HOUSEHOLD INDEBTEDNESS AND FINANCIAL MARKET PARTICIPATION IN SELECTED EU COUNTRIES

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Abstract

This paper examines household financial indebtedness and participation in financial markets across selected EU countries, utilizing household-level data from the fourth wave of the Household Finance and Consumption Survey (HFCS). The analysis reveals that only in the Netherlands and Finland do all households participate in financial markets. Across all surveyed countries, deposits are the most common form of financial market participation, followed by voluntary pensions and mutual funds. Employing factor and cluster analysis in R Studio, Euro Area countries were grouped into four distinct clusters. The findings do not confirm the hypothesis that lower household indebtedness is observed in countries with a greater household financial asset position. The highest level of household indebtedness was observed in a cluster consisting solely of Luxembourg, which also reports the highest GDP, educational attainment, and ownership of diverse financial assets. In contrast, the first cluster, comprising Central and Eastern European countries, and Portugal, recorded the lowest levels of household indebtedness, educational attainment, and financial market participation, particularly in shares and pensions, with limited engagement in mutual funds and other financial instruments. This cluster also exhibited the highest inflation rate.

Key words: HFCS, household, financial markets, financial assets, indebtedness

JEL Code: D14, G11, G51

Introduction

Household indebtedness, particularly over-indebtedness, has become an increasingly urgent concern across Europe in recent years. The debt burden left by the financial crisis has been exacerbated by new borrowing, driven by easier access to credit, rising housing prices, and increased consumer confidence (Zabai, 2017). While household debt levels have been declining since 2021 in most EU countries, with Luxembourg as a notable exception, they remain high. The sharpest declines were recorded in Denmark (-17.3% of GDP), Greece (-10.4% of GDP), and Cyprus (-8.2% of GDP) (European Commission, 2024). Despite these reductions, high

household debt continues to negatively impact financial well-being, often leading to financial distress and, in many cases, bankruptcy (Abrantes-Braga and Veludo-de-Oliveira, 2020). Effectively managing debt has thus become a critical element of financial planning for individuals. The recent economic slowdown has further underscored how debt exacerbates financial strain and increases household vulnerability (Hiilamo, 2018). Furthermore, household indebtedness not only endangers individual financial stability but also presents significant risks to the broader macroeconomic environment (Ramsay and Williams, 2020).

Household financial stability and well-being are impacted not only by indebtedness but also by the pressure arising from financial assets. Brown and Taylor (2008) highlight the importance of understanding the distribution of both financial assets and liabilities at the household level, as it reveals the extent of financial stress households may experience, making it crucial for informed economic policymaking. However, the joint analysis of different balance sheet components, particularly the interplay between debt and assets, has received limited attention. Brown et al. (2015) points out that focusing solely on one aspect of household finances, without considering other balance sheet factors, provides an incomplete picture. Scholars thus recommend examining household debt and assets together. For instance, Feng et al. (2019) analyzed the balance sheets of Chinese households and found that, compared to their counterparts in developed countries, Chinese households generally hold more financial assets and carry lower levels of debt.

According to Carroll et al. (2012) and Kukk (2017), households' reduced buffer stocks or optimal asset holdings can be largely attributed to the increased availability of credit. Easier access to credit encourages households to hold lower levels of precautionary savings, which consequently results in reduced financial assets. Callen and Thimann (1997) similarly observed, using aggregate data from OECD countries, that financial deregulation is negatively correlated with household saving rates. Carroll et al. (2012) further explain that the relationship between debt and financial assets is closely tied to credit market conditions. In more flexible credit markets, the need for precautionary savings diminishes, leading households to reduce their financial asset holdings.

Household balance sheets are shaped by various socio-demographic and economic factors. According to the literature (e.g., Neely, 2022), a sharp increase in inflation diminishes the real value of a borrower's debt, but it often results in higher future borrowing costs. This is because investors, anticipating sustained inflation, demand higher nominal yields to compensate for the anticipated loss of purchasing power and associated uncertainties. Additionally, when low GDP growth coincides with rising inflation, households may incur

excessive debt to sustain consumer spending (Abida and Shafiai, 2018). Furthermore, Lieb and Shuffles (2022) indicates that household balance sheet components are sensitive to inflationary pressures, and active participation in financial markets can provide a buffer against inflation.

The main aim of this article is to analyze household indebtedness and financial market participation in countries included in the fourth wave of the Household Finance and Consumption Survey. A cluster analysis is conducted to test the following hypothesis: *Countries with lower levels of household indebtedness are likely to exhibit higher levels of household financial assets*.

The paper is structured as follows: the next section outlines the data and methodology employed in the study, followed by the presentation of the results. The final chapter summarizes and concludes the key findings.

1 Materials and Methods

This investigation examines household indebtedness and financial market participation within selected EU countries. The study utilizes household-level data from the fourth wave of the Household Finance and Consumption Survey (HFCS), which encompasses all 19 Euro Area countries, as well as the Czech Republic, Croatia, and Hungary, with a sample of over 83 000 households from the first half of 2020 to the first half of 2022 (ECB, 2023a). This data includes detailed information on household financial market participation, indebtedness, and education. The analysis integrates specific features of HFCS data, including Bayesian-based multiple imputations to handle non-response and maintain distribution characteristics, and applies population weights to ensure representativeness by addressing selection probabilities, coverage issues, external data adjustments, and non-response (ECB, 2023b). Additionally, macroeconomic variables such as GDP and inflation from the Eurostat database are included. The study includes the following variables:

- *Participation of households in financial markets:* Households owning financial instruments such as deposits, mutual funds, bonds, shares, voluntary pensions, or other types of financial assets (percentage of households).
- *Education:* Households with tertiary-level educational attainment (percentage of households).
- *GDP:* Gross Domestic Product at market prices (EUR per capita).
- *Inflation:* Harmonised Index of Consumer Prices (HICP).
- *Debt:* Average total household debt holdings (EUR thousands).

Although the data includes various units of measurement, it was standardized before analysis. The cluster analysis, which assumes no correlation between variables, utilized the Pearson correlation coefficient. To address the complexity of the dataset and reduce its dimensionality, Principal Component Analysis (PCA) was employed to transform the original dataset into a new set of uncorrelated variables (Datta et al., 2018). Additionally, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were used to assess the factorability of the data.

Measuring the similarity or dissimilarity between objects based on selected characteristics aids in grouping observations for comparative analysis. In this study, Euclidean distance was employed to quantify the similarity between two objects. For two countries x_i and x_j, the squared Euclidean distance $D_E(x_i, x_j)$ has the following form:

$$D_E(x_i, x_j)^2 = \sum_{i=1}^{m} (x_{il} - x_{jl})^2 \quad (1)$$

where x_{il}: the value of variable *l* for the country x_i; and x_{jl}: the value of variable *l* for the country x_j.

Ward's minimum variance method clusters countries by calculating the distance between centroids and clusters, effectively grouping regions within a multidimensional Euclidean space (Ward, 1963). The specification for Ward's minimum variance method is as follows:

$$I_{AB} = \frac{n_A n_B}{n_A + n_B} \times (\bar{a} - \bar{b})'(\bar{a} - \bar{b}) \quad (2)$$

where $\bar{a}$, $\bar{b}$: centroids for clusters A and B; n_A, n_B: the size of clusters A and B. The optimal number of clusters is given by the majority rule.

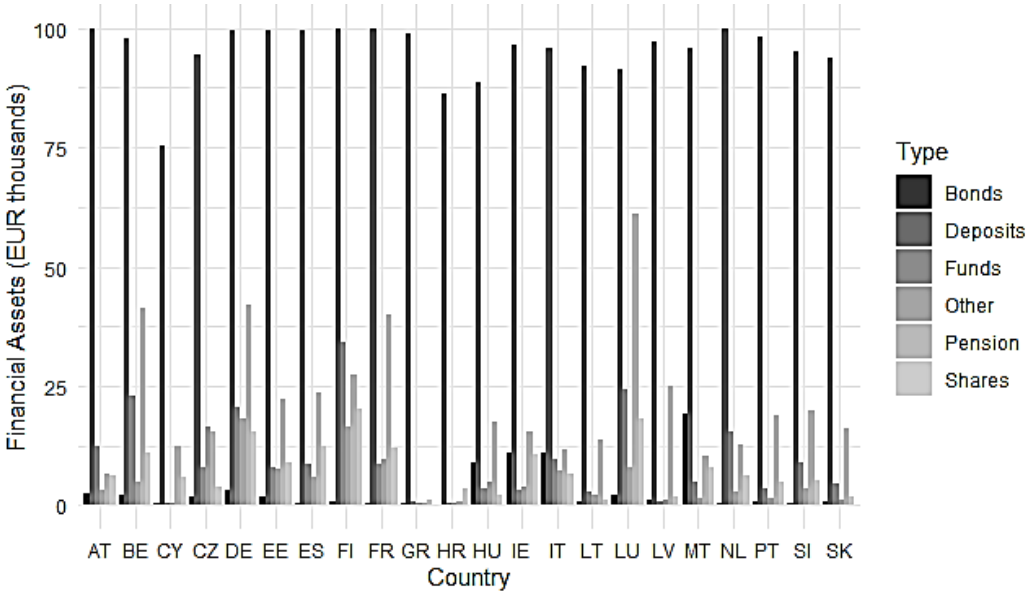
2 Results

Household financial market participation is primarily represented by involvement in various financial market products. Figure 1 illustrates the share of households owning different types of financial products, including deposits, bonds, funds, shares, pensions, and other financial instruments. It is evident that nearly all households possess some form of deposit, making it the most prevalent method of participating in financial markets. According to the fourth wave of the HFCS, all households in the Netherlands and Finland own deposits.

Another significant form of participation is through voluntary pension systems, with Luxembourg having the highest rate at approximately 61% of households. Conversely, Greece has a notably low participation rate in voluntary pensions, at just 0,6%. Considerable variability

is also observed in participation rates for funds and shares. For instance, Finland has the highest participation rate in funds at 34.2%, whereas Greece and Croatia have the lowest rates, at 0.5%. Additionally, inland (20.3%) and Luxembourg (18.0%) show relatively high participation rates in shares, while Croatia and Greece exhibit very low rates in this category. Bond ownership tends to be low across all countries, with Malta (19.1%) and Italy (10.9%) being notable exceptions.

Fig. 1: Household participation in financial market



Source: prepared by authors using Eurostat and HFCS data

Since the initial variables were anticipated to be highly correlated, Principal Component Analysis (PCA) was conducted before clustering. The results of Bartlett's test of sphericity (p-value=1.08×10^{-6}) led to the rejection of the null hypothesis at the 1% significance level, indicating that the correlation matrix is not an identity matrix and thus suitable for factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy supports these findings, with an overall KMO value of 0.70, confirming the adequacy of the dataset for factor analysis. PCA results further reveal that two factors explain 71.81% of the observed variance in the data. Additionally, the Kaiser criterion indicated eigenvalues greater than one for two factors, which guided the decision to use three components in the subsequent analysis. The detailed results of the PCA after rotation are presented in Table 1.

Tab. 1: Results of Principal Component Analysis

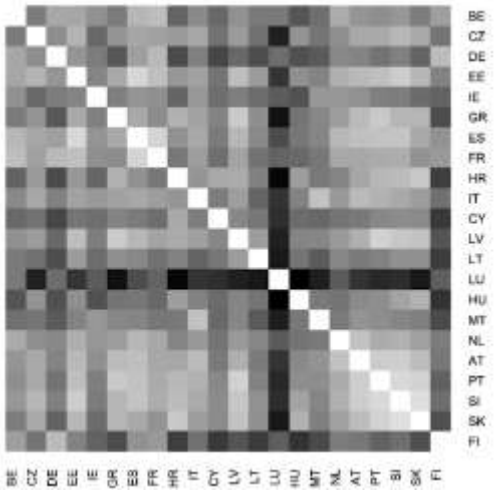
Variable	PC 1	PC 2	PC 3	h2	u2
Deposits	-0.05	0.65	-0.12	0.56	0.56
Funds	0.46	0.76	0.20	0.82	0.18
Bonds	0.23	-0.11	-0.84	0.76	0.24
Shares	0.96	0.66	0.05	0.88	0.12
Pensions	0.58	0.49	0.39	0.73	0.27
Other fin, assets	0.10	0.86	0.05	0.76	0.24
Education	0.40	-0.14	0.65	0.60	0.40
GDP	0.89	0.22	-0.01	0.84	0.16
Inflation	-0.72	-0.02	0.06	0.52	0.48
Debt	0.90	0.10	0.12	0.83	0.17
Proportion Var	0.33	0.25	0.13		

Source: prepared by authors using Eurostat and HFCS data

As shown by the colour differentiation, the first component includes shares, pensions, GDP, inflation, and debt, while the second component comprises deposits, funds, and other financial assets. The third component consists solely of bonds. The communalities (column h2) for all variables exceed 0.50, indicating that no variables need to be excluded from the analysis. The last column (u2) represents the proportion of each variable's variance not explained by the respective factors. The factor scores derived from this analysis were then used in the subsequent cluster analysis.

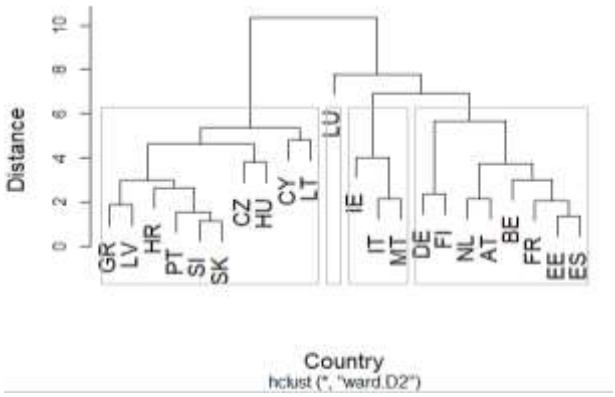
Furthermore, based on the majority rule, four indices suggest that four clusters are optimal. These indices include TrCovW (166.05), TraceW (3.90), Cindex (0.23), and the Ratkowsky index (0.36). The dissimilarities between countries are calculated using the Euclidean distance metric. Figure 2 illustrates the similarities and dissimilarities among EU countries using a heatmap, where darker colours represent greater differences and lighter colours indicate higher similarities. Figure 3 displays the outcomes of the clustering analysis.

Fig. 2: Heatmap showing similarities and differences among countries



Source: prepared by authors using Eurostat and HFCS data

Fig. 3: Dendrogram of countries based on the similarities and differences among countries



Source: prepared by authors using Eurostat and HFCS data

The analysis reveals differences between Luxembourg and countries like Hungary and Croatia, with Euclidean distances of 9.03 and 8.78, respectively, indicating significant dissimilarity. In contrast, Slovenia and Slovakia, along with Portugal and Slovenia, are the most similar, with much smaller distances of 1.13 and 1.33. A major factor driving Luxembourg's distinction is its household indebtedness, which is nearly double that of other countries. In the fourth wave of the HFCS, Luxembourg's average household debt stood at 298,6 thousand euros, while Hungary and Croatia had the lowest debts at 11.4 and 13.1 thousand euros. Luxembourg's high GDP, the highest among the analyzed nations, may partly explain this elevated debt level. In comparison, Hungary's GDP is six times lower, and Croatia's is five times lower. Inflation presents an inverse pattern: Luxembourg enjoys one of the lowest inflation rates, while Hungary faces the highest.

The pronounced differences observed in the analysis led to Luxembourg being classified in its separate cluster (Cluster 2). Cluster 1 consists predominantly of Central and Eastern European countries and Portugal, while Cluster 3 includes Ireland, Italy, and Malta. Cluster 4 is primarily made up of Western and Northern European nations that participated in the HFCS. Table 2 provides a detailed overview of the specific characteristics of each cluster.

Tab. 2: Characteristics of individual clusters

Variable	First cluster	Second cluster	Third cluster	Fourth cluster
Deposits	94.92	91.50	93.15	95.28
Funds	7.48	24.40	5.68	9.39
Bonds	3.41	2.10	4.70	3.23
Shares	6.46	18.00	6.93	7.57
Pensions	19.28	61.00	19.32	20.64
Other fin. assets	5.16	7.90	3.78	5.68
Education	33.78	50.40	35.90	34.45
GDP	30 054.00	83 320.00	31 208.33	30 698.64
Inflation	6.90	3.43	6.12	6.67
Debt	66.99	298.60	73.68	68.76

Note: Deposits, funds, bonds, shares, pensions, other types of financial assets, and education are expressed as a percentage of households; inflation is in HICP; GDP is in euros per capita; debt is in thousands of euros.
Source: prepared by authors using Eurostat and HFCS data

In the first cluster, households hold a high percentage of deposits (94.92%) but low participation in funds (7.48%), bonds (3.41%) and pensions (19.28%). 33.78% of households in the first cluster have at least a third level of education. The cluster recorded the second lowest level of household indebtedness (66.99 thousand euros). GDP growth is relatively high (30 054 euros per capita), while inflation remains moderate (6.90%).

The second cluster stands out with the highest pension ownership (61,00%) and significant funds participation (24.40%), though deposits are slightly lower (91.50%). This cluster has the highest educational attainment (50,40 % of households have at least a third level of educational attainment) and debt levels (298.60 thousand euros). The cluster recorded the highest GDP (83 320 euros per capita), while inflation was the lowest (3.43%).

In the third cluster, deposit ownership is high (93.15%) with moderate participation in bonds (4.70%) and shares (6.93%). Pension ownership (19.32%) and educational attainment (35.90%) are similar to the first and fourth clusters, while debt is higher than in the first cluster (73.68 thousand euros). GDP growth is moderate (31 208.33 euros per capita), as is inflation (6.12%).

The fourth cluster has the highest deposit ownership (95.28%) but low participation in funds (9.39%) and bonds (3.23%). Share (7.57%) and pension ownership (20.64%) are comparable to the first and third clusters. Educational attainment (34.45%) and debt levels

(68.76 thousand euros) are similar to the third cluster. GDP growth is high (30 698.64 euros per capita), with moderate inflation (6.67%).

Overall, the clusters highlight a varied landscape of financial asset ownership, debt levels, and economic indicators. The hypothesis is rejected, as the first cluster with lower debt levels does not have higher financial asset ownership. Contrary to this, the cluster with the greatest household indebtedness recorded the highest participation in most of the financial market instruments.

Conclusion

Household indebtedness has become a pressing issue, particularly after the recent economic slowdown. This is critical because high levels of debt not only endanger the financial stability of households but also pose a broader risk to the macroeconomic environment. However, recent studies indicate that analyzing household debt in isolation is insufficient. Both theoretical models and empirical evidence suggest that income uncertainty significantly shapes household balance sheets.

The main objective of this article is to analyze household indebtedness and financial market participation across countries included in the fourth wave of the Household Finance and Consumption Survey. To capture country-specific factors, variables like education, GDP, and inflation were also considered. Factor and cluster analyses revealed key findings: Luxembourg and Hungary show the greatest differences, while Slovenia and Slovakia are the most similar. These variations primarily reflect differences in household financial market participation and levels of indebtedness, taking into account the macroeconomic conditions of each country.

Four clusters emerged from the analysis, each with distinct characteristics and geographic patterns. The first cluster consists mostly of Central and Eastern European countries. The second cluster, represented solely by Luxembourg, stands out due to stands out due to its elevated GDP, and high levels of financial market participation. The third cluster includes Ireland, Italy, and Malta, while the fourth is predominantly made up of Western European nations.

This key finding indicates that higher household debt levels are associated with increased financial market participation across multiple financial instruments, thereby contradicting our initial hypothesis that countries with lower household indebtedness would exhibit higher levels of financial assets.

It is important to note that both household indebtedness and financial market participation are influenced by various socio-demographic and economic factors. Therefore, for future research, we recommend extending the analysis to include more variables for a deeper understanding of these dynamics.

Acknowledgment

This paper was supported by the Slovak Scientific Grant Agency as a part of the research project No. VEGA 1/0444/23.

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