intervals are large and include zero. Second, there is a large cross-country heterogeneity: we obtain significant **crowding out** effects in Belgium, France, Portugal and Greece while in Germany and Luxembourg we obtain a significant **crowding in** effect of pension. For Italy, estimates are no longer significant when running Quantile and IV quantile regressions.

For the sake of simplicity, we only comment below statistically significant estimates. All graphs representing the point estimates and confidence intervals for all IV quantile regressions based on the deciles (and considering as dependent variables net wealth or financial assets for the seven countries) are provided in the appendix B (Figures B2 and Figures B3) as well as detailed quantile and IV quantile regressions based on quartiles of the distributions (Table B2).

In France, Belgium and Portugal significant displacement effects of pension wealth on net wealth are obtained in the bottom or in the middle of the distribution (See Figure 1.a). For France, the estimated displacement increases up to 38 cents in the third and fourth deciles in our sample. In upper deciles, it is estimated with larger confidence intervals and it is no more significantly different from zero. In Belgium we obtain displacement effects of pension wealth on net wealth increasing up to 65 cents in the 6^{th} decile of our sample. In upper deciles, the estimated effect is not significantly different from zero. In Portugal, we obtain significant displacement effects below median net wealth, with large offsets ranging from more than 1 euro (1.08) in the second decile of our sample to 65 cents in the fourth decile.

[INSERT Figure 1.a]

Belgium and France are also countries where a negative significant effect of pension wealth on the probability to hold real estate properties is obtained (See Table B1 in the appendix, results from IV probit regression). In Belgium and in Greece, a substitution effect

between pension wealth and household assets is also obtained with financial assets (See Figure 1. b), while it is not statistically significant for France.

A striking result is then that part of the substitution effects between pension wealth and net wealth in France and in Belgium are coming from real estate properties. In these two countries, housing assets seem to be a store of value for old ages.

[INSERT FIGURE 1.b]

For Luxembourg and Germany we find opposite effects. Our estimates show that in these two countries, pension wealth **crowd in** financial wealth in the bottom of the distribution (Figure 2). These complementary effects are however small: 11 cents in the first decile to 18 cents in the fourth decile of financial wealth distribution in Luxembourg, then it decreases and become not statistically different from zero (we even obtain negative point estimate in the top of the distribution which is not significant).

[INSERT FIGURE 2]

A similar pattern is observed for Germany with significant crowding in effects in the second and third deciles (5 cents to 9 cents) and then the point estimates decreases and becomes not significant excepted in the top of the distribution (9^{th} decile) where a significant and full offset is obtained (1.06 euro). In Germany, we also obtain a positive effect of pension wealth on the probability to hold real estate property (significantly different from zero at the 10% level, table B1 in the appendix).

5. Conclusion

This paper provides estimates of the displacement effects of mandatory pension wealth on private wealth using harmonized household level information for 7 European countries (Belgium, Germany, France, Greece, Italy, Luxembourg and Portugal). We use the Household

Finance and Consumption Survey of the Eurosystem and pension wealth simulations from OECD models to provide new results on the heterogeneity of the displacement effect across the wealth distribution and across country.

Pooling all countries together, we find a significant displacement effect of pensions on net wealth: each euro of pension wealth is associated with a 62-72 cents decline in private net wealth at the mean. We also find huge heterogeneity across countries and across the wealth distribution. For France, Belgium and Portugal significant displacement effects of pension wealth on net wealth are obtained in the bottom or in the middle of the distribution. Belgium and France are also countries where a negative significant effect of pension wealth on the probability to hold real estate properties is found. For Luxembourg and Germany we find opposite effects: pension wealth crowds in financial wealth in the bottom deciles.

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Table 1. Sample statistics

	Belgium		Germany		France		Greece		Italy		Luxembourg		Portugal	
	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Net wealth	148,651	165,854	123,454	174,828	140,303	303,395	38,528	58,465	92,736	133,068	353,845	927,320	68,531	99,522
Financial assets	40,951	85,440	38,528	91,692	33,630	228,342	4,052	20,954	10,461	40,187	87,208	666,487	12,235	40,084
Real estate properties	133,615	129,269	108,914	147,165	126,408	154,899	36,875	53,405	84,715	115,021	343,471	404,440	82,282	83,946
Own a real estate property (Y/N)	0.78	0.41	0.62	0.48	0.72	0.45	0.61	0.49	0.66	0.47	0.82	0.39	0.86	0.35
Adjusted Pension wealth	107,677	43,426	92,848	58,788	115,777	76,830	68,387	23,047	73,644	45,947	372,605	187,863	51,462	34,462
Adjusted and instrumented pension wealth	97,895	38,438	90,314	62,583	140,159	56,280	69,409	25,060	72,911	45,383	383,034	202,828	58,510	41,719
Wage	45,401	29,855	52,731	50,278	38,892	54,074	17,674	8,014	24,549	15,686	73,348	62,356	18,843	15,398
Age	44	7	44	7	43	7	42	7	45	6	43	7	43	7
Men (Y/N)	0.65	0.48	0.71	0.45	0.63	0.48	0.70	0.46	0.68	0.47	0.71	0.46	0.59	0.49
Married couples (Y/N)	0.55	0.50	0.66	0.47	0.49	0.50	0.70	0.46	0.63	0.48	0.63	0.48	0.69	0.46
Education														
% Upper secondary	0.34	0.48	0.48	0.50	0.37	0.48	0.58	0.49	0.48	0.50	0.32	0.47	0.22	0.42
% Tertiary	0.56	0.50	0.48	0.50	0.53	0.50	0.27	0.44	0.17	0.37	0.47	0.50	0.35	0.48
Nber of employed people	1.67	0.62	1.71	0.66	1.61	0.59	1.33	0.51	1.42	0.59	1.72	0.63	1.62	0.59
% of individuals with inheritances	0.29	0.45	0.30	0.46	0.44	0.50	0.27	0.44	0.27	0.45	0.21	0.40	0.28	0.45
% of individuals with credit constraint	0.03	0.18	0.06	0.23	0.09	0.29	0.07	0.25	0.03	0.16	0.10	0.30	0.08	0.27
Number of individuals	532		1,260		3,700		732		1,852		714		1,905	

Notes: HFCS Wave 2 sample restricted to households with a reference person aged between 30 and 54 in employment and without any self-employed person. Country included: Belgium (BE), Germany (DE), France (FR), Greece (GR), Italy (IT), Luxembourg (LU), PT (Portugal).

Net wealth is gross wealth less liabilities. Gross wealth includes all kind of assets of the households (real assets and financial assets, excluding public and occupational pension plans). Real assets include household main residence, other real estate properties, vehicles, valuables and self-employment business wealth. Financial assets include deposits, mutual funds, bonds, share publicly traded, voluntary pensions/whole life insurance, and other financial assets. Financial assets exclude public and occupational pension plans. Income is the household annual gross cash employee income for the reference period. Household wealth variables are adjusted by the number of consumption units.

Source: Based on data HCFS wave 2?

Table 2. Estimated effect of adjusted pension wealth on net wealth, financial (Ordinary Least Quares (OLS), Instrumental Variable (IV)) and on the probability to hold real estate property (Probit and IV probit)

	Net wealth		Financial wealth		Probability to hold real estate property	
	OLS	IV	OLS	IV	Probit	IV-Probit
Coeff	-0.728 ***	-0.620 ***	-0.758 ***	-0.811 ***	-1.05e-07	-4.21e-06 ***
Lower	-0.895	-0.844	-0.883	-0.978	-4.75e-07	-5.94e-06
Upper	-0.561	-0.396	-0.633	-0.644	2.64e-07	-2.47e-06

Notes: Estimated coefficient and lower and upper bonds of the confidence interval (95%). Dependent variable: private net wealth, financial wealth or a dummy variable equals to one when the household holds a real estate property. Control variable: current gross employee income, age and education of the reference person, household composition (number of adults, number of children), dummy variable for substantial gifts and inheritances received, country fixed effects. Number of observations: 10,632.

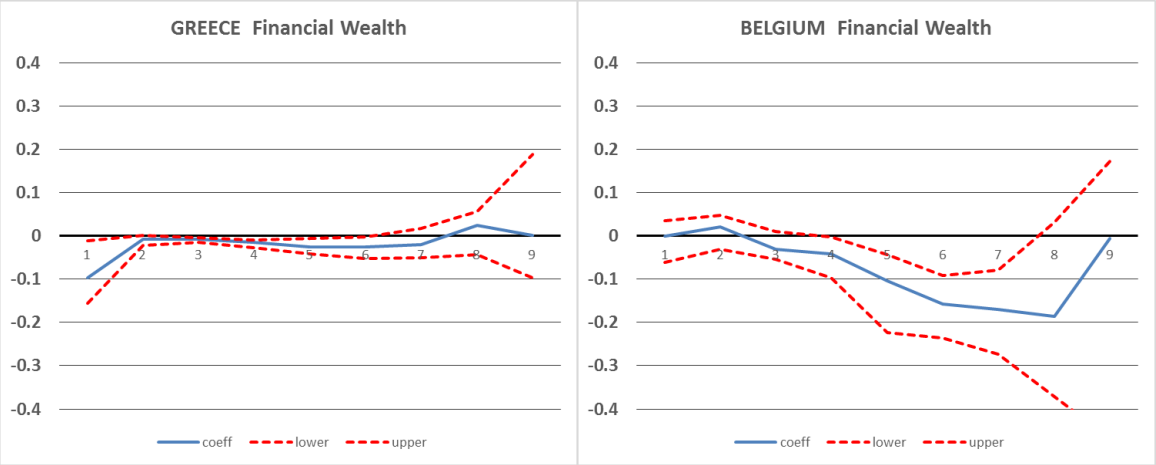
Source: Based on data from HFCS Wave 2 sample restricted to households with a reference person aged between 30 and 54 in employment and without any self-employed person. Country included: Belgium (BE), Germany (DE), France (FR), Greece (GR), Italy (IT), Luxembourg (LU), PT (Portugal).

Figure 1.a. Crowd out effects of pension wealth on net wealth in France, in Belgium and in Portugal. IV-Quantile regressions. Point estimates and confidence interval (95%)

Note: estimates obtained using cqiv procedure in STATA provided by Chernozhukov et al. (2015)

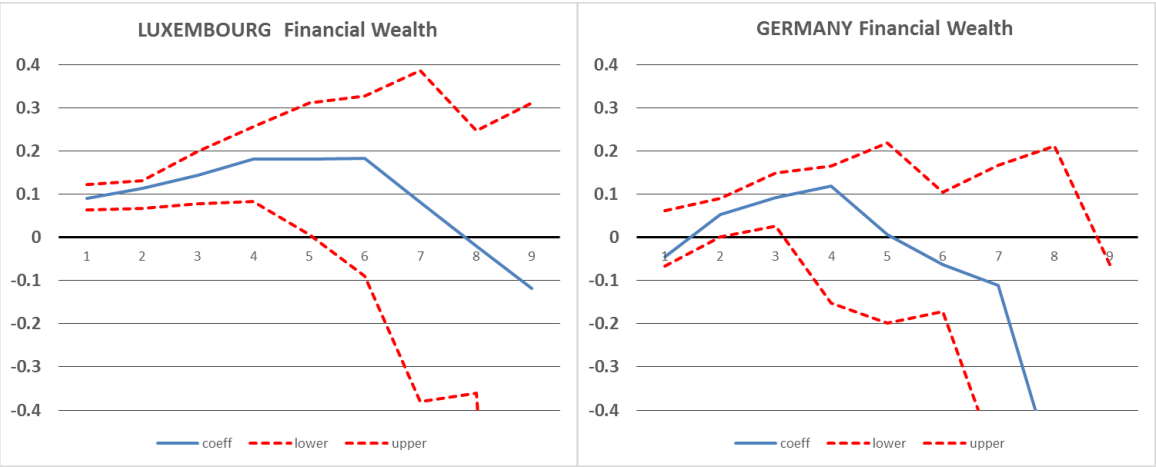
Source: Based on data xxx

Figure 1.b. Crowd out effects of pension wealth on financial wealth in Greece and in Belgium. IV-Quantile regressions. Point estimates and confidence interval (95%)



Note: estimates obtained using cqiv procedure in STATA provided by Chernozhukov et al. (2015)

Figure 2. Crowd in effects of pension wealth on financial wealth in Luxembourg and in Germany. IV-Quantile regressions. Point estimates and confidence interval (95%)



Note: estimates obtained using cqiv procedure in STATA provided by Chernozhukov et al. (2015)

APPENDIX A: Background model

Following Alessie & al. (2013), we derive the empirical equation from a discrete time simple life cycle model with no uncertainty and liquidity constraint. The within period utility function is assumed to have constant relative risk aversion. We assume also perfect capital market with a constant real interest rate r.

The consumer maximisation program is as follows:

$$\boldsymbol{max}_{c_t} \sum_{t=1}^{T} (1+\rho)^{1-t} \frac{c_t^{1-\gamma}}{1-\gamma}$$

$$\boldsymbol{s.t.} \sum_{t=1}^{T} (1+r)^{1-t} c_t = \sum_{t=1}^{R} (1+r)^{1-t} E_t + \sum_{t=R}^{T} (1+r)^{1-t} B_t$$

With c_t the instantaneous consumption at age t, E_t the income at age t, B_t the pension benefit at age t, R the retirement age, T the maximum age, ρ is the discount rate and γ the coefficient of relative risk aversion.

The wealth W_t at a given age t is defined as:

$$W_t = \sum_{\tau=1}^{t} (1+r)^{t-\tau} (yE_t - c_t) \quad \textbf{(1)}$$

with y_t the income at age t, corresponding to wage before retirement and pension after retirement.

We set the value of the discount rate at the interest rate level, i.e. ρ=r. The consumption at age t is equal to:

$$c_t = \left(\sum_{\tau=1}^{T} \left(\frac{1}{1+r} \right)^{\tau-1} \right)^{-1} \left(\sum_{\tau=1}^{R} (1+r)^{1-\tau} E_t + \sum_{\tau=R}^{T} (1+r)^{1-\tau} B_t \right) \quad \textbf{(2)}$$

Substitution of (2) in (1) provides the value of wealth at age t:

$$W_t = \sum_{\tau=1}^{t} (1+r)^{t-\tau} y_t - Q(t) \sum_{\tau=1}^{R} (1+r)^{t-\tau} E_t - Q(t) \sum_{\tau=R+1}^{T} (1+r)^{t-\tau} B_t \quad \textbf{(3)}$$

With Q-factor:

$$Q(t) = \frac{\sum_{\tau=1}^{t} \left(\frac{1}{1+r} \right)^{\tau-1}}{\sum_{\tau=1}^{T} \left(\frac{1}{1+r} \right)^{\tau-1}}$$

APPENDIX B: Additional results

Table B1. Country specific results. Estimated effects of adjusted pension wealth on net wealth, financial wealth (Ordinary Least Quares (OLS), Instrumental Variable (IV)) and on the probability to hold real estate property (Probit and IV probit).

		Net wealth		Financial Wealth		Probability to hold real estate property	
		OLS	IV	OLS	IV	Probit	IV Probit
	Coeff	-0.040	-0.130	-0.100	-0.154	-0.0014	-0.0085 **
Belgium	Lower	-0.789	-0.901	-0.434	-0.467	-0.0032	-0.0163
	Upper	0.710	0.641	0.234	0.158	0.0005	-0.0006
	Coeff	0.048	-0.072	-0.229	-0.454	-0.0007	0.0052 *
Germany	Lower	-0.754	-1.238	-1.148	-1.813	-0.0025	-0.0008
	Upper	0.850	1.093	0.691	0.906	0.0010	0.0112
	Coeff	0.379	0.234	0.174	0.246	-0.0006	-0.0129 ***
France	Lower	-0.011	-0.386	-0.137	-0.249	-0.0016	-0.0174
	Upper	0.768	0.854	0.485	0.741	0.0004	-0.0084
	Coeff	0.101	0.073	0.096	0.052	-0.0028	-0.0007
Greece	Lower	-0.438	-0.518	-0.179	-0.198	-0.0079	-0.0186
	Upper	0.641	0.664	0.372	0.301	0.0022	0.0173
	Coeff	-0.581 ***	-0.378	-0.318 ***	-0.276 ***	0.0011	0.0054
Italy	Lower	-0.969	-0.782	-0.447	-0.411	-0.0007	-0.0009
	Upper	-0.194	0.026	-0.189	-0.142	0.0030	0.0117
	Coeff	-5.404	-4.334	-4.347	-3.770	-0.0007	-0.0019
Luxembourg	Lower	-13.471	-12.291	-10.508	-9.778	-0.0014	-0.0068
	Upper	2.664	3.622	1.814	2.238	0.0001	0.0031
	Coeff	-0.021	-0.734	0.178	-0.100	-0.0033 ***	-0.0015
Portugal	Lower	-0.560	-2.914	-0.050	-1.295	-0.0052	-0.0448
	Upper	0.518	1.446	0.406	1.096	-0.0014	0.0418

Note: Dependent variable: private net wealth, financial wealth or a dummy variable equals to one when the household holds a real estate property. Control variable: current gross employee income, age and education of the reference person, household composition (number of adults, number of children), dummy variable for substantial gifts and inheritances received.

HFCS wave 2. Sample restricted to households with a reference person aged between 30 and 54 and with an observed current gross employee income.

Table B2. Country specific results. Estimated effects of adjusted pension wealth on net wealth and financial wealth (Quantile and IV quantile regressions)

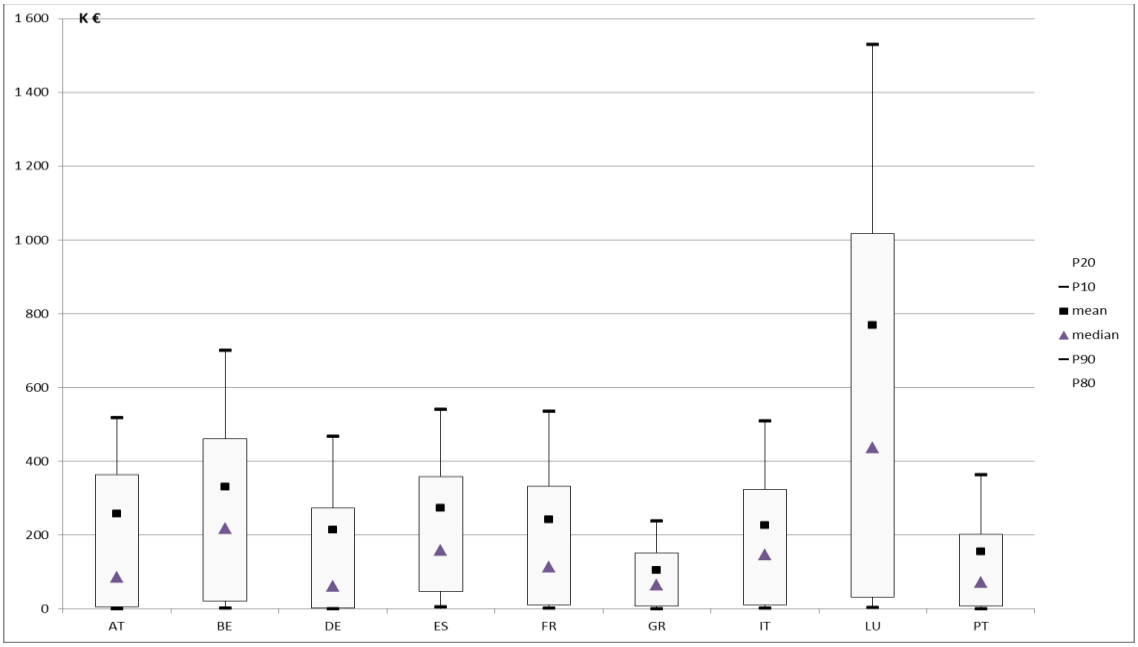
	Net wealth						Financial wealth					
	Q			IVQ			Q			IVQ		
	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3
	0.030	-0.184	-0.015	0.057	**-0.378** **	-0.111	0.011	-0.030	-0.121 **	-0.011	-0.104 **	-0.148 **
Belgium	-0.251	-0.524	-0.545	-0.420	-0.827	-0.682	-0.037	-0.087	-0.233	-0.058	-0.223	-0.279
	0.310	0.156	0.515	0.303	-0.018	0.442	0.058	0.026	-0.009	0.032	-0.043	-0.015
	0.030	**0.210** **	**0.139** **	-0.014	0.037	-0.808	0.043 **	0.066 *	0.123 **	0.099 **	0.006	-0.349
Germany	-0.065	0.054	-0.273	-0.330	-0.086	-1.666	0.003	-0.001	0.024	0.007	-0.199	-0.729
	0.126	0.366	0.551	0.076	0.539	0.960	0.084	0.132	0.223	0.128	0.219	0.263
	-0.132	0.078	-0.066	-0.293	**-0.162** **	-0.207	-0.051	-0.115 **	-0.109	-0.014	-0.094	-0.089
France	-0.343	-0.128	-0.454	-0.540	-0.524	-0.729	-0.102	-0.190	-0.249	-0.076	-0.171	-0.210
	0.078	0.284	0.322	0.047	-0.007	0.139	0.001	-0.039	0.031	0.045	0.044	0.194
	-0.002	-0.075	-0.109	-0.049	-0.094	0.123	0.000	-0.002	0.001	-0.009 **	-0.025 **	-0.007
Greece	-0.067	-0.234	-0.370	-0.109	-0.316	-0.084	-0.003	-0.015	-0.020	-0.018	-0.041	-0.049
	0.062	0.084	0.151	0.024	0.008	0.606	0.003	0.011	0.021	-0.002	-0.006	0.034
	0.097	0.112	0.099	0.130	0.113	0.070	-0.003	0.017	0.019	-0.002	0.020	0.039
Italy	-0.132	-0.184	-0.318	-0.061	-0.117	-0.309	-0.016	-0.015	-0.056	-0.022	-0.008	-0.050
	0.326	0.408	0.515	0.340	0.438	0.423	0.010	0.049	0.093	0.015	0.053	0.103
	0.081	-0.056	-0.732	**0.638** **	0.491	0.170	0.116 ***	0.078 ***	-0.050	0.130 **	0.182 **	0.031
Luxembourg	-0.564	-0.381	-2.064	0.189	-0.173	-1.472	0.073	0.011	-0.276	0.068	0.007	-0.376
	0.726	0.269	0.600	0.833	1.200	0.899	0.160	0.146	0.176	0.163	0.311	0.352
	-0.216 ***	-0.105	-0.042	**-0.797** **	**-0.632** **	0.295	0.031 **	0.093 **	0.259 **	0.004	0.038	0.336 **
Portugal	-0.310	-0.322	-0.262	-1.167	-0.885	-0.608	0.020	0.072	0.188	-0.070	-0.090	0.151
	-0.122	0.112	0.178	-0.447	-0.021	0.920	0.043	0.113	0.330	0.050	0.125	0.532

Note: Dependent variable: private net wealth, financial wealth or a dummy variable equals to one when the household holds a real estate property. Control variable: current gross employee income, age and education of the reference person, household composition (number of adults, number of children), dummy variable for substantial gifts and inheritances received.

Estimates obtained using cqiv procedure in STATA provided by Chernozhukov et al. (2015).

Source: Based on HFCS wave 2. Sample restricted to households with a reference person aged between 30 and 54 and with an observed current gross employee income.

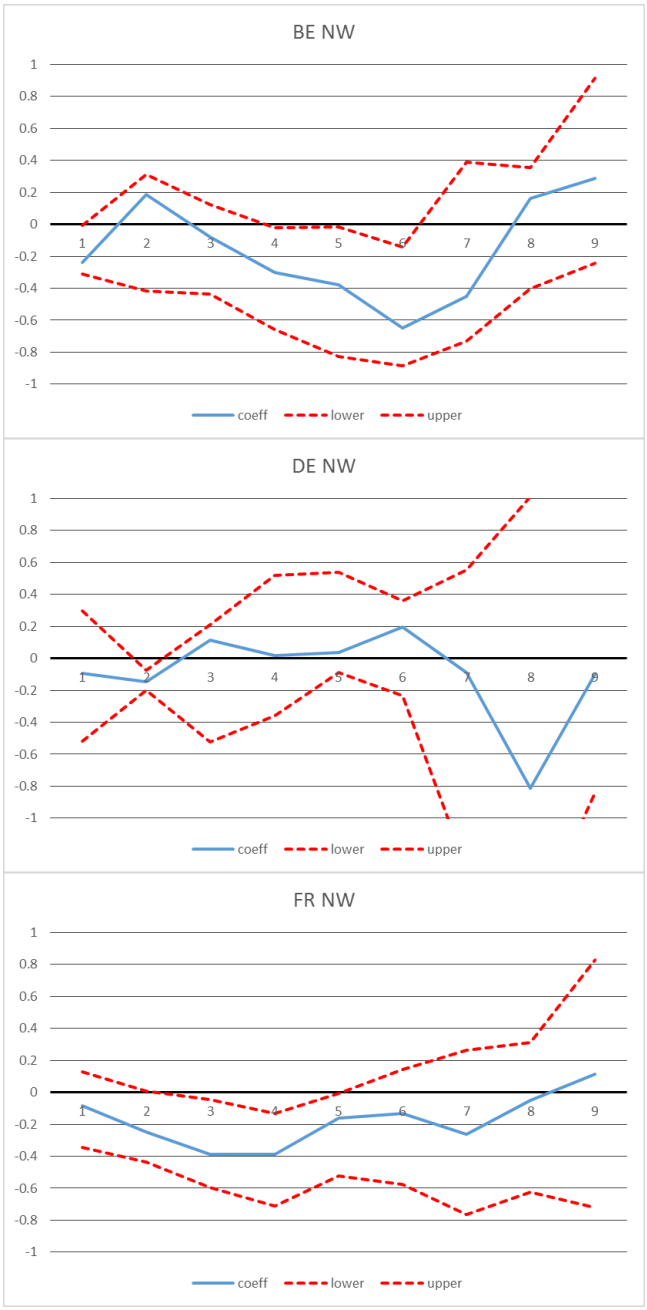
Figure B1. Net wealth distribution across country (p10, p20, p80, p90, mean, median)- Country representative samples

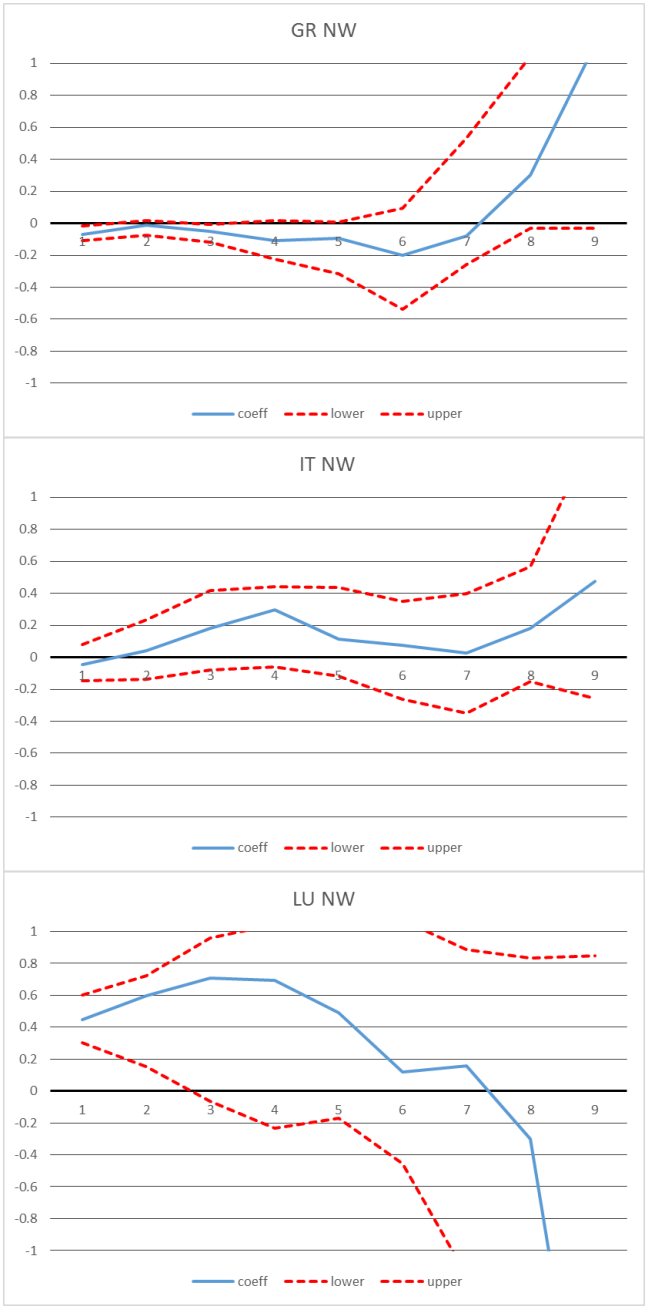


Source: HFCS wave 2. Net wealth is gross wealth less liabilities. Gross wealth includes all kind of assets of the households (real assets and financial assets, excluding public and occupational pension plans).

Note: Austria (AT), Belgium (BE), Germany (DE), Spain (ES), France (FR), Greece (GR), Italy (IT), Luxembourg (LU), PT (Portugal)

Figure B2: Estimated effects of adjusted pension wealth on net wealth (IV quantile regressions) – detailed country results

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-1
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coeff
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upper
IT NW
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0.2
0
-0.2
-0.4
-0.6
-0.8
-1
1 2 3 4 5 6 7 8 9
coeff
lower
upper
LU NW
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0.8
0.6
0.4
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-0.4
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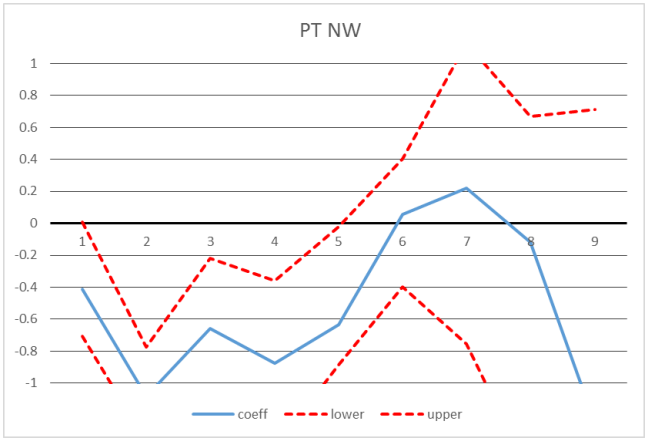
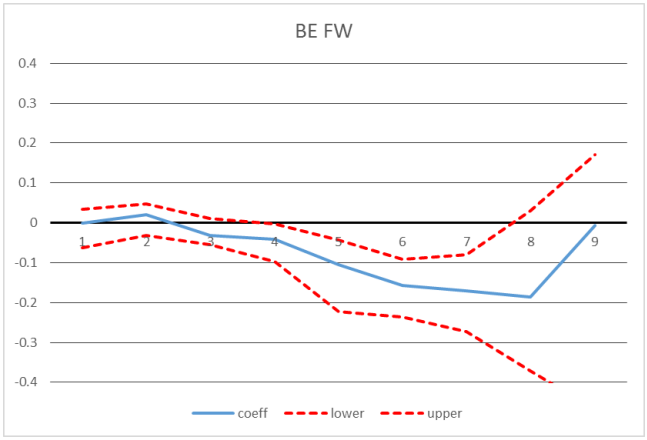
1 2 3 4 5 6 7 8 9
coeff
lower
upper

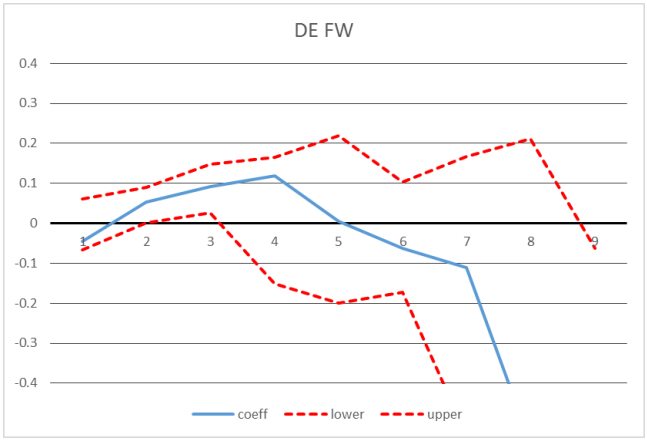


Note: Dependent variable: private net wealth. Control variable: current gross employee income, age and education of the reference person, household composition (number of adults, number of children), dummy variable for substantial gifts and inheritances received. Estimates obtained using cqiv procedure in STATA provided by Chernozhukov et al. (2015).

Source: HFCS Wave 2 sample restricted to households with a reference person aged between 30 and 54 in employment and without any self-employed person.

Figure B3: Estimated effects of adjusted pension wealth on financial wealth (IV quantile regressions) – detailed country results

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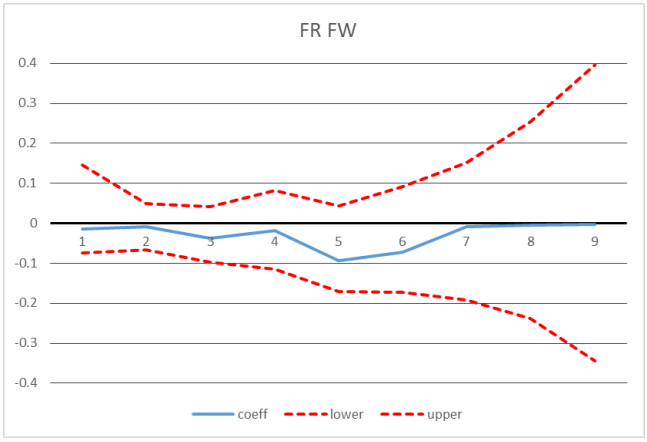
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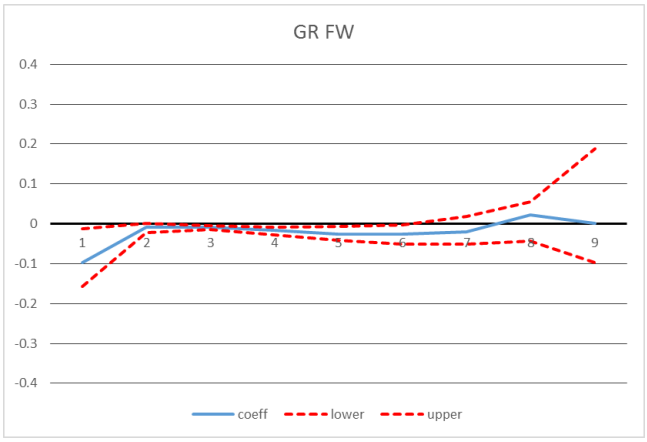
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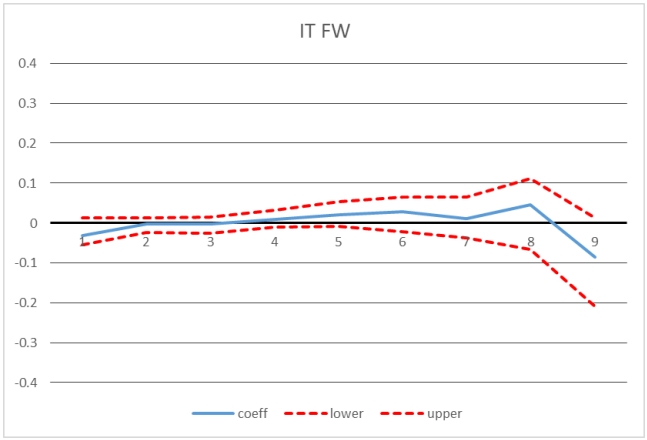

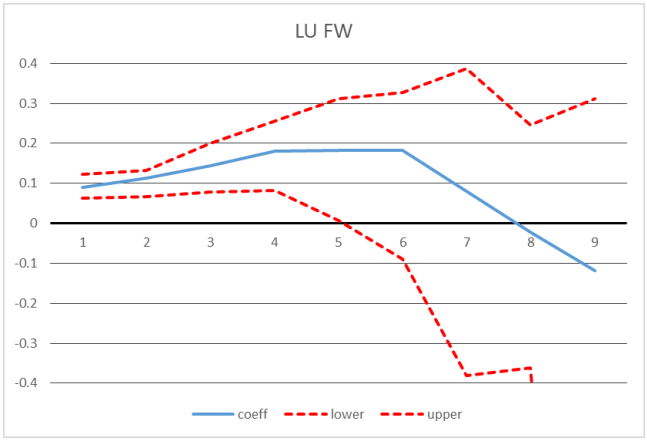

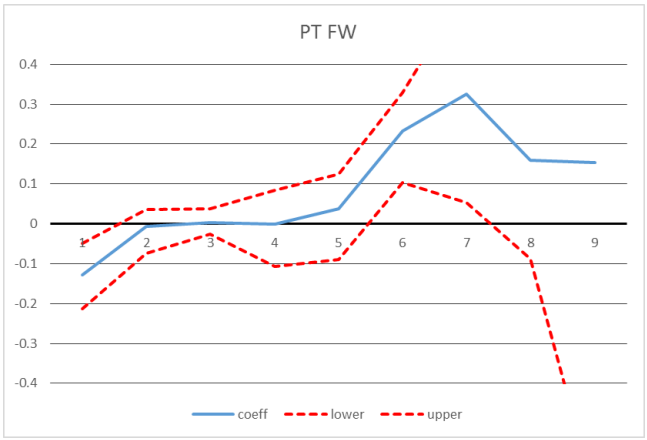

Note: Dependent variable financial wealth. Control variable: current gross employee income, age and education of the reference person, household composition (number of adults, number of children), dummy variable for substantial gifts and inheritances received. Estimates obtained using cqiv procedure in STATA provided by Chernozhukov et al. (2015).

Source: HFCS Wave 2 sample restricted to households with a reference person aged between 30 and 54 in employment and without any self-employed person.