
How Does Households' Wealth Affect Portfolio Choices?

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Abstract:

Purpose: The aim of this paper is to identify the determinants of households' preferences regarding financial asset allocation. It investigates the structures of households' financial asset portfolios in 15 euro area countries. It assumes three risk classes and presents a comprehensive picture of an average portfolio at the domestic and euro area levels.

Methodology: The research is based on the Eurosystem HFCS data. It applies the fractional multinomial logit model which allows analysing parallel movements in all shares of portfolio components resulting from the changes in households' wealth.

Findings: The results obtained allow drawing conclusions about the heterogeneity of households' investment preferences on the financial markets across the euro area. However, in all analysed member countries, deposits can be perceived as a component of primary importance as well as a substitute to voluntary pension plans and whole life insurance contracts. The results from the fractional multinomial logit model lead to a general finding that wealthier households are more open to risk exposure than those less affluent. The most useful wealth measures regarding the aim of the study were net wealth, total financial assets, and annual gross incomes. Their adoption to the model allowed identifying the countries like France, Finland, or Italy where the effect of the deepening changes in portfolio structure caused by the continuous increase in households' wealth was identified. Additionally, Austria, Finland, France, and Italy were recognised as the member states of the most significant differences in this regard between the most distant classes of households - the poorest and the most affluent.

Practical implications: This study allows cross-country comparison of the investment preferences of the households characterised by similar financial standing. The results obtained are relevant to the discussion on households' portfolio choices, and growth potentials of the retail financial market in the euro area.

Originality/Value: The main contribution of this study to the literature is the knowledge on how the differentiated wealth of the euro area households influences the risk profiles of their financial asset portfolios.

Keywords: Household finance, financial asset portfolio, fractional multinomial logit model.

JEL classification: E21, D14.

Paper type: Research article.

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1. Introduction

The euro area countries remain heterogeneous regarding their institutional and macroeconomic background which shape households' living standards and investment choices. Apart from individuals' interests in real estate or valuables, part of their wealth becomes accumulated in financial assets. The aim of this paper is to analyse the risk profiles of financial asset portfolios of households taking into consideration their financial standing in 15 euro area countries. The study is based on the first wave of the Eurosystem Household Finance and Consumption Survey (HFCS) data. It relates to the following financial assets: deposits, sums on managed accounts, mutual fund units, bonds, shares publicly traded, private lending, voluntary pension plans and whole life insurance contracts, non-self-employment private businesses, and others (such as options, futures, index certificates, precious metals, oil and gas leases, future proceeds from a lawsuit or estate that is in the process of being settled, and royalties). Their differentiated risk exposure allows to classify them into three categories: "safe", "relatively safe", and "risky", and recognise as the portfolios' principal components. The study answers the following research questions:

- Does households' well-being determine the structure of their financial asset portfolios in the euro area countries? Regarding its influence, does the increasing wealth lead to deepening changes in the shares of the portfolios' components?
- Which of the considered measures of household financial condition influences the risk profiles of household portfolios the most?
- In which countries can the impact of household wealth on portfolio structure be assessed as the most significant?

The main contribution of this study to the literature is the knowledge on how the differentiated welfare of the euro area households influences the risk profiles of their financial asset portfolios. Moreover, this study provides a comparison of investment preferences of households with parallel financial standing between the countries. The results are relevant to the discussion on households' portfolio choices, as well as growth potentials of retail parts of the financial markets in the euro area. This study gives a starting point for the analysis of the revisions in household investment preferences caused by persisting financial and economic instability in the euro area, based on the second wave data of the Eurosystem HFCS.

The rest of the paper is organised as follows: Section 2 presents the related literature; Section 3 describes data and descriptive statistics regarding the financial assets of households in the Eurozone member states; Section 4 presents the estimation method and empirical results; Section 5 contains conclusions.

2. Literature Review

The regularities observed in households' financial investment decisions has raised

the question whether they are emotional or shaped by specific factors. The development of this knowledge required detailed information on households' portfolios, which was hard to obtain for a long time due to respondents' unwillingness to share it. A significant change in this respect resulted from the development of financial markets and increasing investment opportunities for individuals. However, extending portfolios arise as an additional difficulty in answering questions regarding the values of assets possessed by the households surveyed (Campbell, 2006). The literature dedicated to this topic has been increasing since 2000. Regarding the subject of this paper, the existing conclusions on the structure of portfolios and households' characteristics which influence it are discussed.

One of the first studies on US household investment choices and financial standing was conducted by Campbell (2006). It focuses on real and financial assets, including deposits, CDs, U.S. saving bonds, stocks, mutual fund units, bonds, cash-value life insurance, amounts in retirement accounts, trusts and other managed accounts. Campbell proves that the households from the bottom quartile of the wealth distribution tend to hold safe assets, like deposits, CDs, or U.S. saving bonds, as well as vehicles. Moreover, they are reluctant to possess real estate or private businesses. The interest of wealthy households arises most of all in equities and private businesses, which may be recognised as substitutes in their portfolios. The importance of real estate is emphasised by the portfolio structure of the middle-class households. The presented results lead to the conclusion about the greater popularity of risky assets among wealthy households, which stays in line with conclusion formed by, for example, Carroll (2002) regarding portfolios in several European countries.

A later study of Christelis *et al.* (2013) presents the results about the occurrence of selected financial investments such as stocks, shares in private businesses, and real estate in households residing in 12 EU countries and the US, whose members were above 50 years old. It concludes about the heterogeneous importance of the considered household features for the probability of the possession of assets, mostly visible among the EU countries.

The research which focus solely on the portfolios of the euro area households was conducted by Arrondel *et al.* (2014). The authors analyse households' investment choices in conjunction with their socio-economic characteristics. However, the portfolios examined extend beyond financial assets and display real assets as their the most significant parts. The authors distinguish three categories of financial assets, including self-employment businesses, safe assets, and risky assets. The results obtained prove the significance of household wealth and income for the portfolio size.

In the group of wealthy households, the authors recognise substantially larger amounts of safe assets, along with higher amounts of all other types of assets. They

additionally identify the significant influence of environmental and institutional factors, like culture, history, the welfare state, housing and credit markets, and financial institutions on the wealth accumulation and portfolio choices of households.

Despite the varied investment opportunities, household portfolios remain poorly diversified. Numerous studies discuss their composition and prove their heterogeneity among investors whose risk attitudes differ. However, they also emphasise the popularity of risk-free items (Borsch-Supan and Eymann, 2000; Burton, 2001; Campbell, 2006; Barasinska *et al.*, 2009). According to Campbell *et al.* (2003), the individuals can be divided into those of intermediate level of risk aversion, extremely risk-averse, and risk-loving. The first sub-group is predicted to hold multiple assets including the risky ones, while the remaining hold less diversified portfolios.

Households' portfolio choices are also analysed in conjunction with their investment strategies. Benartzi and Thaler (2001) and De Miguel *et al.* (2009) draw attention to the problem of non-professional investors who rely on the naive strategy, which ignores the risk-return profiles of asset types and assumes splitting the wealth evenly among all available items. In turn, Barasinska, Schafer, and Stephan (2009) discuss the portfolio choices of households based on sophisticated strategy, which accounts not only for the number of assets but also for their degree of risk and combination. The authors distinguish three classes of assets held by households characterised by low risk, moderate risk, and high risk. This categorization is based on Blume and Friend (1975) and Borsch-Supan and Eymann (2000).

Bank deposits are recognised as clearly safe due to the deposit guarantee schemes. The returns on fixed-interest assets are assessed as stable, but due to the dependence of the real payoffs on asset duration and the issuer's rating, they are assigned to the middle asset class. The same is assumed for life insurance policies, which do not bear the risk of losing the entire investment, but the real returns upon termination are uncertain and can be significantly lower than the expected returns. Listed securities and equity of non-listed firms are perceived as the riskiest, due to the volatility of stock prices and uncertainty of dividends. The authors define a portfolio of assets from only one class as undiversified, while a portfolio comprised of assets from at least two different classes is referred to as quite diversified. The fully diversified portfolio is one that includes assets from all three classes. The authors conclude about a strong tendency of households toward safety because most of them possessed portfolios of safe assets or a mix of safe and relatively risky assets. However, the diversified portfolios are also recognised in households, but those with few risky assets constituted a minority in the sample.

It should be emphasised that the potential components of household portfolios are not analysed in the literature with equal attention. Prior to the global financial crisis, the rapid development of financial markets made risky assets more attractive for

research. Some empirical studies focus on wealth invested in equities and conclude about their supplementary role in portfolios. Relatively low significance of stocks and mutual funds is also the conclusion reached by, for example, Haliassos and Bertaut (1995). However, their significance can vary geographically. Guiso, Haliassos and Jappelli (2002) analyse household propensity for stock holding in industrialized countries and prove heterogeneous interests of individuals in European continental and Anglo-Saxon countries. Safe portfolio components generally remain without further distinction. However, due to the recent crisis, deposits appeared in the studies as the sole, or one of, retail financial assets (Du Caju, 2013; ECB, 2013b; Kochaniak, 2015; Teppa *et al.*, 2015).

3. Data and Descriptive Statistics

The study is based on household-level data derived from the first wave of the Eurosystem HFCS. It is conducted for the following euro area countries: Austria, Belgium, Cyprus, Finland, France, Germany, Greece, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain (ECB, 2013a). This database is a reliable source of micro-information for the analyses of the distribution of particular household features in populations. However, its constraint may appear in cross-country analyses due to the institutional and macroeconomic heterogeneity of the member states (ECB, 2013b). The database provides information about 62,522 euro area households of which 57,053 possess at least one type of financial asset. The latter represent the target sample of this study, which broken down by country allows a description and comparison of individual populations. The set of quantitative variables applied in the study refers to a household's are:

- financial assets (in EUR);
- deposits – the sum of sight and saving deposits at banks, credit institutions, mutual banks, and insurance companies;
- managed accounts – the amount deposited at a bank or investment company for a person specialised in investment to manage them;
- mutual funds – the market value of mutual fund units;
- bonds – the market value of bonds issued by foreign or domestic governments, banks, other financial institutions, non-financial corporations, and other organisations;
- shares publicly traded – the market value of shares quoted on recognised stock exchanges or other forms of secondary market;
- non-self-employment private businesses – the amount for which the businesses can be sold (total assets minus total liabilities);
- money owed to households – amounts that are expected to be repaid at some point in the future, e.g. loans to friends or relatives, other private loans, rent deposits;
- voluntary pension plans or whole life insurance contracts – total value of voluntary pension plans and whole life insurance contracts;

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- other assets – value of options, futures, index certificates, precious metals, oil and gas leases, future proceeds from a lawsuit or an estate that is in the process of being settled, royalties, etc.;
 - total financial assets – the sum of all the above asset types;
 - total real assets – total value (in EUR) of main residence, other real estate properties, vehicles, valuables, and self-employment businesses;
 - total financial debt - outstanding balance (in EUR) of mortgages on all properties and non-collateralised debt including credit lines or overdrafts, credit cards, other loans (car loans, consumer loans, instalment loans, private loans from relatives, friends, employers, etc.);
 - net wealth – the sum (in EUR) of total financial and real assets minus total financial debt;
 - annual gross income – employee income, self-employment income, income from pensions, and income from regular social transfers (in EUR);
 - total monthly payments for debt – the sum of all loan instalments (interest and principal) paid monthly to the lenders (in EUR);
 - household size – number of household members.

The diversified nature of financial assets allows to assign them to three separate categories: safe, relatively safe, and risky. They are the cornerstone of the analysis of risk profiles of households' portfolios (Table 1). The middle category is applied, as some assets are neither safe nor risky. Relying on the consensus of the literature, equity or financial products based on equity are clearly risky while saving accounts are apparently safe. The main concerns are about the classification of bonds due to the limited information in their regard. The occurrence of government bonds in portfolios (perceived as almost risk-free), as well as corporate bonds (of elevated risk), lead to their assignment into the middle category. A similar problem occurs with private lending. The lack of knowledge of a borrower's financial situation does not allow it to be treated as a component of limited risks. The decomposition of household financial asset portfolios is conducted in the following manner:

- safe part comprised from deposits;
- relatively safe part including voluntary pension plans, whole life insurance and bonds;
- risky part with the remaining assets (non-self-employment private businesses, mutual fund units, shares, sums on managed accounts, other assets, and private lending).

The household financial asset portfolios can be described by a range of features which commonly occur or are identified only in selected countries. Their heterogeneity in the euro area is seen in mean values which at a domestic level range from EUR 6,897.18 to EUR 213,065.17. The highest (above EUR 100,000) are recognised in Belgium, France, Luxembourg, and Spain, while the lowest are in Greece (EUR 15,028.46), Slovenia (EUR 13,839.75) and Slovakia (EUR 6,897.18).

One of the common features of portfolios is the relatively poor diversification (Figure 1). The dominant part of them consists of at most two components. In the whole group of countries, such portfolios are held by 78% of respondents. In individual member states, the fractions of households who possess them range from 65% in Germany to 99% in Greece. Thus, Germany is characterised by the greatest diversification of household portfolios, while Greece by almost none. Another common feature of portfolios is the dominant position of deposits (Figure 1). The only exception in this regard is Cyprus. The interdependencies identified between individual components of portfolios (Table 1) prove that households treat deposits as substitutes to the selected financial assets.

At the group level, Pearson's correlation coefficient equal to at least 0.45 in absolute values demonstrates that the links between the share of deposits and the share of voluntary pension plans with whole life insurance contracts are the most often. However, additionally at country level individual interactions can be observed. In the portfolios of Austrians, higher proportions of deposits are accompanied by lower shares of voluntary pension plans and whole life insurance contracts ($r = -0.52$), as well as money granted to households ($r = -0.47$) and mutual fund units ($r = -0.45$). In Belgium, deposits are substitutes to voluntary plans and whole life insurance contracts ($r = -0.64$).

The same can be concluded about household portfolios in Cyprus ($r = -0.76$), Germany ($r = -0.64$), France ($r = -0.78$), Luxembourg ($r = -0.67$), the Netherlands ($r = -0.84$), and Slovenia ($r = -0.65$). In Spain, apart from that regularity ($r = -0.54$), the linkages are identified between the proportions of deposits and shares ($r = -0.50$). In Finland, a greater focus on deposits is accompanied by the limited interest in voluntary plans and whole life insurance contracts ($r = -0.60$), shares ($r = -0.55$) and mutual funds ($r = -0.51$). The shares of deposits are linked to the shares of loans granted to other households as well as voluntary plans and whole life insurance contracts in Greece ($r = -0.60$; $r = -0.57$), Portugal ($r = -0.57$; $r = -0.66$), and Slovakia ($r = -0.45$; $r = -0.74$). In Italy, besides the correlation between the shares of deposits and voluntary pension plans with whole life insurance contracts, the deposit position is negatively influenced by the position of bonds in portfolios ($r = -0.52$; $r = -0.60$). The same can be concluded for Malta ($r = -0.55$; $r = -0.57$). Luxembourgian households limit the percentage of deposits to increase investments in mutual funds units ($r = -0.43$) and voluntary plans and whole life insurance contracts ($r = -0.67$).

The division of portfolios into three parts: safe, relatively safe, and risky allows households' preferences to be analysed in terms of their risk exposure (Table 2). The average portfolio profile estimated for the entire group of countries displays safe assets (deposits) as a standard component constituting 71.7% of its value. From all the households surveyed, 99% of them declared deposit possession. Moreover, 49% of them reported deposits as the sole financial assets. Their popularity can be explained by conceptual simplicity, safeness, and the lack of entrance costs.

Voluntary pension plans and whole life insurance contracts are the second favoured items with an average share of 14.5%. They are assigned to relatively safe assets, which together with bonds constitute 16.5% of an average portfolio. The other noteworthy components are publicly traded stocks (4.6%) and mutual fund units (4.1%). However, it should be emphasised that these assets do not appear in more than 63% of the Eurozone households. The cross-country comparison of the structure of average portfolios proves the importance of deposits, the possession of which is declared by at least 82% of households surveyed in individual countries.

The most prominent average shares of deposits are identified in Greece (93%), Portugal (87%), Austria (86%), and Slovakia (84%). In these countries, at least 67% of households surveyed are characterised by portfolios comprised solely of deposits. Moreover, safe assets are found dominant in all average portfolios except the Cypriot portfolios. In Cyprus, households tend to divide their funds between safe (47%) and relatively safe assets (39%) leaving the country with the largest part of population totally without deposits (18%). A similar significance of relatively safe assets (37% of average portfolio) can be identified among Dutch respondents. However, in both almost 40% of individuals do not hold such a component.

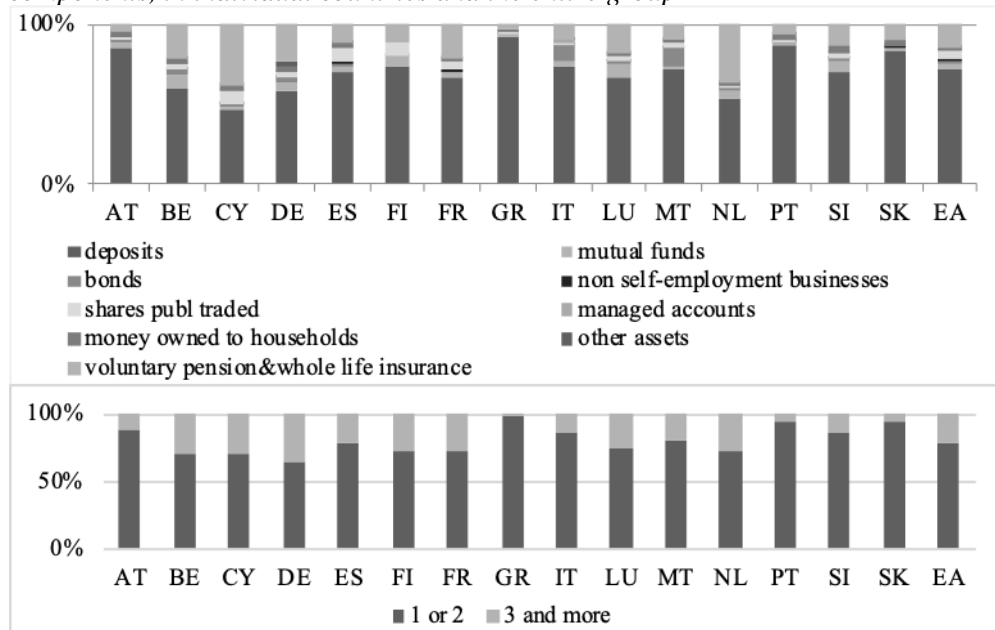
Relatively safe assets are of secondary importance for households in selected countries. They appear in this role in Belgium, Cyprus, Germany, France, Italy, Luxembourg, Malta, the Netherlands, and Slovakia, with average proportions ranging from 9% to 39%. In Cyprus and the Netherlands, voluntary pension plans and whole life insurance contracts constitute 37.3% and 35.6% respectively of an average portfolio. In Malta and Italy, attention should be drawn to bonds, whose mean share is estimated at 10%. It is worth noting that more than 50% of households possessing any value of relatively safe assets are identified only in Belgium, Cyprus, Germany, and the Netherlands. Households with only relatively safe portfolios usually constitute marginal fractions of domestic respondents, which do not exceed 2%. More noticeable proportions of these occur in Cyprus (9%) and the Netherlands (4%).

The average share of risky assets is not so evident at domestic level. In Austria, Spain, Finland, Greece, Portugal, and Slovenia it ranges from 7% to 18% and constitutes the second favoured portfolio part. But even there, risky components do not commonly occur due to their possession by less than 50% of households. It is worth noting that in some of the countries mutual fund units are the most preferred risky assets. In Belgium, Finland, and Luxembourg they constitute 8% of mean portfolios, while in Slovenia they constitute 7%. In others, stocks are recognised as the most popular. In Cyprus, Spain, and Finland, they form 8% of average portfolios.

The values of the coefficient of variation (*CV*), which are estimated for each part of portfolios, demonstrate significant differences in the variability of the shares of deposits and the remaining asset categories in national samples. Safe assets are characterised by the least differentiated shares. Comparing the coefficients for the

shares of relatively safe and risky assets, it can be concluded that the risky assets are more varied in Belgium, Cyprus, Germany, France, Italy, Luxembourg, Malta, the Netherlands, and Slovakia.

Figure 1. The average structure of financial asset portfolios and average number of components, in individual countries and the entire group



Source: Author's own study based on the Eurosystem HFCS data.

Table 1. Pearson's correlation coefficients between the shares of deposits and other financial assets in household portfolios in individual countries and the entire group

Countries	mutual fund units/ total financial assets	bonds/ total financial assets	non-self-employment private businesses/ total financial assets	shares/ total financial assets	managed accounts/ total financial assets	money owed to households / total financial assets	other assets/ total financial assets	voluntary pension plans & whole life insurance contracts/ total financial assets
Austria	-0.45	-0.37	-0.15	-0.27	-0.05	-0.47	-0.15	-0.52
Belgium	-0.36	-0.25	-0.10	-0.26	-0.09	-0.19	-0.13	-0.64
Cyprus	-0.08	-0.14	-0.10	-0.25	x	-0.20	x	-0.76
Finland	-0.51	-0.11	x	-0.55	x	x	x	-0.60
France	-0.28	-0.13	-0.18	-0.39	-0.04	-0.16	-0.16	-0.78
Germany	-0.33	-0.23	-0.08	-0.29	-0.05	-0.24	-0.19	-0.64
Greece	-0.26	-0.19	-0.18	-0.38	x	-0.60	x	-0.57
Italy	-0.35	-0.60	-0.11	-0.25	-0.16	-0.09	-0.16	-0.52
Luxembourg	-0.43	-0.20	-0.09	-0.27	-0.07	-0.21	-0.13	-0.67
Malta	-0.24	-0.57	-0.08	-0.36	-0.10	-0.16	-0.07	-0.55
Netherlands	-0.19	-0.16	x	-0.14	x	-0.14	-0.09	-0.84
Portugal	-0.26	-0.09	-0.11	-0.30	-0.05	-0.57	-0.04	-0.66
Slovakia	-0.35	-0.07	-0.09	-0.08	-0.14	-0.45	x	-0.74

Slovenia	-0.38	-0.11	x	-0.30	x	-0.35	x	-0.65
Spain	-0.37	-0.17	-0.24	-0.50	-0.12	-0.29	x	-0.54
Euro area	-0.36	-0.25	-0.15	-0.39	-0.08	-0.22	-0.13	-0.68

Note: x – statistically insignificant correlation coefficients.

Source: Author's own calculations derived from the Eurosystem HFCS data.

Table 2. Risk profiles of financial asset portfolios – descriptive statistics

Category of assets	Mean	Median	HH with <u>no</u> assets from a given category	HHs with assets from a given category <u>only</u>	HHs with assets from this category	Coefficient of variation (CV)
Austria (n=2,315)						
safe	85.76%	100.00%	0.52%	66.52%	99.48%	31.01%
relatively safe	6.56%	0.00%	80.13%	0.09%	19.87%	274.81%
risky	7.68%	0.00%	78.27%	0.43%	21.73%	263.49%
Belgium (n=2,275)						
safe	60.43%	66.67%	0.40%	34.77%	99.60%	62.40%
relatively safe	24.64%	2.47%	49.01%	0.13%	50.99%	133.00%
risky	14.92%	0.00%	60.88%	0.22%	39.12%	180.45%
Cyprus (n=1,108)						
safe	47.32%	43.86%	18.41%	21.75%	81.59%	87.27%
relatively safe	38.90%	24.89%	38.18%	9.12%	61.82%	103.47%
risky	13.78%	0.00%	50.18%	3.25%	49.82%	192.19%
Finland (n=10,989)						
safe	73.44%	93.92%	0.00%	41.94%	100.00%	45.66%
relatively safe	11.00%	0.00%	67.46%	0.00%	32.54%	203.82%
risky	15.56%	0.00%	54.06%	0.00%	45.94%	171.32%
France (n=14,868)						
safe	67.59%	85.85%	0.19%	43.38%	99.81%	53.95%
relatively safe	21.26%	0.00%	54.37%	0.09%	45.63%	142.75%
risky	11.14%	0.00%	64.49%	0.07%	35.51%	199.57%
Germany (n=3,474)						
safe	58.63%	60.66%	1.64%	27.81%	98.36%	61.36%
relatively safe	25.69%	0.38%	44.30%	0.78%	55.70%	121.18%
risky	15.68%	0.00%	54.26%	0.52%	45.74%	166.29%
Greece (n=2,219)						
safe	92.82%	100.00%	1.58%	86.71%	98.42%	23.94%
relatively safe	2.63%	0.00%	95.09%	0.59%	4.91%	525.05%
risky	4.55%	0.00%	90.31%	0.95%	9.69%	390.46%
Italy (n=6,590)						
safe	73.27%	100.00%	2.58%	57.81%	97.42%	49.36%
relatively safe	19.48%	0.00%	64.66%	2.08%	35.34%	160.82%
risky	7.25%	0.00%	82.43%	0.23%	17.57%	269.58%
Luxembourg (n=936)						
safe	66.73%	84.38%	0.21%	41.67%	99.79%	55.17%
relatively safe	19.28%	0.00%	58.01%	0.21%	41.99%	156.36%
risky	13.99%	0.00%	62.29%	0.00%	37.71%	186.22%
Malta (n=814)						
safe	71.79%	98.86%	0.12%	49.63%	99.88%	48.18%
relatively safe	20.29%	0.00%	59.46%	0.00%	40.54%	149.47%
risky	7.91%	0.00%	75.18%	0.12%	24.82%	240.33%
the Netherlands (n=1,261)						
safe	53.51%	50.81%	4.68%	28.95%	95.32%	73.20%
relatively safe	37.30%	24.91%	39.81%	4.12%	60.19%	102.95%
risky	9.19%	0.00%	64.55%	0.40%	35.45%	212.35%
Portugal (n=4,143)						
safe	87.26%	100.00%	0.29%	73.57%	99.71%	30.90%
relatively safe	6.16%	0.00%	84.31%	0.02%	15.69%	305.94%
risky	6.58%	0.00%	84.38%	0.27%	15.62%	305.24%
Slovakia (n=1910)						
safe	84.27%	100.00%	1.10%	69.90%	98.90%	35.10%
relatively safe	9.42%	0.00%	81.05%	0.58%	18.95%	248.50%
risky	6.31%	0.00%	84.92%	0.41%	15.08%	313.99%
Slovenia (n=300)						
safe	70.77%	97.95%	4.67%	48.67%	95.33%	53.79%
relatively safe	13.79%	0.00%	72.67%	1.67%	27.33%	212.38%
risky	15.44%	0.00%	64.33%	2.33%	35.67%	186.75%

Spain (n=5,956)						
safe	69.70%	100.00%	0.91%	50.84%	99.09%	54.21%
relatively safe	12.38%	0.00%	69.11%	0.37%	30.89%	201.23%
risky	17.92%	0.00%	65.21%	0.39%	34.79%	173.12%
Euro area (n=59,158)						
safe	71.67%	98.92%	1.15%	49.10%	98.85%	49.99%
relatively safe	16.53%	0.00%	63.73%	0.66%	36.27%	172.30%
risky	11.80%	0.00%	67.29%	0.29%	32.71%	205.85%

Source: Author's own calculations derived from the Eurosystem HFCS data.

4. Estimation Method and Empirical Results

The analysis of the determinants of portfolio structure is based on a fractional multinomial logit model (Mullahy, 2011; Murteira and Ramalho, 2013), which allows the conditional mean for the shares of financial assets in a household portfolio that together comprise the underlying total to be estimated. Its implementation for Stata® is provided by Buis (2008). The model is described by the following formula:

$$E[y_{ij}|x_i] = \Lambda(x_i\beta_j) = \frac{\exp(x_i\beta_j)}{[\sum_{h=1}^J \exp(x_i\beta_h)]} \tag{1}$$

where:

y_{ij} - j -th asset held by the i -th individual ($j = 1...J$); x_i – financial asset portfolio of the i -th individual; β - vector of regression coefficients.

The model reflects the bounded nature of each individual share (i.e. $0 \leq y_{ij} \leq 1$ for $j = 1...J$) as well as the fact that shares add up to unity (i.e. $\sum_{j=1}^J y_{ij} = 1$). This implies that the resulting predicted shares from the model should also lie between 0 and 1 (i.e. $E[y_{ij}|x_i] \in (0,1)$ for $j = 1...J$) and add up to one (i.e. $\sum_{j=1}^J E[y_{ij}|x_i] = 1$).

Following Mullahy (2011), and Murteira and Ramalho (2013), the estimation of conditional mean for all the shares jointly is based on the quasi maximum likelihood estimator for the multinomial logit specification. The contribution of an individual household to the likelihood is as follows:

$$L_i(\beta) = \prod_{j=1}^J E[y_{ij}|x_i]^{y_{ij}} \tag{2}$$

The sum of the individual log-likelihoods is maximized to obtain the estimator for β :

$$\hat{\beta} = \arg \max_{\beta} \sum_{i=1}^N \log L_i(\beta) \tag{3}$$

Murteira and Ramalho (2013) noted that an application of the fractional multinomial logit model gives rise to the problem of the independence of irrelevant alternatives (IAA). However, in this study this problem can be perceived as of marginal importance due to the assignment of all types of household financial assets into three subgroups which relate to all possible risk classes.

The study adopts the model in 3 versions based on the following independent variables:

- Net wealth, which is the most general measure of welfare, based on information derived from the household balance sheet, regarding the values of real assets, financial assets, and debt incurred from loans. It gives the most aggregated picture of the impact of a household's wealth on their investment preferences on financial markets;
- Total real assets, total financial assets, and total liabilities from loans. This version gives an insight into the influence of the components of net wealth on the structure of portfolios. It allows one to draw conclusions about the preferences of households that are characterised by particular attitudes towards asset accumulation, investments in financial or real assets, as well as borrowing. Moreover, it enables them to be compared within individual countries and their entire group. Additionally, the outcomes allow the tracking of the evolution of the structure of portfolios caused by the increase of particular components of net wealth and the identification of the ones which influence the structure of portfolios the most;
- Annual gross income, monthly loan repayments, and household size – this model refers to household welfare described by the most significant cash inflows, which are incomes, and outflows, which are loan repayments. Household size is applied to assess how different models of a household influence the analysed investment preferences.

Regarding versions 2 and 3, the interpretation of the influence of a given independent variable on the risk profile of an average portfolio requires an assumption of the constancy of the remaining independent variables.

The adoption of the measures referring to balance sheet items and flows allows assessing the importance of the both dimensions of household wealth. It should be noted that the database does not provide information about monthly loan repayments in Finland. For this country, version 3 of the model contains only two independent variables.

Due to the constraint of the use of HFCS data in the comparative analysis, each independent variable which refers to the financial standing of a household (net wealth, total financial assets, total real assets, total liabilities from loans, annual gross income, and monthly loan repayments) is converted into five dummies, denoting its affiliation to one of the specified classes. This conversion is based on the arithmetic mean of the adopted feature in individual countries. Such a transformation allows the cross-country analysis of the portfolios' structure to be conducted regarding the subgroups of households characterised by the same financial status in their own populations. Additionally, this transformation allows the differences in the structure of portfolios within individual member states to be displayed between the households assigned to classes 1-5. Thus, each continuous

variable is converted into dummies referring to five classes of households according to the division of its value as follows:

- the lowest range of the variable's value: $x < 50\% \bar{x}$;
- low range of the variable's value: $50\% \bar{x} \leq x < 100\% \bar{x}$;
- medium range of the variable's value: $100\% \bar{x} \leq x < 150\% \bar{x}$;
- higher range of the variable's value: $150\% \bar{x} \leq x < 200\% \bar{x}$;
- the highest range of the variable's value: $x \geq 200\% \bar{x}$.

Class 1 represents the basis for comparison. The mean values of the variables adopted for the conversion are presented in Table 3. They display significantly different average standards of living within the analysed geographic area. Such diversity is a problem in cross-country analyses, when absolute values are subject to comparison. Cypriots and Spaniards are distinguished by the highest average net wealth, mostly due to their investments in real estate. The average wealth of households in Luxembourg can also be assigned as one of the highest, but it results from high mean values of both types of assets, as well as incomes. Additionally, they are eager to finance their assets by taking loans.

Table 3. Arithmetic mean of the variables (in EUR) being subject to conversion in individual countries and the whole group

Countries	Net wealth	Total financial assets	Total real assets	Total liabilities	Gross income	Monthly loan payments
Austria	248,350.40	56,746.16	211,579.04	19,974.81	42,192.74	132.70
Belgium	448,104.35	147,746.41	329,743.64	29,385.69	55,340.41	303.48
Cyprus	1,031,260.96	91,855.24	1,054,002.93	114,597.21	54,813.93	1,057.17
Finland	230,797.65	40,951.07	237,884.88	48,038.30	56,406.10	x
France	520,537.79	144,744.36	406,973.79	31,180.35	53,592.46	345.37
Germany	385,877.17	94,898.11	333,635.52	42,656.46	62,611.20	348.56
Greece	168,197.74	15,028.46	164,944.30	11,775.01	30,488.87	117.22
Italy	317,167.66	36,843.96	290,356.95	10,033.26	38,005.64	101.71
Luxembourg	959,977.64	132,424.35	928,671.76	101,118.47	107,358.24	876.42
Malta	354,540.01	52,195.41	312,948.90	10,604.30	25,868.13	80.86
Netherlands	264,244.28	92,198.14	267,123.48	95,077.34	52,119.87	551.90
Portugal	181,480.10	24,895.00	173,471.99	16,886.90	21,769.45	133.43
Slovakia	71,867.06	6,897.18	69,277.48	4,307.59	13,465.09	48.93
Slovenia	170,861.34	13,839.75	162,085.40	5,063.81	27,091.76	119.66
Spain	1,180,878.45	213,065.17	1,010,479.65	42,666.38	50,936.54	419.51
Euro area	444,750.59	92,115.05	386,933.31	34,297.78	48,197.61	240.17

Note: x - no data available in the database.

Source: Author's own calculations derived from the Eurosystem HFCS data.

The variable describing household size is subject to conversion as well. In its case, the following dummies denoting the classes of households are introduced: 1. one-person; 2. two-person; 3. three-person; 4. four-person; 5. five-person and more. These variables allow to analyse the impact of the model of a household on its risk perception and the profile of its financial asset portfolio. Class 1 is the basis for comparison. It should be noted that the households from classes 1 represent significant parts of the samples surveyed (Table 4). The households characterised by the flows (incomes and loan repayments) from classes 1 form 17% or more of the samples. Regarding the balance sheet items, their fractions are at least 25%.

Table 4. Fractions of households (in %) assigned to class 1 due to the variable values

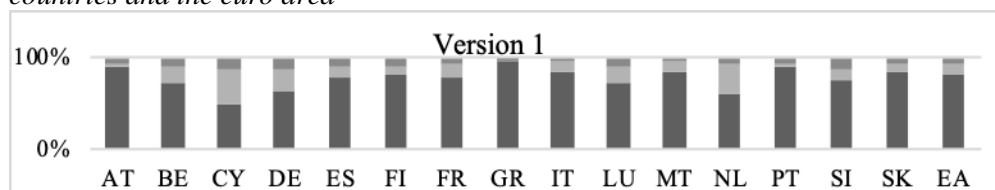
Countries	Total real assets	Total financial assets	Total liabilities	Net Wealth	Annual gross income	Monthly loan repayments	Household size
Austria	55	67	82	56	29	83	36
Belgium	32	64	70	42	35	37	30
Cyprus	56	63	54	59	30	46	10
Finland	35	62	62	42	26	x	23
France	50	75	74	56	38	66	28
Germany	52	59	73	53	32	68	23
Greece	39	64	77	41	29	75	21
Italy	36	59	83	38	25	83	24
Luxembourg	42	59	65	48	29	51	24
Malta	43	48	80	43	28	78	17
Netherlands	25	44	51	36	17	51	25
Portugal	49	67	74	52	35	68	21
Slovakia	32	59	82	34	20	76	21
Slovenia	36	62	73	40	26	70	12
Spain	65	78	76	68	45	68	20
Euro area	45	66	73	50	32	65	24

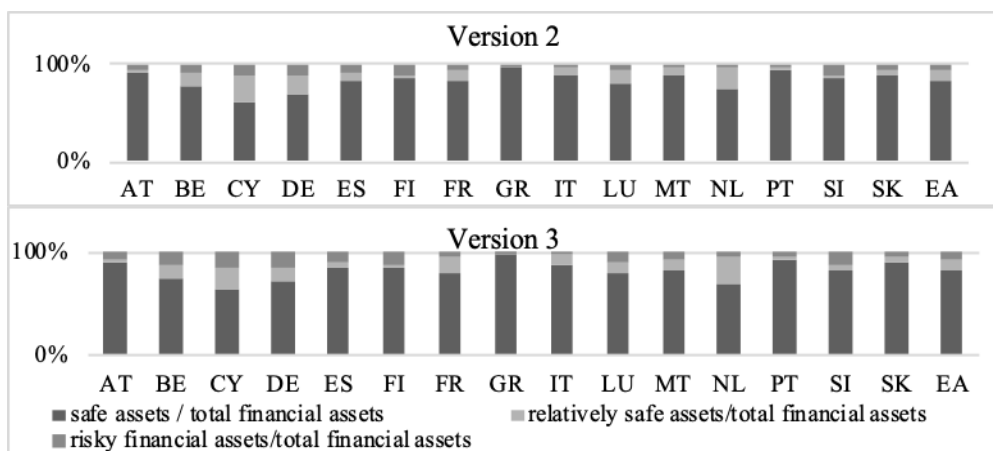
Note: x - no data available in the database.

Source: Author's own calculations derived from the Eurosystem HFCS data.

The adopted versions of the model provide vast information regarding the impact of the selected features on the structure of portfolios of households assigned to five separate classes and residing in individual euro area countries. Due to the extended results, the tables include the most significant information regarding the aim of the study. The full information is displayed only for the whole group of countries in separate tables.

Regardless of the version of the model and the country analysed, households assigned to class 1 demonstrate preferences regarding the deposits in their portfolios the share of which exceed 50% (Figure 2). The basis for comparison that is the most focused on this component can be identified in Austria and Greece. Regarding the other parts of portfolios, there is an orientation towards relatively safe components (bonds, voluntary pension plans and whole life insurance contracts) among Cypriot and Dutch households. In selected countries, respondents from class 1 demonstrate an interest in risky items with stocks amounting up to 16%. These portfolios represent the basis for the estimation of the changes in investment preferences of households assigned to classes 2-5.

Figure 2. The predicted structure (in %) of a financial asset portfolio of a household assigned to class 1 regarding the values of all independent variables, in individual countries and the euro area



Source: Author's own calculations derived from the Eurosystem HFCS data.

4.1 Results from Version 1 of the Fractional Multinomial Logit Model

Version 1 of the model proves the significant impact of a household's net wealth on its portfolio structure. The only gaps in the outcomes refer to the shares of relatively safe assets in portfolios of Luxembourgiens, Slovaks and Slovenians. In the Eurozone, net wealth exceeding EUR 222,375.29 (class 1) discourages individuals from possessing deposits and redirects their interests towards relatively safe and risky items (Table 5). Both these parts tend to increase along with the continuous increase in net wealth. However, the affluent households from classes 4-5 demonstrate greater focus on risky assets. The comparison of results obtained for households assigned to the most distant classes (1 and 5) prove the lowered average share of deposits by 35 p.p. (from 81% to 46%) and elevated shares of risky assets by 21 p.p. (from 7% to 28%) and relatively safe assets by 14 p.p. (from 12% to 26%) in the portfolios of the richest respondents.

Table 5. Discrete change estimates of the fractional multinomial logit model for the Eurozone (version 1)

Variable	Discrete change	SE	p-value
safe assets/total financial assets:			
Net wealth (class 2)	-0.1018	0.0036	0.000
Net wealth (class 3)	-0.1740	0.0049	0.000
Net wealth (class 4)	-0.2291	0.0069	0.000
Net wealth (class 5)	-0.3485	0.0052	0.000
relatively safe assets/total financial assets:			
Net wealth (class 2)	0.0587	0.0030	0.000
Net wealth (class 3)	0.0856	0.0040	0.000
Net wealth (class 4)	0.1063	0.0056	0.000
Net wealth (class 5)	0.1397	0.0044	0.000
risky assets/total financial assets:			
Net wealth (class 2)	0.0432	0.0023	0.000
Net wealth (class 3)	0.0884	0.0035	0.000
Net wealth (class 4)	0.1228	0.0051	0.000
Net wealth (class 5)	0.2089	0.0044	0.000
No of observations: 57,053; Wald chi ² (8) = 6,028.34; Prob>chi ² = 0.0000; Log pseudolikelihood = -43,470.594			

Source: Author's own calculations derived from the Eurosystem HFCS data.

The analysis of investment preferences of households assigned to all classes above class 1 proves the substitutability of safe assets by the remaining components in individual countries (Table 6). However, certain inconsistency in this respect can be identified in the Cypriot sample, regarding the relatively safe part of portfolios of the households assigned to classes 2 and 5. Households whose net wealth ranges from EUR 515,639.45 to EUR 1,031,260.96 (class 2) possess this part greater than the basis, displaying its average share at 49%.

The most affluent households, with net wealth from EUR 2,062,521.92, tend to limit the average share of relatively safe assets to 26%. In 7 out of 15 member states, the most significant modifications of portfolio structure can be observed between the poorest and the wealthiest subgroups in the samples (Table 7). However, the rich ones do not demonstrate common investment preferences regarding the shares of relatively safe and risky assets. In Austria, France, and Italy the average share of their relatively safe assets is more boosted, while in Germany, Finland, Greece, and Portugal the average share of risky assets is more boosted. In Finland, France, Italy, and Portugal, the changes in portfolios' structure tend to evolve through all the classes.

Table 6. *Classes of households regarding their net wealth, characterised by the most modified portfolio structure (in p.p.) in comparison to class 1*

Countries	safe assets /total financial assets	relatively safe assets /total financial assets	risky assets /total financial assets
Austria	<u>5 (-21.9)</u>	5 (11.9)	5 (10.0)
Belgium	<u>5 (-37.6)</u>	4 (9.7)	<u>5 (28.8)</u>
Cyprus	4 (-14.0)	2 (10.9); 5 (-11.6)	<u>5 (17.3)</u>
Finland	<u>5 (-32.1)</u>	5 (9.3)	<u>5 (22.8)</u>
France	<u>5 (-53.4)</u>	5 (29.1)	<u>5 (24.3)</u>
Germany	<u>5 (-23.3)</u>	5 (8.1)	<u>5 (15.2)</u>
Greece	5 (-12.3)	5 (5.4)	5 (6.9)
Italy	<u>5 (-34.9)</u>	5 (19.1)	<u>5 (15.8)</u>
Luxembourg	<u>5 (-22.0)</u>	x	<u>5 (27.7)</u>
Malta	<u>5 (-35.4)</u>	4 (26.8)	<u>5 (15.0)</u>
Netherlands	<u>5 (-21.4)</u>	3 (11.0)	<u>5 (18.7)</u>
Portugal	<u>5 (-16.1)</u>	5 (7.1)	<u>5 (9.0)</u>
Slovakia	5 (-8.7)	x	5 (6.5)
Slovenia	5 (-29.9)	x	5 (20.0)
Spain	<u>5 (-46.8)</u>	4 (5.3)	<u>5 (42.9)</u>

Notes: the underline informs about evolving changes in the share of the portfolio component caused by a continuous increase in household net wealth from class 1 to class 5; the number in the front of the brackets indicate the class of households with the greatest difference in the share of a given portfolio part in comparison to the basis (class 1); the number in the brackets inform about the difference (in p.p.) in the average shares of a portfolio part between households from class 1 and the class indicated in the front of the brackets; x-statistically insignificant discrete change.

Source: Author's own calculations derived from the Eurosystem HFCS data.

Table 7. *The average structure (in %) of portfolios of households with net wealth assigned to classes 1 and 5*

Portfolio parts	Austria		Germany		Greece		Finland		France		Italy		Portugal	
	class 1	class 5	class 1	class 5	class 1	class 5	class 1	class 5	class 1	class 5	class 1	class 5	class 1	class 5
safe assets/ total financial assets	90	68	64	41	97	85	82	50	80	27	85	50	91	75

relatively safe assets/ total financial assets	4	16	24	32	1	6	8	17	14	43	12	31	4	11
risky assets/ total financial assets	6	16	12	27	2	9	10	33	6	30	3	19	5	14

Source: Author's own calculations derived from the Eurosystem HFCS data.

4.2 Results from Version 2 of the Fractional Multinomial Logit Model

Version 2 of the model estimates the influence of the values of financial and real assets possessed by households, as well as debt incurred on the risk profiles of their financial assets' portfolios.

In the euro area, a continued increase in each variable results in a continuous modification of the structure of the portfolios (Table 8). Thus, the most visible differences in this regard can be recognised between class 1 and class 5. In all cases, the importance of deposits becomes diminished. Households that possess real assets of value exceeding EUR 193,466.65 (above class 1) demonstrate greater proportions of relatively safe and risky parts than the basis. The comparison of profiles of portfolios between the most distant classes proves that households whose real assets are equal at least to EUR 773,866.62 reduce on average the share of deposits to 77% (by 7 p.p.) and raise the parts of relatively safe assets to 12% (by 2 p.p.) and risky assets to 11% (by 5 p.p.).

These changes do not seem to considerably modify the risk profiles of portfolios when comparing them to those observed in portfolios of respondents with low and high values of financial assets. Households that possess financial assets of the values equal to or above EUR 184,230.10 (class 5) tend to reduce the share of deposits in their portfolios to 51% (lower by 33 p.p. than in the average portfolio of the basis for comparison). Their interest is directed towards relatively safe assets which form 26% of portfolios and risky ones with the share of 23%. The portfolio modifications done by indebted households are like those conducted by households with extended values of real assets. However, in portfolios of respondents whose debt is equal to or above EUR 68,595.56 (class 5), more attention is paid towards relatively safe assets.

In individual countries, the average structure of portfolios does not maintain itself in such an unambiguous manner (Table 9). The opposed preferences can be identified between the households from selected classes. Only in Finland and France do the increasing values of total real assets from class 1 up to class 5 lead to a consequent reduction in the average share of deposits in favour to two other asset categories in portfolios (Table 10). Additionally, the greatest differences in portfolio structure can be identified between the Italian households that are the least and the most involved in real assets. However, these differences do not result from the evolution of the structure of the portfolios throughout all classes, and their consequences should be assessed as slight.

Table 8. Discrete change estimates of the fractional multinomial logit model for the Eurozone (version 2)

Variable	Discrete change	SE	p-value
	safe assets/total financial assets:		
Total real assets (class 2)	-0.0217	0.0028	0.000
Total real assets (class 3)	-0.0268	0.0036	0.000
Total real assets (class 4)	-0.0502	0.0050	0.000
Total real assets (class 5)	-0.0700	0.0046	0.000
Total financial assets (class 2)	-0.1742	0.0044	0.000
Total financial assets (class 3)	-0.2349	0.0064	0.000
Total financial assets (class 4)	-0.2480	0.0081	0.000
Total financial assets (class 5)	-0.3308	0.0061	0.000
Total liabilities (class 2)	-0.0619	0.0055	0.000
Total liabilities (class 3)	-0.0659	0.0065	0.000
Total liabilities (class 4)	-0.0770	0.0074	0.000
Total liabilities (class 5)	-0.0702	0.0036	0.000
	relatively safe assets/total financial assets:		
Total real assets (class 2)	0.0114	0.0022	0.000
Total real assets (class 3)	0.0083	0.0026	0.001
Total real assets (class 4)	0.0159	0.0036	0.000
Total real assets (class 5)	0.0219	0.0032	0.000
Total financial assets (class 2)	0.1117	0.0037	0.000
Total financial assets (class 3)	0.1474	0.0056	0.000
Total financial assets (class 4)	0.1405	0.0067	0.000
Total financial assets (class 5)	0.1574	0.0051	0.000
Total liabilities (class 2)	0.0526	0.0046	0.000
Total liabilities (class 3)	0.0552	0.0054	0.000
Total liabilities (class 4)	0.0634	0.0061	0.000
Total liabilities (class 5)	0.0547	0.0030	0.000
	risky assets/total financial assets:		
Total real assets (class 2)	0.0103	0.0017	0.000
Total real assets (class 3)	0.0184	0.0023	0.000
Total real assets (class 4)	0.0344	0.0033	0.000
Total real assets (class 5)	0.0481	0.0031	0.000
Total financial assets (class 2)	0.0625	0.0029	0.000
Total financial assets (class 3)	0.0874	0.0044	0.000
Total financial assets (class 4)	0.1075	0.0058	0.000
Total financial assets (class 5)	0.1735	0.0051	0.000
Total liabilities (class 2)	0.0093	0.0028	0.000
Total liabilities (class 3)	0.0107	0.0033	0.000
Total liabilities (class 4)	0.0135	0.0037	0.000
Total liabilities (class 5)	0.0154	0.0018	0.000
No of observations: 57,053; Wald $\chi^2(24) = 11,225.86$; Prob> $\chi^2 = 0.0000$; Log pseudolikelihood = -41,930.385			

Source: Author's own calculations derived from the Eurosystem HFCS data.

Similar conclusions can be drawn regarding the values of financial assets and liabilities (Table 9). However, the model provides information about their importance for the formation of whole portfolios only in selected countries. The households in Austria, Finland, France, Italy, and Malta that possess financial assets of the highest values are characterised by the most modified portfolio structure in comparison to the basis (Table 11). However, the most significant difference in this regard is recognised regarding the average portfolio of French respondents. The least involved households are primarily focused on deposits, while the most involved on relatively safe assets. Moreover, only in this country can the consistent developments in portfolio structure be observed class by class. Regarding the liabilities, the outcomes obtained display possible modifications of whole portfolios only in selected countries. The greatest changes in this regard occur at various ranges of the debt. In Austria, Germany, Finland and the Netherlands certain classes

of households reveal a tendency to hold lower shares of deposits and risky assets in their portfolios than the basis.

However, the general stance in this regard allows an emphasis on the greater importance of relatively safe assets and diminished importance of deposits for households that are more indebted than households from class 1. Thus, at a country level, the increasing values of both financial and real assets result in deepening changes of the structure only of the portfolios of French households. They diminish the significance of deposits and increase the importance of two other components.

Table 9. Classes of households regarding the values of assets and debt characterised by the most modified portfolio structure (in p.p, in comparison to class 1

Countries	safe assets/ total financial assets			relatively safe assets / total financial assets			risky assets/ total financial assets		
	Total financial assets	Total real assets	Total liabilities	Total financial assets	Total real assets	Total liabilities	Total financial assets	Total real assets	Total liabilities
Austria	<u>5</u> (-39.4)	3 (3.0)	4 (-6.5)	5 (23.0)	5 (-1.6)	5 (1.7)	5 (16.4)	3 (-2.7)	3 (-3.3)
Belgium	5 (-41.5)	4 (-8.6)	2 (-13.1)	2 (9.0)	4 (5.2)	3 (12.5)	5 (33.2)	5 (3.8)	x
Cyprus	5 (-9.2)	x	<u>5</u> (-34.5)	x	5 (-14.5)	5 (33.5)	5 (5.3)	4 (10.4)	x
Finland	5 (-23.9)	<u>5</u> (-13.7)	5 (-3.6)	5 (3.8)	<u>5</u> (4.8)	<u>5</u> (4.3)	<u>5</u> (20.2)	<u>5</u> (9.0)	2 (-1.8)
France	<u>5</u> (-58.0)	<u>5</u> (-11.1)	2 (-3.1)	<u>5</u> (40.6)	<u>5</u> (5.1)	x	<u>5</u> (17.4)	<u>5</u> (6.0)	5 (1.8)
Germany	<u>5</u> (-35.7)	2 (5.3)	5 (-15.7)	4 (14.9)	2 (-4.4)	5 (14.5)	<u>5</u> (25.9)	x	3 (-4.5)
Greece	3 (-9.2)	5 (-2.8)	5 (-2.4)	3 (6.3)	x	x	5 (3.2)	5 (2.7)	5 (1.8)
Italy	<u>5</u> (-41.4)	<u>5</u> (-3.5)	4 (-11.2)	5 (23.8)	5 (2.3)	4 (11.5)	<u>5</u> (17.6)	5 (1.2)	5 (0.8)
Luxembourg	<u>5</u> (-34.3)	x	4 (-15.8)	2 (13.8)	5 (-5.9)	4 (12.8)	<u>5</u> (25.0)	x	x
Malta	<u>5</u> (-28.0)	<u>5</u> (-11.5)	5 (-4.9)	5 (21.5)	3 (6.7)	5 (3.9)	<u>5</u> (6.5)	5 (5.5)	x
Netherlands	3 (-50.2)	3 (6.8)	5 (-10.7)	3 (50.3)	4 (-10.9)	5 (9.6)	5 (7.9)	5 (6.3)	3 (-1.6)
Portugal	3 (-16.7)	x	3 (-8.2)	3 (7.8)	3 (1.1)	3 (3.7)	<u>5</u> (12.2)	2 (-1.2)	3 (4.5)
Slovakia	<u>5</u> (-22.0)	4 (3.4)	3 (-16.8)	4 (17.1)	5 (-2.6)	3 (10.8)	5 (5.4)	x	x
Slovenia	3 (-29.0)	x	5 (-25.5)	3 (30.5)	3 (-2.7)	2 (21.2)	x	x	5 (11.6)
Spain	<u>5</u> (-30.1)	4 (-18.3)	2 (-14.4)	2 (6.8)	4 (7.2)	2 (13.7)	5 (29.9)	4 (11.1)	5 (1.1)

Notes: the underline informs about evolving changes in the share of the portfolio component caused by a continuous increase in household total financial assets, total real assets, or total debt from loans from class 1 to class 5; the number in the front of the brackets indicate the class of households with the greatest difference in the share of a given portfolio part in comparison to the basis (class 1); the number in the brackets inform about the difference (in p.p.) in the average shares of a portfolio part between households from class 1 and the class indicated in the front of the brackets; x-statistically insignificant discrete change.

Source: Author's own calculations derived from the Eurosystem HFCS data.

Table 10. The average structure (in %) of portfolios of households with the values of total real assets assigned to classes 1 and 5

Portfolio parts	Finland		France		Italy	
	class 1	class 5	class 1	class 5	class 1	class 5
safe assets/ total financial assets	86	72	82	71	90	87
relatively safe assets/ total financial assets	4	9	13	18	8	10
risky assets/total financial assets	10	19	5	11	2	3

Source: Author's own calculations derived from the Eurosystem HFCS data.

Table 11. The average structure (in %) of portfolios of households with the values of total financial assets assigned to classes 1 and 5

Country	Austria		Finland		France		Italy		Malta	
	class 1	class 5	class 1	class 5	class 1	class 5	class 1	class 5	class 1	class 5
safe assets/ total financial assets	92	53	86	62	82	24	90	49	90	62
relatively safe assets/ total financial assets	3	26	4	8	13	54	8	32	7	28
risky assets/total financial assets	5	21	10	30	5	22	2	20	3	10

Source: Author's own calculations derived from the Eurosystem HFCS data.

4.3 Results from Version 3 of the Fractional Multinomial Logit Model

This version of the model allows an analysis of the impact of the most significant cash flows in a household – annual gross incomes and monthly loan repayments – on the risk profile of its financial asset portfolio. Moreover, it examines the influence of the household model in this respect.

The results obtained for the whole group of countries (Table 12) emphasise the most significant impact of annual gross income on household investment preferences. Its continuous increase strengthens respondents' interest in the relatively safe and risky assets. However, the latter appear more attractive for respondents with higher and the highest incomes (classes 4-5). The comparison of average portfolios of households whose annual gross incomes do not exceed EUR 24,098.81 (class 1) to average portfolios of households with incomes equal at least to EUR 96,395.22 (class 5) reveals a reduction of the share of safe assets by almost a half (from 83% to 44%). Due to this modification, the proportion of risky assets rises by 23 p.p. to 31%, while relatively safe assets rise by 16 p.p. to 25%. Similar tendencies can be identified regarding the impact of monthly loan repayments above EUR 120.09.

However, their scale seems marginal, up to 4 p.p. Household size influences the share of safe and risky parts to the similar extent as monthly loan repayments. Larger households (3 persons or more) prefer slightly more deposits and limit the share of risky items in their portfolios in comparison to one-person households. It should be emphasised that the directions of the changes in portfolio structure within the classes caused by the two latter features may not be consistent.

In most of the countries, annual gross incomes above the limit for class 1 motivate households to keep fewer deposits in portfolios and invest more in the remaining assets (Table 13). It should be noted that from all the variables adopted to variant 3 of the model, gross incomes influence portfolio structure the most. The greatest differences in this regard can be identified between the average portfolios of French households assigned to class 1 and class 5. The latter tend to keep a lowered share of safe assets by 60 p.p. and focus on the possession of the relatively safe asset

(increased by 33 p.p.) and risky ones (increased by 27 p.p.). It should be noted that the average share of deposits declines from 80% to 20%.

Table 12. Discrete change estimates of the fractional multinomial logit model for the Eurozone

Variable	Discrete change	SE	p-value
safe assets/total financial assets:			
No. of household members (= 2)	0.0052	0.0031	0.093
No. of household members (= 3)	0.0358	0.0034	0.000
No. of household members (= 4)	0.0338	0.0035	0.000
No. of household members (> 4)	0.0282	0.0044	0.000
Gross income (class 2)	-0.1070	0.0041	0.000
Gross income (class 3)	-0.1941	0.0056	0.000
Gross income (class 4)	-0.2728	0.0073	0.000
Gross income (class 5)	-0.3878	0.0070	0.000
Monthly loan repayments (class 2)	-0.0289	0.0041	0.000
Monthly loan repayments (class 3)	-0.0428	0.0051	0.000
Monthly loan repayments (class 4)	-0.0302	0.0056	0.000
Monthly loan repayments (class 5)	-0.0350	0.0034	0.000
relatively safe assets/total financial assets:			
No. of household members (= 2)	0.0023	0.0023	0.301
No. of household members (= 3)	-0.007	0.0026	0.010
No. of household members (= 4)	-0.0027	0.0027	0.314
No. of household members (> 4)	0.0022	0.0034	0.513
Gross income (class 2)	0.0628	0.0032	0.000
Gross income (class 3)	0.0993	0.0045	0.000
Gross income (class 4)	0.1281	0.0059	0.000
Gross income (class 5)	0.1586	0.0061	0.000
Monthly loan repayments (class 2)	0.0119	0.0029	0.000
Monthly loan repayments (class 3)	0.0186	0.0035	0.000
Monthly loan repayments (class 4)	0.0222	0.0041	0.000
Monthly loan repayments (class 5)	0.0206	0.0024	0.000
risky assets/total financial assets:			
No. of household members (= 2)	-0.0076	0.0020	0.000
No. of household members (= 3)	-0.0288	0.0020	0.000
No. of household members (= 4)	-0.0311	0.0020	0.000
No. of household members (> 4)	-0.0304	0.0023	0.000
Gross income (class 2)	0.0442	0.0030	0.000
Gross income (class 3)	0.0948	0.0046	0.000
Gross income (class 4)	0.1448	0.0065	0.000
Gross income (class 5)	0.2292	0.0073	0.000
Monthly loan repayments (class 2)	0.0017	0.0029	0.560
Monthly loan repayments (class 3)	0.0242	0.0036	0.000
Monthly loan repayments (class 4)	0.0079	0.0037	0.034
Monthly loan repayments (class 5)	0.0144	0.0023	0.000
No of observations: 57,053; Wald chi ² (24) = 5,864.23; Prob>chi ² = 0.0000;			
Log pseudolikelihood = -43,482.196			

Source: Author's own calculations derived from the Eurosystem HFCS data.

In Finland and Italy, the share of deposits is recognised as lowered by about half in comparison to portfolios of the basis. It should be noted that in Austria, Finland, France, Italy, and Malta the steady increase in annual gross incomes leads to deepening changes in portfolio structures through all the classes. The differences between the portfolios of households assigned to the most distant classes are presented in Table 14. The impact of the monthly loan repayments on portfolio risk profiles is not evident (Table 13). The analysis of the differences in the preferences of households assigned to the most distant classes (classes 1 and 5) is limited to Cyprus and Portugal. However, the changes in this regard do not have an evolving nature. In Cyprus, the average share of deposits in portfolios of households whose monthly instalments are from the highest range (at least EUR 2,114) is lowered by

32 p.p. Due to this, the shares of both remaining assets are increased – relatively safe assets by 20 p.p. and risky assets by 12 p.p. In Portugal, these modifications seem less pronounced and limited up to 5 p.p.

In the case of the influence of household size on the risk profiles of portfolios in individual countries, attention should be drawn to the Dutch sample, where modifications evolve class by class (Table 13). Larger households are more focused on relatively safe assets. Their average share in households from class 5 reaches 57%, due to the reduction in the average shares of deposits by 28 p.p. and risky assets by 3 p.p. The developing changes can also be observed in the portfolios of French households. However, unlike the Dutch, the largest French households prefer more deposits in their portfolios (by 9 p.p.), which form 89% of their average value. Such modification is due to the reduction of the average share of relatively safe assets by 6 p.p. and risky assets by 3 p.p. Additionally, slight differences towards deposits are identified between the portfolios of Austrians assigned to class 1 and class 5, however, their nature is not continuous with an increase in household members.

Table 13. The classes of households regarding their size, annual gross income, and monthly loan repayments characterised by the most modified portfolio structure (in p.p.) in comparison to class 1

Countries	safe assets/ total financial assets			relatively safe assets / total financial assets			risky assets/ total financial assets		
	Household size	Annual gross income	Monthly loan repayments	Household size	Annual gross income	Monthly loan repayments	Household size	Annual gross income	Monthly loan repayments
Austria	<u>5 (5.0)</u>	<u>5 (-24.0)</u>	3 (-7.0)	5 (-2.0)	<u>5 (11.0)</u>	4 (4.0)	<u>5 (-4.0)</u>	<u>5 (12.0)</u>	x
Belgium	x	<u>5 (-23.0)</u>	2 (-11.0)	5 (7.0)	4 (8.0)	2 (9.0)	<u>5 (-3.0)</u>	<u>5 (17.0)</u>	x
Cyprus	x	5 (-14.0)	<u>5 (-32.0)</u>	x	2 (7.0)	5 (20.0)	x	x	5 (12.0)
Finland	<u>5 (4.0)</u>	<u>5 (-41.0)</u>	x	4 (2.0)	<u>5 (11.0)</u>	x	<u>5 (-6.0)</u>	<u>5 (30.0)</u>	x
France	<u>5 (9.0)</u>	<u>5 (-60.0)</u>	x	<u>5 (-6.0)</u>	<u>5 (33.0)</u>	5 (-2.0)	<u>5 (-3.0)</u>	<u>5 (27.0)</u>	3 (2.0)
Germany	2 (3.0)	<u>5 (-29.0)</u>	5 (-6.0)	4 (7.0)	3 (9.0)	2 (10.0)	4 (-8.0)	<u>5 (22.0)</u>	2 (-7.0)
Greece	x	<u>5 (-6.0)</u>	x	x	x	4 (-1.0)	x	x	3 (-1.0)
Italy	3 (4.0)	<u>5 (-46.0)</u>	5 (-2.0)	3 (-2.0)	<u>5 (20.0)</u>	4 (2.0)	<u>5 (-2.0)</u>	<u>5 (26.0)</u>	x
Luxembourg	x	4 (-35.0)	4 (-8.0)	x	2 (4.0)	4 (9.0)	<u>5 (-4.0)</u>	<u>5 (34.0)</u>	5 (-4.0)
Malta	x	<u>5 (-21.0)</u>	x	x	<u>5 (11.0)</u>	x	x	<u>5 (10.0)</u>	x
Netherlands	<u>5 (-28.0)</u>	4 (-10.0)	4 (-8.0)	<u>5 (31.0)</u>	x	x	<u>5 (-3.0)</u>	<u>5 (10.0)</u>	x
Portugal	x	<u>5 (-16.0)</u>	5 (-5.0)	x	<u>5 (7.0)</u>	5 (3.0)	x	5 (9.0)	5 (2.0)
Slovakia	4 (-4.0)	x	3 (10.0)	x	4 (5.0)	5 (5.0)	x	x	x
Slovenia	x	x	4 (-26.0)	x	x	x	x	3 (-8.0)	4 (25.0)
Spain	2 (-2.0)	<u>5 (-46.0)</u>	5 (-5.0)	4 (3.0)	4 (6.0)	3 (4.0)	4 (-4.0)	<u>5 (42.0)</u>	2 (-4.0)

Notes: the underline informs about evolving changes in the share of the portfolio component caused by a continuous increase in household size, annual gross income, or monthly loan repayments from class 1 to class 5; the number in the front of the brackets indicate the class of households with the greatest difference in the share of a given portfolio part in comparison to the basis (class 1); the number in the brackets inform about the difference (in p.p.) in the average shares of a portfolio part between households from class 1 and the class indicated in the front of the brackets; x-statistically insignificant discrete change.

Source: Author's own calculations derived from the Eurosystem HFCS data.

Table 14. The average structure (in %) of portfolios of households whose annual gross incomes are assigned to class 1 and class 5

Portfolio parts	Austria		Finland		France		Italy		Malta		Portugal	
	class 1	class 5	class 1	class 5	class 1	class 5	class 1	class 5	class 1	class 5	class 1	class 5
safe assets/ total financial assets	90	66	84	43	80	20	86	40	83	62	93	77
relatively safe assets/ total financial assets	3	14	4	15	14	47	10	30	10	21	2	9
risky assets/total financial assets	6	18	12	42	6	33	4	30	7	17	5	14

Source: Author's own calculations derived from the Eurosystem HFCS data.

5. Conclusions

The analysis of households' financial asset portfolios in the euro area countries proved their poor diversification and the heterogeneity regarding mean values. In the considered set of financial assets, deposits emerged as the most favoured component of portfolios. A significant position was also assigned to voluntary pension plans and whole life insurance contracts, which were recognised as the main substitute to deposits. The importance of other components, such as shares, bonds, mutual fund units, or private lending could be identified in portfolios of households residing in selected countries.

On the basis of the fractional multinomial logit model, certain conclusions could be drawn regarding the impact of households' characteristics on risk profiles of their portfolios. Its first, most generalised version, allowed the recognition of household net wealth as a feature significantly shaping the risk profiles of the portfolios. In the Eurozone, the increase in net wealth encouraged the extension of the share of relatively safe and risky assets. However, the interest of affluent households was focused more on risky assets. The results obtained for individual countries were not coherent. In Austria, France and Italy, the most affluent households primarily tended to have more relatively safe items than the basis for comparison, while in Germany, Finland, Greece, and Portugal they focused more on risky assets. Only in four member states – Finland, France, Italy and Portugal – were households' preferences identified as evolving through all the classes as a consequence of increasing households' net wealth.

The second version of the model provided an insight into the significance of individual components of net wealth for the structure of household portfolios. In the euro area, the most profound developments in portfolio structure resulted from households' investments in financial assets. The households that accumulated wealth in such a form demonstrated preferences regarding risky and relatively safe assets, minimising the share of deposits in portfolios. This was clearly visible in Austria, Finland, France, Italy and Malta. In France, the structures of average portfolios of households assigned to the most distant classes (class 1 and class 5) were significantly different due to the reorientation of the preferences of wealthy

households from deposits into the remaining components. Moreover, only in this country did consecutive increases of portfolio values cause the gradual evolution of respondents' preferences. The impact of investments in real assets on the structure of the financial asset portfolios was not so noticeable. In the euro area, they led to slight increases in the share of risky and relatively safe assets due to a reduction in the share of deposits. Similar changes could also be observed in portfolios of households residing in Finland, France, and Italy. However, in Finland and France household preferences tended to evolve class by class. The importance of debt from loans for the risk structure of financial asset portfolios was not obvious in individual countries. The greatest modifications in this regard were spread within their various classes. However, a common tendency could be seen regarding the diminished significance of deposits in favour of relatively safe assets. The attitude to risky items was assessed as heterogeneous among the countries.

The last version of the model provided information about the impact of gross incomes, loan repayments, and household size on investment preferences of households. However, the results obtained for selected countries were incomplete. Annual gross incomes appeared as the variable of the greatest explanatory power, proving the increasing importance of risky and relatively safe assets along with their growth. Moreover, the structure of portfolios of the households declaring incomes from the highest range was more balanced. The most noticeable evolving modifications of portfolios were recognised in France, Finland, and Italy.

Additionally, the sequential increases of incomes led to evolving changes in portfolio structures of Austrian and Maltese households. The constant impact of increasing monthly loan repayments was visible in portfolios in Cyprus and Portugal, but only in Cyprus could the modifications of their structure be assessed as significant. The impact of the rising number of household members from class 1 to class 5 could be seen only in the Netherlands and France. The results proved the opposing significance of deposits and relatively safe assets for the largest households there. Additionally, in Austria the smallest and the biggest households demonstrated a divergent stance on deposits.

In conclusion, the risk profiles of households' financial asset portfolios remained under the influence of their financial standing. However, the usefulness of the considered wealth measures for the aim of the study was varied, and the most information was provided by net wealth, total financial assets, and annual gross incomes. The results obtained allowed the general conclusion that the greater the wealth of a household, the less significant were deposits and more preferred the remaining parts of portfolios. Only in the selected euro area countries, might the progressive recovery of the financial situation lead to the developing changes in portfolios, and thus, its impact could be tracked through all the classes of households. This occurred in France, where the changes resulted from a continuous increase in households' net wealth, investments in total real and financial assets, annual gross income, and additionally household size. In Finland, they were caused

by increasing net wealth, total real assets, and annual gross incomes. In Italy, growing net wealth and annual gross incomes were responsible for the evolution of the structure of portfolios through all classes of households. The wealth measures adopted to the model allowed the identification of the countries where the greatest differences in portfolio structure occurred between the most distant classes of households – the poorest and the most affluent. These occurred in Austria, Finland, France, and Italy, where the richest households possessed the shares of deposits lowered on average by at least 20 p.p. in comparison to the portfolios of the basis.

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