Private Wealth and Pensions across European Countries

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Motivations

- Adequacy of the households’ saving to their retirement needs.

- Link with pension schemes: do people adapt their behaviour to changes in the pension schemes? If they do, how do they do it?

- Heterogeneity in the euro zone: are differences in households’ portfolio and wealth in the European countries due to differences in the pension schemes?
Net Wealth distributions

Source: HFCS wave 2
Motivations

- The effect of pension on savings:
  - An old issue in the literature
  - Ambiguous overall effect: displacement effect, early retirement effect, life expectancy

\[ \text{public benefits} \rightarrow \text{consumption over the life-cycle} \rightarrow \text{private savings} \]
\[ \text{public benefits} \rightarrow \text{Earlier retirement} \rightarrow \text{private savings} \]
\[ \text{public benefits} \rightarrow \text{Retirement spell expectancy} \rightarrow \text{private savings} \]

\[ \Rightarrow \text{Related policy issue: Adequacy of savings to retirement needs.} \]
Related literature

- **No consensus** on the magnitude of the effect. Papers differ in terms of country, time period, identification strategy, endogeneity bias, sample selection, etc.

- **Identification strategies**
  - Pension reforms. Attanasio and Rohwedder 2003, Attanasio and Brugiavini 2003
Main results

- Need to account for the endogeneity between pension wealth and non-pension wealth arising from individual expectations about at what age to retire (Instrument in the spirit of Engelhardt and Kumar (2011))

- Need to account for heterogeneous effects across the net wealth distribution (quantile regressions) and across country

- Significant displacement effect of pension (62-72 cents) at the mean (Pooled sample)
Main results

- **Substantial cross-country heterogeneity**: crowd in/crowd out effects:
  - depending on the country and wealth decile
  - depending on the type of assets (financial assets, housing assets)

Underlying issues: Differences in replacement rate, progressivity? The role of housing as a store of value for old age? Financial crisis and reforms across country?
Presentation outline

Empirical model
Data & Pension
Results
Conclusion
Empirical Model

- Estimation of the displacement effect of mandatory pension wealth on net wealth, accounting for the heterogeneity of the displacement effect.

- Data from a cross-country harmonized wealth survey combined with estimates of pension wealth from the OECD pension models.

- Standard reduced form equation of wealth accumulation based on the life-cycle.

- Identification provided by legislation variation across schemes.
Household Wealth survey: Household Finance and Consumption Survey - HFCS (ECB)

- Harmonized household level information on wealth and income for European countries

- Covers the full population (not only 50+)

- Detailed information on wealth composition, household composition, current income but not on wage history

OECD pension model

- Harmonized methodology and assumptions across country (inflation, growth)

- Pension wealth: discounted sum of all future pension benefits taking into account residual life expectancy and indexation of pension benefits (by country)

- Main national basic, minimum and mandatory schemes (both public and private pensions) for private-sector workers under pension rule of 2014.

- Computed considering various multiple of average earnings and retirement ages
DATA

- Matching household non pension wealth (HFCS) with individual pension wealth (OECD model)

Based on:

- gender, age, income (as a multiple of the average income of the age group)
- The age at which the individuals expect to retire
- whether the individuals declare in the HFCS to be eligible in the future to public or private pension
Sample selection

- Reference person aged 30-54 and in employment (cross-country heterogeneity in entry into the labour market, transition to retirement)

- Self-employed people excluded (pension wealth not available in OECD simulations)

- Countries for which we have the required information (7).

Countries excluded because of too small sample size, or because some crucial information is missing (expected retirement age in the HFCS or simulation of OECD pension), or because of reference year (Spain 2011 in the HFCS)
## DATA: sample composition (mean of the main variables)

<table>
<thead>
<tr>
<th></th>
<th>Belgium</th>
<th>Germany</th>
<th>France</th>
<th>Greece</th>
<th>Italy</th>
<th>Luxembourg</th>
<th>Portugal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net wealth</td>
<td>148,651</td>
<td>123,454</td>
<td>140,303</td>
<td>38,528</td>
<td>92,736</td>
<td>353,845</td>
<td>68,531</td>
</tr>
<tr>
<td>Financial assets</td>
<td>40,951</td>
<td>38,528</td>
<td>33,630</td>
<td>4,052</td>
<td>10,461</td>
<td>87,208</td>
<td>12,235</td>
</tr>
<tr>
<td>Real estate properties</td>
<td>133,615</td>
<td>108,914</td>
<td>126,408</td>
<td>36,875</td>
<td>84,715</td>
<td>343,471</td>
<td>82,282</td>
</tr>
<tr>
<td>Housing wealth owners (Y/N)</td>
<td>0.78</td>
<td>0.62</td>
<td>0.72</td>
<td>0.61</td>
<td>0.66</td>
<td>0.82</td>
<td>0.86</td>
</tr>
<tr>
<td>Adjusted Pension wealth</td>
<td>107,677</td>
<td>92,848</td>
<td>115,777</td>
<td>68,387</td>
<td>73,644</td>
<td>372,605</td>
<td>51,462</td>
</tr>
<tr>
<td>Adjusted and instrumented pension wealth</td>
<td>97,895</td>
<td>90,314</td>
<td>140,159</td>
<td>69,409</td>
<td>72,911</td>
<td>383,034</td>
<td>58,510</td>
</tr>
<tr>
<td>Wage</td>
<td>45,401</td>
<td>52,731</td>
<td>38,892</td>
<td>17,674</td>
<td>24,549</td>
<td>73,348</td>
<td>18,843</td>
</tr>
<tr>
<td>Age</td>
<td>44</td>
<td>44</td>
<td>43</td>
<td>42</td>
<td>45</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>Men (Y/N)</td>
<td>0.65</td>
<td>0.71</td>
<td>0.63</td>
<td>0.70</td>
<td>0.68</td>
<td>0.71</td>
<td>0.59</td>
</tr>
<tr>
<td>Married couples (Y/N)</td>
<td>0.55</td>
<td>0.66</td>
<td>0.49</td>
<td>0.70</td>
<td>0.63</td>
<td>0.63</td>
<td>0.69</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Upper secondary</td>
<td>0.34</td>
<td>0.48</td>
<td>0.37</td>
<td>0.58</td>
<td>0.48</td>
<td>0.32</td>
<td>0.22</td>
</tr>
<tr>
<td>% Tertiary</td>
<td>0.56</td>
<td>0.48</td>
<td>0.53</td>
<td>0.27</td>
<td>0.17</td>
<td>0.47</td>
<td>0.35</td>
</tr>
<tr>
<td>Nber of employed people</td>
<td>1.67</td>
<td>1.71</td>
<td>1.61</td>
<td>1.33</td>
<td>1.42</td>
<td>1.72</td>
<td>1.62</td>
</tr>
<tr>
<td>% of individuals with inheritances</td>
<td>0.29</td>
<td>0.30</td>
<td>0.44</td>
<td>0.27</td>
<td>0.27</td>
<td>0.21</td>
<td>0.28</td>
</tr>
<tr>
<td>% of individuals with credit constraint</td>
<td>0.03</td>
<td>0.06</td>
<td>0.09</td>
<td>0.07</td>
<td>0.03</td>
<td>0.10</td>
<td>0.08</td>
</tr>
<tr>
<td>Number of individuals</td>
<td>532</td>
<td>1,260</td>
<td>3,700</td>
<td>732</td>
<td>1,852</td>
<td>714</td>
<td>1,905</td>
</tr>
</tbody>
</table>

=> Wealthier people than in the country representative sample

### Main variables definitions

- **Net (non-pension) wealth** = total assets (real assets + financial assets)-total liabilities
- **Financial assets** = deposits, mutual funds, bonds, non-self employment private businesses, publicly traded shares, money owned to household, private pension plans and whole life insurance policies
- **Real estate properties** = household main residence + other real estate properties
- **Adjusted pension wealth** = discounted sum of all future pension benefits multiplied by the gale’s Q factor (with r=2%)
## Results: pooled sample

**Estimated effect of adjusted pension wealth on net wealth, financial wealth and on the probability to hold real estate property**

<table>
<thead>
<tr>
<th></th>
<th>Net wealth</th>
<th>Financial wealth</th>
<th>Probability to hold real estate property</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS</td>
<td>IV</td>
<td>OLS**</td>
</tr>
<tr>
<td>Coeff</td>
<td>-0.728 ***</td>
<td>-0.620 ***</td>
<td>-0.758 ***</td>
</tr>
<tr>
<td>Lower</td>
<td>-0.895</td>
<td>-0.844</td>
<td>-0.883</td>
</tr>
<tr>
<td>Upper</td>
<td>-0.561</td>
<td>-0.396</td>
<td>-0.633</td>
</tr>
</tbody>
</table>

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.
## Country by country results: Q and IV Q estimates

<table>
<thead>
<tr>
<th>Country</th>
<th>Net wealth</th>
<th>Financial wealth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q1</td>
<td>Q2</td>
</tr>
<tr>
<td>Belgium</td>
<td>0.030</td>
<td>-0.184</td>
</tr>
<tr>
<td></td>
<td>-0.251</td>
<td>-0.524</td>
</tr>
<tr>
<td></td>
<td>0.310</td>
<td>0.156</td>
</tr>
<tr>
<td>Germany</td>
<td>0.030</td>
<td>0.210</td>
</tr>
<tr>
<td></td>
<td>-0.065</td>
<td>0.054</td>
</tr>
<tr>
<td></td>
<td>0.126</td>
<td>0.366</td>
</tr>
<tr>
<td>France</td>
<td>-0.132</td>
<td>0.078</td>
</tr>
<tr>
<td></td>
<td>-0.343</td>
<td>-0.128</td>
</tr>
<tr>
<td></td>
<td>0.078</td>
<td>0.284</td>
</tr>
<tr>
<td>Greece</td>
<td>-0.002</td>
<td>-0.075</td>
</tr>
<tr>
<td></td>
<td>-0.067</td>
<td>-0.234</td>
</tr>
<tr>
<td></td>
<td>0.062</td>
<td>0.084</td>
</tr>
<tr>
<td>Italy</td>
<td>0.097</td>
<td>0.112</td>
</tr>
<tr>
<td></td>
<td>-0.132</td>
<td>-0.184</td>
</tr>
<tr>
<td></td>
<td>0.326</td>
<td>0.408</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>0.081</td>
<td>-0.056</td>
</tr>
<tr>
<td></td>
<td>-0.564</td>
<td>-0.381</td>
</tr>
<tr>
<td></td>
<td>0.726</td>
<td>0.269</td>
</tr>
<tr>
<td>Portugal</td>
<td>-0.216</td>
<td>-0.105</td>
</tr>
<tr>
<td></td>
<td>-0.310</td>
<td>-0.322</td>
</tr>
<tr>
<td></td>
<td>-0.122</td>
<td>0.112</td>
</tr>
</tbody>
</table>
Results: cross country heterogeneity

- Cross-country heterogeneity: « main » cases
  - « Crowding out » effect: bottom or middle of the distribution
    - BE (NW, FW), FR (NW), GR (FW)
    - BE, FR: also a negative effect of pension wealth on the probability to hold real estate property
  - « Crowding in » effect: Bottom of the distribution
    - DE (FW), LU (NW, FW)
    - DE: also a positive effect of pension wealth on the probability to hold real estate property

Remark: when both significant effects for NW and FW: larger effect for NW than for FW (BE, LU)

- PT: Crowding out at the bottom (NW, FW) and crowding in at the top (FW)
Crowding out effect
Net wealth

- Additional results with housing wealth
- BE and FR: also a negative effect of pension wealth on the probability to hold real estate properties (IV Probit): real estate property as a store of value for old ages.
Crowding out effect
Financial wealth

GREECE  Financial Wealth

BELGIUM  Financial Wealth

coeff  lower  upper

0 1 2 3 4 5 6 7 8 9

0 0.1 0.2 0.3 0.4

-0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4
Crowding *out* at the bottom crowding *in* 6 and 7 deciles

Portugal
Crowding in effects
Financial wealth

- Additional results with housing wealth
- DE: also a positive effect of pension wealth on the probability to hold real estate properties (IV Probit)
Results for Italy

- No significant estimates with IV Quantile regression
- While Attanasio and Brugiavini (2003) were able to find a substituability effect between pension wealth and saving. Differences in the methodology (1992 reforms), but also in the time period?
Why similar results in some countries?

- Generosity of the pension system

Source: HFCS-wave 2, OECD pension simulations (2014). Sample restricted to households with a reference person aged between 30 and 54 in employment and without any self-employed person.
Why similar results for BE, FR and GR?

- Generosity of the pension system

**Median adjusted pension wealth**

**Source:** HFCS-wave 2, OECD pension simulations (2014). Sample restricted to households with a reference person aged between 30 and 54 in employment and without any self-employed person.
Why similar results in some countries?

- Similar design in terms of pension level and replacement rate over the wage distribution

  - FR, BE: replacement rate <0.5 below median earnings, and then decreasing
  - LU, PT: pension benefits increase with earnings, high replacement rates (but lower wages in PT)
  - DE: very low replacement rate: may explain some complementarity at the bottom

Source: «Pensions at a Glance 2015: OECD and G20 indicators», OECD publishing
CONCLUSION

- Crowding out/crowding in estimates of pension wealth on non-pension wealth for 7 European countries

- Focus on population in employment – Year 2014

- Cross-country heterogeneity
  - Crowding out effects in the bottom or middle of the distribution in BE (NW, FW), FR (NW), GR (FW), PT (NW, FW)
  - Crowding in effects in LU (NW, FW), DE (FW)
  - No significant effect in IT [large confidence intervals]
CONCLUSION

- How to interpret the cross-country heterogeneity?
  - Welfare states (Mediterranean versus Continental countries)? Our results do not match with the standard Esping-Andersen classification.
  - Differences in replacement rate, progressivity of the system?
  - Interaction with housing markets? Housing as a store of value for old age in some countries.
## Financial wealth

| Country     | Lower Coeff | Lower IV | Q1 | Q2 | Q3 | Upper Coeff | Upper IV | OLS Coeff | OLS IV | IV Coeff | IVQ Coeff | IVQ OLS | IVQ IV | OLS Q1 | OLS Q2 | OLS Q3 | IVQ Q1 | IVQ Q2 | IVQ Q3 |
|-------------|-------------|----------|----|----|----|-------------|----------|-----------|---------|----------|-----------|---------|--------|--------|--------|--------|--------|--------|--------|--------|
| Belgium     | -0.434      | -0.467   | -0.037 | -0.087 | -0.233 | 0.234       | 0.158    | -0.100   | -0.154  | -0.100  | -0.154   | -0.148 ** | -0.104 ** | -0.148 ** |
| Germany     | -1.148      | -1.813   | 0.003  | -0.001 | 0.024 | 0.691       | 0.906    | -0.229   | -0.454  | -0.454  | 0.099 **  | 0.006   | -0.349 |
| France      | -0.137      | -0.249   | -0.102 | -0.190 | -0.249 | 0.485       | 0.741    | 0.174    | 0.246   | -0.014  | -0.094   | -0.089 |
| Greece      | -0.179      | -0.198   | -0.003 | -0.015 | -0.020 | 0.372       | 0.301    | 0.096    | 0.052   | -0.009  | -0.025 ** | -0.007 |
| Italy       | -0.447      | -0.411   | -0.016 | -0.015 | -0.056 | -0.189      | -0.142   | -0.318 *** | -0.276 *** | -0.002 | 0.020   | 0.039 |
| Luxembourg  | -10.508     | -9.778   | 0.073  | 0.011  | -0.276 | 1.814       | 2.238    | -4.347   | -3.770  | -0.050  | -0.280 ** | 0.031 |
| Portugal    | -0.050      | -1.295   | 0.020  | 0.072  | 0.188 | 0.406       | 1.096    | 0.178    | -0.100  | 0.031 ** | 0.093 **  | 0.259 ** | 0.004   | 0.038   | 0.336 ** | 0.151   | 0.532 |

Q1, Q2, Q3 refer to the first, second, and third quartiles, respectively. OLS and IV refer to ordinary least squares and instrumental variables, respectively. The asterisks (*) indicate significance levels of 0.1, 0.05, and 0.01, respectively.
Endogeneity issue (pension wealth)

- In our case: pension wealth computed accounting for the expected retirement age (elicited through the HFCS)

- Instrumental variable: pension wealth computed using the country specific NRA

### Instrumented Pension Wealth : Retirement age

<table>
<thead>
<tr>
<th>BE</th>
<th>DE</th>
<th>FR</th>
<th>GR</th>
<th>IT</th>
<th>LU</th>
<th>PT</th>
</tr>
</thead>
<tbody>
<tr>
<td>67</td>
<td>65</td>
<td>67</td>
<td>67</td>
<td>67</td>
<td>65</td>
<td>66</td>
</tr>
</tbody>
</table>
Empirical model (1)

- Standard empirical specification derived from a simple life-cycle model, following Gale (1998) (e.g. Alessie et al. 2013).

- We estimate:

\[ W_i = \beta_0 + \beta_1 Y_i + \beta_2 P_i + \gamma Z_i + u_i \]

\( i \): the individual index,

\( W_i \): non pension wealth

\( Y_i \): income

\( P_i \): pension wealth (mandatory pensions for the private sector), adjusted by the Gale’s Q factor (with \( r=2\% \))

\( X_i \): Additional controls (age, gender, household composition, education, credit constraints, gifts and inheritances received)

\( u_i \): the error term.
Empirical model (2)

- We run OLS, IV and Quantile and IV Quantile regressions

Instrumented Quantile regressions with CQIV – stata module of Chernozhukov et al.(2015)

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 $q_\tau$ the conditional $\tau$-quantile for the quantile regressions
Empirical model (3)

- **Identification:**
  - Cross-country differences in pension scheme (Alessie et al., 2013; Hurd et al. 2012)
  - Non linearities in pension scheme and differences in pension enrolment across individuals within countries.

- **Endogeneity issue and instrumental variable**
  - Unobservable factors such as preference for leisure may affect both pension and saving
  - Our pension wealth variable: simulated pension benefits using gender, year of birth, number of years of contribution and the mean earning histories by cohort and wage level.
  - Endogeneity arising from individual expectations “at what age they will retire”. => *Pension wealth instrumental variable: considering the country specific normal retirement age instead of the individual expectations*
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- Endogeneity arising from individual expectations “at what age they will retire”. => Pension wealth instrumental variable: considering the country specific normal retirement age instead of the individual expectations.
The background model (1)

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:

$$\max_{c_t} \sum_{t=R}^{T} (1 + \rho)^{1-t} \frac{c_t^{1-\gamma}}{1 - \gamma}$$

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

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, \( \rho \) is the discount rate and \( \gamma \) the coefficient of relative risk aversion.
The background model (2)

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

\[
W_t = \sum_{\tau=1}^{t} (1 + r)^{t-\tau} (E_t - c_t)
\]  

(1)

with \( E_t \) 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. \( \rho = r \). The consumption at age \( t \) is equal to:

\[
c_t = \left( \sum_{\tau=1}^{T} \left( \frac{1}{1+r} \right)^{\tau-1} \right)^{-1} \left( \sum_{\tau=1}^{R} (1 + r)^{1-\tau} E_t + \sum_{\tau=R}^{T} (1 + r)^{1-\tau} B_t \right)
\]  

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

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

(3)

With Q-factor:

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