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Risk-Intolerant but Risk-Taking—Towards a Better Understanding of Inconsistent Survey Responses of the Euro Area Households

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Abstract: The sustainable development of the EU internal market for retail financial services is based on the rules of ‘suitability’, ‘know your client’, and ‘know your product’. The rules ensure that financial institutions (including banks) offer retail clients only products and services that are adequate to their purposes and preferences, including risk tolerance. Our study, however, concerns households for which the above rules are not valid, since they declare risk aversion and possess risky assets. According to the European Union Markets in Financial Instruments Directive and Regulation (MiFID II and MiFIR), the inconsistent information they provide within survey questions should classify them to more compound suitability assessment procedures. In the study, we use nationally representative data for 16 euro area countries from the second wave of the Eurosystem Household Finance and Consumption Survey. Using logit regression, we identify sets of socio-demographic and socio-economic characteristics conducive to the possession of risky assets by risk-averse households in individual countries. To assess their similarity, we use the hierarchical taxonomic method with Ward’s formula. The results of the study showed that risky assets were primarily possessed by risk-averse households that were characterised by high income, including from self-employment, and reference persons having a university degree and at least 55 years of age. The significance of their other characteristics was mainly shaped at the national level. The clear similarity of sets of the characteristics was confirmed only for a few pairs of countries. The information inconsistency that may result from erroneous self-assessments of being risk-averse was recognised in all countries and most often concerned high-income households with reference persons being males with a university degree. In 11 countries, the reason for this inconsistency could also be the inadequacy of assets held, also among senior households. The results provide insights for practitioners and policy. Identification of households providing inconsistent information to financial institutions, with the recognition of its reasons based on easily verifiable characteristics, may prove helpful in suitability assessments. The results confirming the similarity of household profiles requiring special attention between countries may be useful for entities operating cross-border. Due to the collection of information on risk aversion based on the single question self-classification method, conclusions regarding the restrictions of its use should also be considered relevant. In turn, policy implications may relate to consumer protection, since significant fractions of risk-averse households indeed participate in risky assets. Moreover, in selected countries, the risk-averse senior households were recognised as susceptible to making wrong investment decisions.

Keywords: risk tolerance; risk aversion; risk-taking; MiFID II; MiFIR; suitability assessment; households; risky financial assets; financial institutions; financial advisory; portfolio management

1. Introduction

Risk tolerance influences a wide range of households' financial decisions. Its significance for portfolio choices has been emphasised in Article 25 of Directive 2014/65/EU (MiFID II) and Articles 54 and 55 of Commission Delegated Regulation 2017/565 (MiFIR), which promote the 'suitability', 'know your client' and 'know your product' rules within the EU [1,2]. The rules emphasise the need for an in-depth assessment of retail clients' risk tolerance and ensure that they are provided only with products meeting their investment objectives and preferences. Risk tolerance and portfolio choices are the focus of interest of practitioners and researchers. In financial institutions, including personal advisory and portfolio management entities, they relate to individual cases [3–5], while in research studies they relate to entire populations [6,7] or specified subsets of individuals or households [8,9]. In all cases, information about self-assessed risk attitudes and asset participation is often collected within survey instruments, which are expected to provide up-to-date, accurate, and complete data.

Aiming at the uniform and consistent application of the MiFID II in the EU member countries, the European Securities and Markets Authority (ESMA) draws attention to the limited reliability of information derived from survey questions and the need for its re-examination [10]. It recognises the constraints of self-assessed risk tolerance, if not counterbalanced by objective criteria, as well as questions in batteries regarding portfolio components. Moreover, the ESMA signals the inconsistency of survey information provided by particular types of respondents, e.g., those who are unwilling to take any risk but have ambitious investment objectives. This may occur if a self-assessed risk attitude is untrue or asset selection incorrect due to the respondent's narrowed understanding of characteristics and risks related to financial products and a shortage of investment experience. According to the ESMA guidelines, knowledge of the socio-economic and socio-demographic features of retail clients, such as, for instance, their marital status, family situation, age, employment situation, or liquidity needs may help recognise information inconsistency under the suitability assessment.

A single question self-classification is one of the methods of estimating individuals' and households' risk attitudes. It is based on the following question with four possible answer variants: 'Which of the following statements comes closest to describing the amount of financial risk that you (and your husband/wife/partner) are willing to take when you save or make investments?'

1. Take substantial financial risks expecting to earn substantial returns,
2. Take above average financial risks expecting to earn above average returns,
3. Take average financial risks expecting to earn average returns,
4. Not willing to take any financial risk.

The question has been widely applied in nationally representative surveys, which allow concluding about general or particular subjective risk attitudes within a specific population, with outcomes discussed in the literature related to consumer finance. This method has been used by both researchers and practitioners [11–17].

Our study is devoted to particular households residing in 16 euro area countries that assess themselves as unwilling to take any risk (risk-averse) but hold risky financial assets in their portfolios. The inconsistent information they provide within survey questions should classify them to more compound suitability assessment procedures under MiFID II and MiFIR. Our study aims to profile these households according to their socio-demographics and socio-economics, i.e., to describe the primary providers of information for the purposes of re-examination in individual countries. The problem we analyse can be referred as to a gap between a subjective and objective risk attitude of a household, since the response to the single question is based on self-assessment, and risky asset participation discloses existing risk exposure [12,18–20]. We are particularly interested in recognising the possible causes of the information inaccuracy, which can be declaring untrue risk aversion or holding inadequate financial assets, as well as in the profiles of households to which they can be assigned. As the single question self-classification was commonly used, this study also aims to recognise its limitations when applied to specified types of respondents. The paper seeks to answer the following research questions:

- Due to the focus of our study on a specified subgroup of households declaring risk aversion, first, a question should be asked about which socio-demographics and socio-economics determine the likelihood of declaring risk aversion by households in the euro area countries?
- Regarding the discussed information inconsistency, which of the socio-demographics and socio-economics determine the likelihood of possession of risky financial assets by households that declare risk aversion? In other words, which household characteristics can be considered as favouring the occurrence of the considered inconsistency of information in the countries analysed?
- Due to the adoption of the common regulatory frames and guidelines related to MiFID II and MiFIR, to what extent are the profiles of households affected by the information inconsistency similar among the euro area countries?
- Since there are two possible causes for information inconsistency, can we conclude at the country level for which households the incorrect self-assessment of risk aversion is the most probable cause, and for whom it is the participation in inadequate (risky) assets?
- The single question self-classification is a simplified method of estimating households' risk attitudes. Regarding this, for which households may the usefulness of this method be limited?

The discussed information inconsistency can be identified in most of the euro area countries. According to the second wave data of the Eurosystem Household Finance and Consumption Survey (HFCS), in domestic populations, up to 35% of households which declare unwillingness to take any financial risk hold risky financial assets.

Our study extends the existing research line of inquiry regarding risk tolerance and risk behaviour, particularly their incoherence, including its causes and consequences. In contrast to previous studies which examine the gap between the subjective risk tolerance and objective risk tolerance within their whole ranges, we focus solely on the risk-averse households holding risky financial assets in portfolios, for which the consequences of the aforementioned gap might be the most severe. It should be noted that current knowledge about the causes and consequences of the gap is modest. The same can be concluded about the socio-demographic and socio-economic profiles of households which undervalue their own risk tolerance and overexpose to financial risk. Moreover, few studies relate to the EU populations, but if they do so, they rely on data for specific groups of retail investors, like the clients of selected financial institutions [12,18]. The data we use are nationally representative, thus giving an insight into the euro area populations, and allowing to draw conclusions about their similarities and dissimilarities regarding the issues analysed. Such an approach is currently desired due to the re-regulation of the markets for retail financial services, not only in the EU but globally.

The results of our study have implications for practice and policy. The knowledge about households which provide inconsistent information and should be treated with utmost caution may aid professionals to remain compliant with MiFID II and MiFIR. Since the new regulatory environment has been implemented, they are obliged to recognise the constraints of retail clients prior to offering them financial products and services. Our findings seem to be useful for entities operating internationally since we identify the countries regarding which a suitability assessment can be based on similar procedures. The policy implications refer to the issues of consumer protection as a significant part of households are self-reliant, i.e., they make financial decisions on their own and are excluded from the suitability assessment [21]. The prevalence of such households which are overexposed to financial risk (risk-averse but prone to making wrong choices) may lead to social problems under financial market stress. Thus, it is essential to know if the self-classification approach offers, in fact, an accurate gauge of risk-taking propensities that helps in decision making.

The remainder of the paper is organised as follows: Section 2 contains an overview of the theory and literature related to households' financial risk tolerance and behaviour. Section 3 presents the methodology. Section 4 describes the HFCS data applied in the study. Section 5 contains the results of empirical analysis and discussion. Section 6 contains conclusions.

2. Theoretical Background and Literature Review

2.1. Theory

Financial risk tolerance can be defined as the maximum amount of uncertainty that someone is willing to accept when making a financial decision [22] or the willingness to engage in a financial behavior in which the outcomes are uncertain with a possible identifiable loss [23]. It is the inverse of an economic term of risk aversion derived from household preferences [24–26]. Risk aversion refers to a hesitancy to accept a choice that has an uncertain payoff when an alternative choice with a more certain outcome is available [26]. The concept of risk aversion was developed by Pratt [27] and Arrow [28] with the use of normative models of rational choice describing how people ought to make decisions under uncertainty.

The first economic theory which we should recall is the expected utility theory which relates to links between risk aversion and risk behaviour. It assumes in its basic form that consumers are rational, and their risk preferences remain constant under uncertainty [29]. For this reason, consumers are expected to make the same choices regardless of the situation or event which has occurred [30,31]. Optimal behaviour under uncertainty is possible only under the assumption that risk-averse individuals should maximise expected utility, which is a function of outcomes related to the wealth or income levels [32]. Pratt [27] and Arrow [28], providing the measures of risk aversion with the coefficients of absolute and relative risk aversion. The first one can be used for global comparisons of risk aversion, e.g., among individuals, with the assumption that a person with higher absolute risk aversion for every prospect may be assessed as more risk-averse. This measure may also be considered as local under the assumption that an individual with a higher absolute risk aversion will always have a higher risk premium for small bets. A relative risk aversion is, in some sense, independent of wealth levels, since the coefficient measures the willingness to accept bets being a proportion of the current wealth [32].

The expected utility theory was extended within the modern portfolio theory [33], which relates to the optimality of portfolios consisted solely of risky assets. This approach of mean-variance assumes that risk-averse investors with diversified portfolios maximise their satisfaction (referred to as utility) by maximising their portfolios' returns for a given risk level. Thus, they should take the additional risk only if returns associated with the risk are high. With the increasing significance of liquidity needs, theorists began to draw attention to portfolios consisting of both risky and risk-free assets. Tobin [34] identified an investor's risk attitude as a determinant of the optimal portfolio choice from the set of efficient portfolios consisting of both asset categories. Thus, self-assessed risk attitudes became essential for proper allocational decisions between risk-free and risky assets. In this approach, greater risk tolerance results in the choice of higher volatility, which is compensated for by a higher expected return [35]. This paradigm can be, in some sense, visible in MiFID II and MiFIR, as the recognition of clients' risk attitudes conditions further financial asset recommendations.

However, as an increasing number of studies were signalling the incompatibility between what consumers should do and what they actually do, the rationality of investors' choices was being questioned, as well as the ability of normative models to explain actual investment choices [29,36–43].

The new approach to risk attitudes was enhanced with behavioural finance and psychosocial aspects. The descriptive prospect theory incorporated risk-seeking in the domain of losses in the analyses. According to Kahneman and Tversky [41], the carriers of value or utility were changes of wealth, rather than final asset positions that included current wealth. Within this theory, the utility function was defined over gains and losses separately, and a probability weighting function converted the underlying probabilities of the lottery into subjective probabilities [44]. The significance of perceptions and judgments for decision making became expressed in the assumption of the dependence of a person's risk tolerance on how a situation or event is framed. Della Vigna [45] found that consumers demonstrate risk aversion when they are asked to make a choice in which the outcome is framed as a gain, and risk-seeking when the choice is framed as a loss. More orientation toward behavioural finance, psychology and sociology can be recognised in theory assuming the significance of feelings triggered

by the situation and risky choice for the decision-making process. In Loewenstein, Weber, Hsee and Welch's risk-as-feelings hypothesis, emotional reactions to risky situations often differ from reasoned assessments and directly influence investment behavior [46,47].

As we have presented, knowledge about the links between financial risk tolerance and financial risk behaviour has a broad theoretical framework, related not only to the economy and finance, but also psychology and sociology. Regarding our study, the significance of prospect theory with its subjective input may be recognised, however, only when considered jointly with a sociological theory of family development. The similarity of the concepts of a household and a family should be noted here [48]. Two aspects of the theory of family development make the prospect theory useful for understanding how the family (household) and demographic variables affect risk tolerance. The first aspect is the assumption that all choices are considered in relation to one's accumulated wealth position, with wealth increasing risk tolerance. The other is the premise of the variation of losses and gains and the perception of losses to be more important than gains in individual decision-making regarding risk-taking behaviour. Both theories relate to the probabilities of events which are useful for explaining individuals' propensity for financial risk. The theory of family development does it through the adoption of socio-demographics and socio-economics for the purposes of family profiling [49]. It recognises the changes in role expectations in the family over time which are a function of changes in a family membership, individual developmental needs, and direct societal expectations [49]. According to this theory, families form their expectations and behaviours on the basis of their stage requirements confirmed in their characteristics. Moreover, family stages have stochastic qualities that introduce life uncertainties that may influence current and future behaviour and decisions [50]. Features like gender, age, marital status, having dependents, and income level may thus alter the context for assessing potential gains and losses in an investment situation. The measures of subjective and objective risk tolerance we apply in the study can also be referred to the theory; however, to a limited extent. The single question self-classification has its roots in the economic theory, but households' perceptions of own risk attitude may remain under the influence of the current situation or insufficient information [30]. The same dependence may occur regarding the measure of financial risk behaviour, which in our study is a simplified behavioural measure and refers to the occurrence of risky assets in portfolios [51].

2.2. Literature

We based our research on existing literature related to both subjective financial risk tolerance and financial risk behaviour. Regarding the aim of the study, particularly essential for us were findings related to:

- risk tolerance measures, including their limitations, if applied in research studies,
- the role of socio-demographics and socio-economics for the formation of households' perceptions and behaviours related to the financial products and services,
- inconsistencies between the subjective and objective risk tolerance, and household characteristics that determine their occurrence.

Risk tolerance estimations may be based on respondents' self-assessments of risk attitudes (subjective measure) or investment behaviours reflected in portfolio composition (objective measure). The reliability of risk tolerance measures depends on how free they are from measurement error and consistent from one use to another [16,52]. Regarding the single question, opinions are ambiguous. Grable and Lytton [16] indicate its limitation resulting from incomplete coverage of the spectrum of financial risk tolerance. Despite it, they find this method closely linked to investment choices and sufficient in explanatory studies, as long as researchers are aware of its limitation. Kimbal, Sahn and Shapiro [53] emphasise the problem of subjective wording of the single question, like 'substantial', 'above average', and 'average', which may be differently interpreted by respondents. Schooley and Worden [17] recognise the additional weakness, which is the lack of possible declaration of 'the willingness to take less-than-average financial risk', which, in their opinion, makes respondents choose risk

aversion. Grable and Schumm [54] describe the reasons for the popularity of the single question among researchers, such as a common belief in its high degree of face validity and similar reliability to longer risk scales, lack of alternative risk-tolerance questions in national surveys, or only a few alternatives to national finance databases. Regarding objective measures, their advantage is intrinsic validity, as the risk attitudes are evidenced in the natural environment [55]. Still, their weak side is limited control over contextual variables, such as liquidity needs, financial constraints, or market expectations, which influence behaviour beyond risk tolerance [56]. Moreover, Hanna, Gutter, and Fan [30] indicate an obvious limitation of the assessment of risk tolerance based on portfolio composition, which is the fact that not all households hold financial assets.

Vast studies are dedicated to socio-demographics and socio-economics determining financial risk tolerance in both approaches. These characteristics stand out from others, like latent psychological and behavioural biases, by their availability in nationally representative databases, and easy recognisability and verifiability at household level. The *age of a respondent* is one of the commonly recognised socio-demographic determinants. Generally, risk tolerance is concluded to decrease with age, but this relationship may not be linear [7,57–59]. Younger investors are more tolerant, since they have time to recover from losses. Yao, Sharpe, and Wang [6] and Bakshi and Chen [60] find risk tolerance declining along with the investment horizon, leading to shifting wealth holdings toward less risky assets. Opposed to general findings, Grable [61] concludes that there is a positive relationship between the age and risk tolerance of investors. Several studies recognise the inconsistencies between age and risk tolerance, and age and actual risk-taking. Finke and Huston [62] and Chang, DeVaney and Chiremba [15] find that older investors declare lower risk tolerance but tend to invest more aggressively than the young ones. *Gender* differences are also well documented in the literature and lead to an assumption that males are more risk-tolerant and take more risks than females do [15,25,61,63–65]. However, Roszkowski and Grable [16] argue that women may underestimate their risk tolerance, while men tend to overestimate it. Despite these findings, Bucciol and Miniaci [7] do not identify gender as a significant characteristic. Investors' *level of education* is recognised as a determinant positively influencing respondents' self-assessed risk tolerance and risk-taking, since more formal education makes it easier to assess the risk-return trade-offs [15,61,66]. *Wealth* and *income* are two related factors that are hypothesised to positively influence risk tolerance [7,15,22,61,67–69]. Regarding wealth, its significance indeed may not be so evident. On the one hand, wealthy individuals may afford to incur losses on risky investments, and their accumulated wealth may reflect high risk tolerance. On the other hand, however, the impoverished may perceive risky investments as a lottery and be more willing to bear the risk associated with a given payoff. Vissing-Jorgensen [70] argues that wealthy households own more risky assets because they can overcome market requirements, such as entry costs (advising fees) and a minimum value of an investment. Similar conclusions refer to income levels [70,71]. It should be noted that *the status on the labour market* matters for the risk tolerance as well. The self-employed distinguish themselves by higher declared risk tolerance [72] and greater risky asset allocation [73]. However, private business risk may crowd out participation in risky financial assets [74]. Many studies discuss the significance of *the marital status* of an investor; however, it should be noted that the estimated risk tolerance of a couple may reflect combined preferences [9]. Previous results find singles generally more risk-tolerant than married people [69,75], but select studies identify an opposite effect [61] or do not identify significant differences at all [68]. The results of a study by Jianakoplos and Bernasek [65] extend the above and find that single women are less risk-tolerant than single men. Less attention is paid to the *household size*, measured by the number of adult members and dependent children. Large households are found to be more conservative in their risk attitudes, since their size negatively influences the wealth per capita and positively the committed expenditure-to-wealth ratio. Furthermore, they are more exposed to the risk of the random needs of family members [74,76]. *Credit constraints* may also influence households' portfolio choices, not favouring the possession of risky assets [77,78].

The existing literature also discusses the relationship between subjective and objective financial risk tolerance; however, relatively little attention is paid to the EU populations in this regard. In most studies, this issue is examined in a similar manner, by adopting a model with an objective (subjective) risk tolerance measure as the dependent variable and a set of independent variables consisting of a subjective (objective) risk tolerance measure and at least one socio-demographic or socio-economic feature. It should be emphasised that still little is known about the factors commonly favouring the inconsistency of subjective and objective risk tolerance. Some researchers, like Chang, DeVaney, and Chiremba [15], Finke and Huston [62], and Schooley and Worden [17], agree that people who declare a willingness to take financial risk are more involved in risky assets than those who are risk-averse. Hallahan, Faff, and McKenzie [69] analyse the gap in a more sophisticated way. They explain the relations between investors' subjective and objective risk tolerance in conjunction with their portfolio choices. However, they define objective risk tolerance as a feature based on responses to detailed questions. They find it broadly consistent with the subjective (self-declared) risk tolerance within the single question. The results also allow to draw conclusions about the rationality of individuals' investment choices due to their compliance with both risk attitudes. The consistency of subjective risk tolerance and risk-taking is also examined by Gutter, Fox, and Montalto [79], who recognise it among 66% of households. However, select studies confirm an evident gap between what respondents say about their risk tolerance and what they have in portfolios. A study by Jianakoplos [80] recognises a significant fraction of respondents who self-assess as less risk-tolerant but hold considerable portions of risky assets. Even larger incoherence is presented in the study of Kannadhasan [81], described by the regression coefficient at the level of 0.107. The heterogeneity of results obtained so far for different countries encouraged us to conduct the study for an almost entire euro area. Although the countries we consider became similar due to their membership in the EU and adoption of the single currency, they still remain different in many dimensions, including cultural, institutional, structural, and macroeconomic, which affect not only households' wealth, but also their perceptions and behaviours.

Despite the noticeable discussion about the discrepancies between the declared risk tolerance and portfolio composition, little is known about their causes—whether they result from wrong self-assessments or unsuitable asset holdings. Both reasons should be taken into account since, as we explained earlier, the measures of subjective and objective risk tolerance have specific shortcomings. Based on data concerning German consumers, Ehm, Kaufmann, and Weber [18] find the phenomenon of enlarged commitment in risky assets of less risk-tolerant individuals, caused by inadequate portfolio choices rather than an inability to assess own risk attitude. In turn, the findings of Martin [19] for the US population and Moreschi [20] for clients of select financial institutions lead to conclusions about individuals' inability to assess risk attitude being a primary reason. Marinelli, Mazzoli and Palmucci [12] recognise two types of gaps on the basis of data for the clients of an Italian bank, i.e., arising from wrong self-assessments (related to over- and undervaluation) and incoherent portfolio composition (related to over- and underexposure to risk). However, this is the only research we have found which provides the results referred to socio-demographics and socio-economics of individuals affected by the gap resulting from a particular cause. Marinelli, Mazzoli and Palmucci [12] recognise male investors, homeowners, and heavy savers as being characterised by a lower self-assessment gap, in contrast to married people. On the other hand, wealthy individuals with a shorter investment horizon and less debt show a smaller portfolio composition gap. Generally, people who display cautious economic behaviour, such as homeowners, savers, and those not indebted, are recognised as more consistent in their financial risk-tolerance expressions.

3. Methodology

In the study, we applied a logit regression model. In general, regression modelling allows to determine what factors, and in what way, influence the studied phenomenon expressed as numbers in a dependent variable. If this variable is the so-called 'latent' variable, but ultimately expressed in a

dichotomous way (dummy), then probability models including the logit model are suitable regression models [82]. Therefore, using various household characteristics, we modelled specific ‘propensities’ of households considered to be important for the purposes of the study. This model can take the following form:

$$\log \frac{P_i}{1 - P_i} = \beta_0 + \sum_{j=1}^k \beta_j x_{ij}, \quad (1)$$

where $P_i = P(y_i = 1)$, and x_{ij} represents the value of the j -th independent variable for the i -th household.

The study was conducted for each of the countries in three stages. Since it concerns households self-assessed as risk-averse, the first stage covered all surveyed households and provided an answer to the following question: *which socio-demographics and socio-economics determine the likelihood of declaring risk aversion by households in the euro area countries?* We used the model (1) with the dichotomous dependent variable R_averse . We assigned the value of 1 to households declaring aversion to risk, and 0 to the others. Therefore, among statistically significant independent variables, one could distinguish:

1. Stimulants of the studied phenomenon referring to those socio-economic characteristics that favoured declaring a lack of risk appetite. In households distinguished by such characteristics, the declared aversion to risk should be considered relatively frequent;
2. Destimulants of the studied phenomenon referring to the characteristics limiting the likelihood of declaring risk aversion. Therefore, among households displaying these characteristics, the belief in risk intolerance should be considered relatively rare.

The detailed results obtained in this stage were used in the further part of the study to identify the causes of the gap between subjective and objective risk tolerance of households, i.e., the ranges of survey responses for targeted re-examination.

In the second stage of the study, we focused only on households that declared no willingness to take any financial risk in each country. The following research question was posed: *which of the socio-demographics and socio-economics determine the likelihood of possession of risky financial assets by households that declare risk aversion? In other words, which household characteristics can be considered as favouring the occurrence of the considered inconsistency of information in the countries analysed?* In this part of the study, we used the model (1) for the dichotomous dependent variable R_assets that identifies households which simultaneously declared risk aversion and possessed at least one type of risky asset. A value of 1 was assigned to such households, while the others (being risk-averse and risk-free) were assigned 0. At this stage, the profiles of households whose inconsistent information should be subject to re-examination were determined.

The results from the second stage also allowed us to identify similarities and differences in the profiles of households (specified for individual countries) whose survey responses would be classified for re-examination. Thus, we asked the question: *to what extent are the profiles of households affected by the information inconsistency similar among the euro area countries?* Based on the characteristics favouring the occurrence of inconsistent information and the confirmed strengthening influence of incomes, and the education and age of the responding person along with their ranges, we classified the countries according to the similarities of the profiles of risk-averse but risk-taking respondents. For this purpose, the hierarchical taxonomic method with Ward’s formula was used with the input dataset consisting of dummies identifying the profile for each country based on the parameter estimates of logit regression. Therefore, if a statistically significant parameter characterised a given variable in this regression, then 1 was assigned to a given country; otherwise it was 0. Based on this set of dummies, a Jaccard distance matrix was determined [83].

In the third stage of the study, we combined the results obtained in the two previous stages, relating to the statistical significance and directions of the impact of individual independent variables on the probability of occurrence of the phenomena explained. The goal of this stage was to provide answers to the following questions: *can we conclude on the causes of information inconsistency in each country? If so, then for which households is the incorrect self-assessment of risk aversion the most probable cause*

and for which is it the participation in inadequate (risky) assets? This part of the study allowed, therefore, to recognise the causes of the analysed information inconsistency in households of specified profiles. They were indicated by the characteristics that played the role of:

1. Destimulants of the declared risk aversion (in stage 1) and stimulants of holding risky assets by households unwilling to take the risk (in stage 2). The widespread risk tolerance of households with such characteristics suggested incorrect self-classification of those who declared risk aversion when holding risky assets. In their case, re-examination should therefore first serve to identify the real attitude towards risk.
2. Stimulants of both the declared risk aversion (in stage 1) and the possession of risky assets by households unwilling to take the risk (in stage 2). The widespread risk aversion of households displaying such characteristics indicated that decisions about participation in risky assets should be seen as potentially erroneous. Therefore, in the case of such households, re-examination should be first of all focused on the adequacy of holding risky assets, including the testing of the household’s knowledge of the main characteristics and risks related to these assets and their investment experience.

In the above cases, the re-examination might therefore be carried out with a focus on a specific area of information obtained from households, which, based on the results of the study, was indicated as the most probable cause of inconsistency. It should be noted, however, that the need for re-examination also applies to households with characteristics of which statistical significance was not confirmed at the adopted level of significance regarding the declared risk aversion (in stage 1), but it was confirmed regarding the possession of risky assets (in stage 2). In their case, one can only conclude that there is an increased tendency to provide inconsistent information, without suggesting its cause.

It should be noted that the recognition of the declared risk aversion as one of the reasons for the information inconsistency and the need for its re-examination indicates the limitations of the single question method. In this case, the following question should be raised: *for which households may the usefulness of the single question be limited?*

The overall procedure applied in the study is presented in Figure 1.

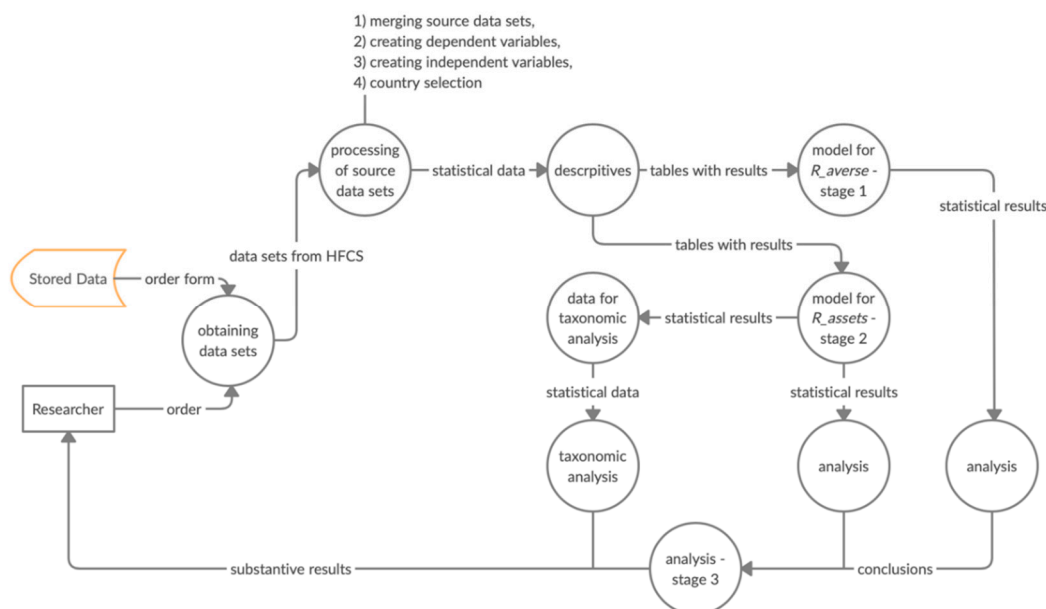


Figure 1. Graphical description of the study. Source: Created by the authors.

4. Data

Our study is based on the second wave data of the Eurosystem HFCS [84], which is a unique source of information about the distribution of socio-demographic and socio-economic features within

the populations of the EU countries, including the self-assessed financial risk tolerance and the classes of financial assets held. The data are confidential and made available on request for research purposes.

In the euro area, information inconsistency was related to diverse domestic fractions of risk-averse household (Figure 2). On the basis of the adopted threshold at 5%, we selected 16 out of 18 countries surveyed for the study, in which from 5.2% to 35.3% of households with subjective risk aversion held risky assets in their portfolios. These were Austria (AT), Belgium (BE), Cyprus (CY), Estonia (EE), Finland (FI), France (FR), Germany (DE), Ireland (IE), Italy (IT), Luxembourg (LU), Malta (MT), the Netherlands (NL), Portugal (PT), Slovakia (SK), Slovenia (SI), and Spain (ES). We omitted Greece (GR) and Latvia (LV) since the fractions in question were much below the threshold there—0.7% and 1.6%, respectively. Taking into account that risk aversion was the most popular attitude in these two countries (declared by about 80% of Greeks and Latvians), one may conclude that subjective risk intolerance of households residing there was generally reflected in their portfolios. This consistency could result from the significantly worse living standards when compared with the remaining euro area countries, as evidenced by the Eurostat for 2014 (the reference year for both countries). The data reveal low satisfaction from own financial situation of more than half of each population and annual median equivalised net incomes of both countries classified to the lowest.

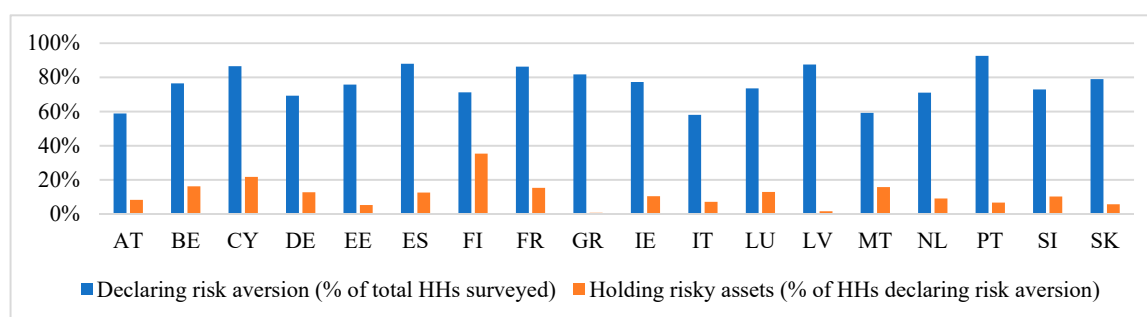


Figure 2. Households declaring risk aversion and their fractions responsible for information inconsistency in the population of individual countries. Source: Created by the authors and based on the Eurosystem HFCS data.

The total number of households covered by our study was 70,730, while in individual countries it ranged from 999 (in Malta) to 12,035 (in France). In most countries, including Austria, Belgium, Cyprus, France, Germany, Luxembourg, Italy, Slovakia, and Slovenia, 2014 was the reference year, but for Estonia, Finland, Ireland, Malta, the Netherlands, and Portugal, it was 2013. This difference should not be perceived as relevant for our study, since we did not use data in monetary units, subject to decline under the European sovereign debt crisis.

In the HFCS database, the information on the attitudes of households towards financial risk was obtained only by the single question self-classification method. We were interested in respondents declaring the attitude ‘Not willing to take any financial risk’, distinguished by the unequivocal self-assessment (risk aversion), and thus excluding the possibility of interest in any risky assets. In the study, it was described by the dummy variable R_averse .

As concerns the information on financial asset classes held by households, we focused solely on the assets with capital-loss risk, no matter whether they were perceived as risky or fairly risky. We included into this group publicly traded shares, other equities related to non-self-employment, not publicly traded businesses, mutual fund units, bonds except state or other general government, and sums on managed accounts. Based on them, the dummy variable R_assets was created that identifies the participation of a household in at least one type of these assets. It should be explained that the decision to use the dummy resulted from the shortage of data about the values of risky assets in households’ portfolios for selected countries.

For the purposes of statistical analysis, we used a set of independent variables related to socio-demographics and socio-economics. A household’s members typically own financial assets jointly

and declare a common attitude towards financial risk, but many of its attributes are personal-specific. In the HFCS, the most knowledgeable member regarding the situation of a household and a primary decision-maker is the responding person, thus we also controlled for his or her attributes. The set was composed of the following:

1. Quintile class of total gross income of a household, at a country level (dummies): *TGI_1Q*—the first quintile (reference variable); *TGI_2Q*—the second quintile; *TGI_3Q*—the third quintile; *TGI_4Q*—the fourth quintile; *TGI_5Q*—the fifth quintile;
2. Type of income of a household (dummies): *I_Empl*—employee income; *I_SEmpl*—self-employment income; *I_Pens*—income from pensions; *I_STrans*—regular social transfers (except pensions);
3. Number of adult members of a household (discrete variable): *N_Adult*;
4. Number of dependent children in a household (discrete variable): *N_Child*;
5. Education level of a responding persons (dummies): *E_1L*—primary and lower (reference variable); *E_2L1S*—lower secondary; *E_2L2S*—upper secondary; *E_3L*—tertiary.
6. Marital status of a responding person (dummies): *MS_S* (reference variable)—single (never married); *MS_M&CU*—married and in a consensual union on a legal basis; *MS_Wid*—widowed; *MS_Div*—divorced;
7. Age of a responding person (dummies): *A < 25* (reference variable); *A_25–39*; *A_40–54*; *A_55+*; age ranges correspond to those adopted in the European Commission study on financial assets and liabilities of European citizens (EC, 2012);
8. Gender of a responding person (a dummy): *Gender*—1 if male.

It should be added that we also took into account other variables related to the type of household, such as being credit constrained or receiving intergeneration transfers (gifts and inheritances), as well as a responding person's labour status. Due to their statistical insignificance or lack of data for selected countries, these variables were finally omitted in the multidimensional statistical analysis. Summary statistics of the independent variables which were used in the model (1) are presented in Tables A1 and A2. They were computed using sampling weights according to the HFCS guidelines [85].

The sampling weights were also applied to gather in-depth information for each country regarding the distribution of:

- the risk aversion among households characterised by a particular socio-demographic or socio-economic feature,
- the occurrence of risky assets among risk-averse households with a given socio-demographic or socio-economic characteristic.

The information allowed us to supplement the findings from the regression modelling in stages 1 and 2 of the study.

5. Results and Discussion

5.1. Risk-Averse Households but Participating in Risky Assets

Since the providers of inconsistent information were selected from households declaring risk aversion, in the first stage of the study we profiled the latter for each country. The results of regression modelling are presented in Table A3. Some of the distinguishing characteristics of these households turned out to be statistically significant in larger groups of countries, showing supranational significance. They referred to the following:

1. The household, taking into account:
 - its income level, primarily the lowest within the first quintile group in the country of residence (in 16 countries). Risk aversion was declared by the majority of such households, representing from 72% (in Italy) up to 98% (in Portugal) of domestic populations;
 - its sources of income, in particular pensions and regular social transfers (in 8 and 6 countries respectively). Within these subsets of countries, risk aversion was declared from 65% (in Italy) up to 96% (in Portugal) of retired households, and from 57% (in Austria) up to 86% (in France) of living from social transfers;
 - its size, expressed by a large number of adult members (in 13 countries). Among the households of at least three adult members, risk aversion was declared by from 66% (in Malta) up to 93% (in Cyprus).
2. The responding person, taking into account his or her:
 - level of education, most of all primary and lower (in 15 countries). Risk aversion was declared by from 75% (in Italy) up to 97% (in Portugal) of households distinguished by this feature;
 - gender, as risk aversion was more common among women (in 14 countries);
 - age, primarily not below 55 (in 11 countries). Taking into account the structure of households from the highest age range regarding risk attitude, between 71% (in Austria) and 95% (in Portugal) of them declared risk aversion;
 - marital status; risk aversion was declared mainly by the widowed and the divorced (in 10 and 9 countries, respectively). Among widowed responding persons, the share of risk-averse ranged from 74% (in Italy) up to (94% in Estonia), while among divorced persons from 75% (in Germany) up to 90% (in France).

In turn, earning income from self-employment was the most often destimulant of declaring risk aversion (in 10 countries). Our results are therefore in line with the results dominating in the literature, regarding the significance of the characteristics and the directions of their impact. Detailed results from this part of the study were used in its third stage.

Profiling of the providers of inconsistent survey information (subject to re-examination) was performed in the second stage of the study, based on the same set of socio-demographics and socio-economics. Detailed modelling results are contained in Table A4. It should be noted that characteristics such as the level of household income, education, and age of respondents were described by more than one independent variable. When considering these characteristics, we primarily focused on the variables that had the greatest positive impact on the probability of having risky assets by those declaring aversion to risk. Table 1 lists for each country the characteristics that favoured the occurrence of inconsistencies in survey information, and therefore can be treated as helpful in profiling respondents whose answers burdened with the greatest risk of inconsistency. As can be seen, these households were not homogeneous in 16 countries.

Despite the visible differences in household profiles, some similarities could be seen within specific groups of countries. The statistical significance of *the level of income classified as the highest* in the country was confirmed particularly often (in all countries except the Netherlands and Slovakia), *ceteris paribus*. Its importance as a determinant of the gap between subjective and objective risk attitude of an investor was confirmed by a study by Marinelli, Mazzoli and Palmucci [12] and Moreschi [20] who found that the inclination to provide inconsistent information increases along with increasing income. They explain this positive relationship with the smaller significance of potential losses for wealthy people, and thus by their lower precision in assessing their risk attitude and selecting financial assets. In our study, we also confirm the increase in the probability of information inconsistency with the rise in the level of income starting from the first quintile group in Austria, Belgium, Cyprus, Finland, France, Germany, Italy, Malta, and Spain, while in other countries within its higher ranges, *ceteris paribus*. The significance of the incomes from the highest range was evidenced in the structure of domestic

populations, as from 13% in Estonia up to 56% in Finland of households declaring aversion to risk and achieving such incomes had risky assets. The results of our study also confirmed the significance of *the source of income*, since in Estonia, Finland, Ireland, Luxembourg, Portugal, and Slovakia, the problem of inconsistent information in particular concerned those living on *self-employment incomes (ceteris paribus)*. In Finland, it related to every second such household. The results of Stewart and Roth's [72] study suggest that its cause may be the hidden willingness to risk of these households. It can also be added that the provision of inconsistent information least often concerned those living on incomes from employment in Cyprus, Germany, Ireland, Italy, Malta, Portugal, Slovenia, and Spain, as well as from regular social transfers in Estonia, Finland, France, Ireland, Luxembourg, the Netherlands, Portugal, and Spain, *ceteris paribus*. The negative impact of the last characteristic seems obvious, due to the difficult financial situation of such households limiting their activity on the market for retail financial services. Their lowest subjective and objective risk appetite is also emphasised by Chang, DeVaney and Chiremba [15].

A characteristic favouring the provision of inconsistent information was also the *size of the household*, expressed in both the number of adult members and dependent children. Previous studies differ with regard to its significance. Some indicate a greater susceptibility of small households, explaining it with a smaller sense of mutual responsibility and less pressure among their members [22,86]. We find this regularity in our results for Austria, Belgium, France, Germany, Italy, Luxembourg, Malta, and Spain. It is worth adding that in Belgium, for instance, every fourth two-person household declaring risk aversion possessed risky assets. However, some studies emphasize that the problem of inconsistent information mainly concerns large households due to difficulties in determining a common risk attitude for the group of people and the selection of adequate assets. In such a situation, the information provided may be influenced by the objectives and preferences of one of the household members [9,10,66]. In our study, the increased propensity to provide inconsistent information by large households has been confirmed for Finland, *ceteris paribus*. More than half of Finnish households with at least three adult members and declared risk aversion participated in risky assets. As concerns the number of dependent children, the results of our study confirmed the significance of this characteristic in five countries, while the direction of its impact was not consistent. In the case of Belgium and Estonia, households distinguished by their higher number showed a greater tendency to provide inconsistent information, *ceteris paribus*. However, the study of Marinelli, Mazzoli and Palmucci [12] shows that the fact of raising children may make adult household members more diligent in assessing their own attitude towards risk and selecting assets, due to the consequences of their current financial decisions for the forthcoming status of children. In our study, the negative impact of the number of children was confirmed for France, Malta, and Slovakia.

Households whose responding persons completed a *tertiary level of education* were evidently more susceptible to providing inconsistent information. This characteristic turned out to be statistically significant in all countries except Austria, Cyprus and Malta. Numerous studies recognise it as conducive to subjective risk tolerance and risk-taking, thus signalling that the information inconsistency we analysed could have originated from declaring false risk aversion. Marinelli, Mazzoli and Palmucci [12] do not confirm the significance of the level of education for the gap between subjective and objective risk tolerance which, however, could be due to the non-representativeness of their research sample. It should be added that in Finland, France, Luxembourg, Portugal, and Spain, the impact of education on the likelihood of providing inconsistent information increased gradually, starting from its lowest level, *ceteris paribus*. However, in Estonia, Germany, Ireland, Italy, and the Netherlands, it strengthened within the two highest levels—upper secondary and tertiary. It is noteworthy that in Finland nearly half of the households that declared risk aversion and had responding persons with a tertiary level of education possessed risky assets, while in France, Spain, and Belgium it was about 25%.

Our results confirmed the significance of *the responding person's age of at least 55 years* in nine countries. It should be added that in some of them, a higher age range was related to a higher probability of information inconsistency, *ceteris paribus*. In France, the strength of the impact of the respondent's

age started to increase from the lowest range (up to 24 years), while in Belgium, Finland, and Spain within the two highest ranges. Moreover, the significance of being at least 55 was strengthened by the significance of *incomes derived from pensions*. Together these two characteristics signalled that the problem of increased information inconsistency could have affected senior households in 13 countries. The significance of the age of the responding person has not been confirmed in Estonia, Slovakia, and Slovenia. In Finland, 40% of households declaring risk aversion and having responding persons at least 55 years old had risky assets. In Belgium, Cyprus, and Malta, this ratio was around 20%. It is worth noting that not only the lower subjective risk tolerance of people nearing retirement and on retirement is emphasized in the literature, but also the lower level of their financial literacy and cognitive abilities, which make seniors more exposed to wrong investment choices and falling victim to financial frauds [87,88].

The marital status of the responding person proved to be significant in eight countries. We observed an increased tendency to provide inconsistent information among households of the married and in a consensual union, *ceteris paribus*, most of all in Belgium, Cyprus, and Slovakia, while this was the case for the divorced in Slovakia and the widowed in Slovenia. The reasons for the significance of being married or in a consensual union can be explained by the possible conflict in risk tolerance of couples, often resulting in separate portfolios or decisions made on the basis of the risk tolerance of one household member [66]. For instance, among Cypriot households of the married and in a consensual union declaring risk aversion, 27% participated in risky assets. The statistical significance of the divorced and the widowed for the occurrence of the phenomenon of information inconsistency in Slovakia and Slovenia could result from the possession of risky assets previously belonging to the common property [15]. In turn, the increased propensity of singles to provide inconsistent information could be inferred primarily for the population of Spain, but also of Austria, France, and Germany.

Our study also confirmed the relevance of *the gender of the responding person*, pointing to the increased tendency of males to provide inconsistent information in France, Ireland, Luxembourg and Malta, *ceteris paribus*. In the literature, this characteristic is widely documented as a determinant of both subjective risk tolerance and risk-taking, which indicates that the reason for the inconsistency of survey responses in the countries indicated could be the erroneous declarations of male respondents regarding the household's attitude towards risk.

The results of our study revealed the heterogeneity of the profiles of households susceptible to providing inconsistent information within selected countries. In Belgium, these were households with extremely different income status, both the richest (with incomes from the fifth quintile range) and the relatively poor (living on social transfers), while in Germany, France, and Luxembourg at a different stage of development, with responding persons assigned to the lowest and highest age ranges. In Austria, both of the above cases were identified.

Following the characteristics indicated in Table 1, we grouped the countries according to the degree of similarity of the profiles of households that provided inconsistent information. Based on the hierarchical classification method with Ward's formula with a Jaccard distance matrix determined (Table A5), this similarity could be confirmed within the following subsets of countries (Figure 3): Ireland and Portugal; Germany and Italy; Finland and Spain; Austria and Belgium; France and Malta. For each of the pairs indicated, it is, therefore, possible to assume a similar approach to the suitability assessment regarding the households analysed. It was also possible to cut the dendrogram at higher levels of aggregation and to obtain the following subsets of countries: Austria, Belgium, Germany, and Italy; Cyprus, Finland, France, Malta, and Spain; Estonia, Luxembourg, Slovakia, and Slovenia; Ireland, the Netherlands, and Portugal. However, the diversity of household profiles within each of the extended groups was found to be significantly larger. The distinct differences of risk-averse but risk-taking households concerned Slovakia, the Netherlands, Slovenia, and Cyprus. The above findings may prove useful for practitioners when providing investment products, advisory, and portfolio management services to retail clients in the euro area, primarily if operating cross-border.

Table 1. The sets of socio-demographics and socio-economics favouring the occurrence of inconsistency in the information provided by a household.

	<i>TGL_1Q</i>	<i>TGL_2Q</i>	<i>TGL_3Q</i>	<i>TGL_4Q</i>	<i>TGL_5Q</i>	<i>N_Adult (Small)</i>	<i>N_Adult (Large)</i>	<i>N_Child (Small)</i>	<i>N_Child (Large)</i>	<i>E_1L</i>	<i>E_2L1S</i>	<i>E_2L2S</i>	<i>E_3L</i>	<i>I_SEmpl</i>	<i>I_Pens</i>	<i>I_STrans</i>	<i>MS_S</i>	<i>MS_M&CU</i>	<i>MS_Wid</i>	<i>MS_Div</i>	<i>Gender</i>	<i>A<25</i>	<i>A_25-39</i>	<i>A_40-54</i>	<i>A_55+</i>
AT	*	*	*	*	*H								H												
BE	*	*	*	*	*H								H											*	*H
CY	*	*	*	*	*H																				H
DE	*	*	*	*	*H							*	*H												
EE				*	*H							*	*H												
ES	*	*	*	*	*H					*	*	*	*H											*	*H
FI	*	*	*	*	*H					*	*	*	*H											*	*H
FR	*	*	*	*	*H					*	*	*	*H									*	*	*	*H
IE			*	*	*H							*	*H												H
IT	*	*	*	*	*H							*	*H												
LU				*	*H								H												
MT	*	*	*	*	*H																				H
NL												*	*H												H
PT			*	*	*H					*	*	*	*H												H
SI	*	*	*	*	*H								H												
SK													H												

Notes: variables named as in Section 'Data and Methodology'; the shaded fields relate to the characteristics statistically significantly increasing the likelihood of providing inconsistent information; (*) signifies a gradual strengthening of influence of a characteristic; (H) marks the level of a characteristic at which the possession of risky assets is most likely.

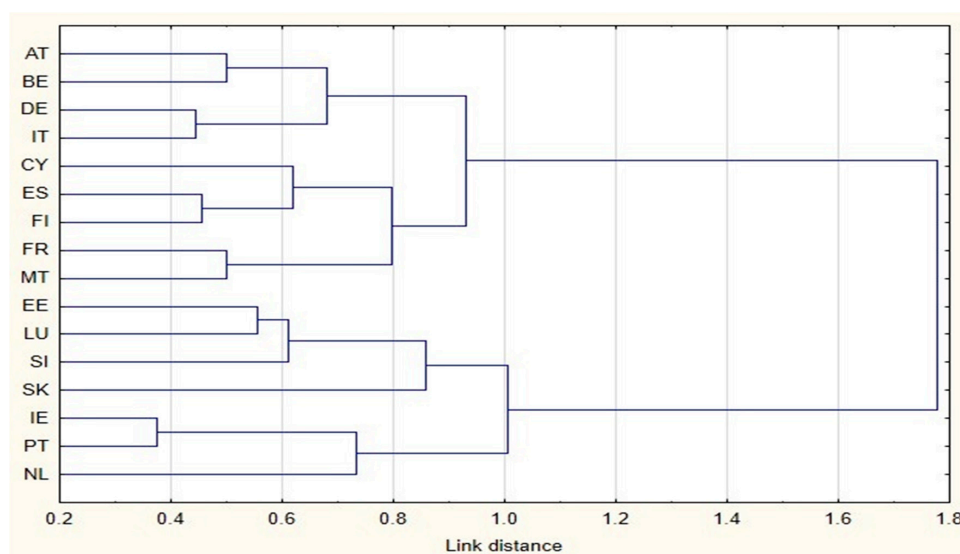


Figure 3. Hierarchical clustering dendrogram of 16 euro area countries with households risk-averse but risk-taking. Source: Created by the authors.

The heterogeneity of domestic profiles of households that provide inconsistent information may raise a question about its causes. It should be noted that the countries analysed vary in terms of vast institutional, structural, and macroeconomic features which shape risk tolerance and risk behaviour [48,89]. Thus, among the possible causes might be the differences in national pension systems, taxation, public wealth (including medical coverage and unemployment insurance), availability of financial products, as well as the differences in asset price dynamics. Additionally, a cause might be a diversity of populations in terms of socio-demographic and socio-economic features, related, among others, to wealth, income, age, and education.

5.2. Targeted Re-Examination of Household Survey Responses

Joining the results of regression modelling from stages 1–2 (Tables A3 and A4), we were able to indicate for individual countries the primary scopes of survey information to re-examination if provided by households of specific socio-demographics and socio-economics (Table 2). In the case of characteristics such as the level of household income, education, and age of the respondent, we focused primarily on their ranges, which in stages 1–2 were of the strongest impact, since in their case the cause of information inconsistency was most visible.

The problem of information inconsistency that might result from the inaccurate perception of own risk attitude concerned all countries, however, it referred to households with different characteristics. Due to the risk aversion declared, they can be considered potentially affected by the underestimation of own risk attitude. In some countries, such households were distinguished by the highest incomes, originating from self-employment, and male respondents with a tertiary level of education completed. It should be emphasised that all these characteristics are indicated in the existing subject literature as conducive to subjective risk tolerance, and therefore not constituting the attribute of risk-averse households. In Austria, Cyprus, and the Netherlands, the need to focus re-examination on the risk attitude was indicated by incomes classified into the highest. In Belgium, Germany, Italy, Slovenia, and Spain, in addition to the highest level of income, an important characteristic was also the tertiary education of respondents, while in Malta—male responding persons. In France and Luxembourg, apart from the highest level of income and tertiary education of the respondents, the representation of households by males was also important. In Ireland, the household profile consisting of all the above characteristics was complemented by the source of income from self-employment. In Portugal, in turn, potential difficulties with self-assessments of risk attitude were recognised among households achieving the highest incomes in the country, including those obtained from self-employment and represented by

persons with higher education. In Finland, the need to focus re-examination on risk attitudes signalled the highest income and its origin from self-employment. In the case of Slovakia, households with incomes from self-employment, and responding persons with tertiary education completed, *ceteris paribus*, were mainly perceived as unable to assess own attitudes towards financial risk.

Table 2. Variables indicating the scopes of information for re-examination.

	TGL_2Q	TGL_3Q	TGL_4Q	TGL_5Q	N_Adult	N_Child	E_2L1S	E_2L2S	E_3L	I_SEmpl	I_Pens	I_STrans	MS_S	MS_M&CU	MS_Wid	MS_Div	Gender	A_25-39	A_40-54	A_55+
AT				H																
BE				H																
CY				H																
DE				H					H											
EE				H																
ES				H					H											
FI				H			H													H
FR				H					H											H
IE				H					H											
IT				H					H											
LU				H					H											
MT				H																
NL				H																
PT				H					H											
SI				H																
SK																				

Notes: variables named as in the section 'Data and Methodology'; the fields shaded in grey mean that the discerned cause of information inconsistency is a false self-assessment of risk aversion; the fields shaded in black mean that the discerned cause of information inconsistency is inappropriate decisions about financial asset allocation; (H) signifies the level of a characteristic at which the cause of information inconsistency is the clearest.

Recognition of households whose self-assessed risk aversion raises objections, in practice, gives grounds for focusing the re-examination on the declared attitude. In the case of false declarations, such households can be considered risk-tolerant and offered financial assets from classes other than safe. It is noteworthy that the identification of households potentially affected by underestimation of own risk attitude reveals the imprecision of the single question method as well, i.e., its limitations if applied to households of the indicated characteristics.

The need for re-examination primarily targeted to the adequacy of risky assets holdings, with an assessment of households' knowledge about characteristics of and risks related to financial assets and their investment experience, was recognised in 11 countries. It refers to households that could be potentially affected by overexposure to financial risk. In their case, the most recurring characteristics in the euro area were the responding person's age from the highest range and income from pensions, signalling that the problem of inadequacy of assets could be related to senior households (Table 2). The significance of the first characteristic was confirmed in Cyprus, Finland, France, Ireland, the Netherlands, and Portugal, while the second—in Austria and Italy. As already explained, current literature addresses the problem of misallocation of assets among seniors, indicating as its cause the deficit of financial literacy and cognitive abilities [87,88]. The characteristics we recognise are reflected in the results of the study by Marinelli, Mazzoli and Palmucci [12], which confirms the positive effect of age on the occurrence of the gap between subjective and objective risk tolerance due to the overexposure to financial risks. Our findings are partly in line with the research results of Chang, De Vaney and Chiremba [15], which also signal the positive effect of age on objective risk tolerance. It should be added that the profile of Austrian households was supplemented with incomes derived from social transfers, while those of Finnish with a set of characteristics related to the respondents' secondary level of education (most of all the upper one), as well as a large number of adult members of a household. The significance of the last feature is signaled in the EU regulations [10] and previous studies, indicating the difficulties in

choosing the assets adequate to risk tolerance of all adult members of a large household [9,66]. In Spain, an incorrect selection of assets was signalled concerning the households represented by people aged from 40 to 54. Its intensification at this stage of life could result from the increased investment activities, described in the existing theory and empirical findings [90,91]. In Slovakia, in turn, the characteristic indicating the need to focus re-examination on the issue of asset selection was the divorced status of a responding person, *ceteris paribus*. This can be explained by the findings of Chang, DeVaney and Chiremba [15] showing that divorced singles may participate in assets that reflect their previous status as part of a couple.

Referring the results to the sphere of practice, one can conclude that the recognised inadequacy of participation in risky assets provides the basis for offering retail clients the asset switching or rebalancing portfolios under management by professionals.

6. Conclusions

The study allowed us to recognise the risk-averse but risk-taking households in 16 euro area countries. Particular socio-demographics and socio-economics distinguished them from consistent households, i.e., risk-averse and risk-free. Some of these characteristics were found statistically significant within larger groups of countries, causing the problem of information inconsistency to partly take an international dimension. It should be emphasised, however, that in every country, the profile of households analysed was complemented by characteristics of significance shaped at the domestic level.

The results of our study can be considered important for the sustainable development of financial institutions providing to retail clients the investment products, and advisory and portfolio management services under the new regulatory environment of MiFID II and MiFIR. They can be useful, among others, for entities operating cross-border, since we recognise the similarities in the profiles of households providing inconsistent information within the subsets of countries. Heterogeneity of the profiles of risk-averse but risk-taking households across the euro area indicates the need for shaping the consumer protection regulations to some extent at the domestic level, to take into account the specificities of particular populations.

Our study has identified certain socio-demographics and socio-economics that predispose households to declare untrue risk aversion or make wrong asset allocation decisions at the country level. Therefore, the results gave the basis to propose the orientation of re-examination towards particular scopes of survey information. The identification of household profiles having difficulties with self-assessment of risk attitude based on the single question self-classification indicates the limitations of this method. We identified the type of households regarding which its results should be applied with utmost caution in each country. In turn, the possible inadequacy of having risky assets was signalled in 11 countries, and related, among others, to senior households. In every country, the profile of households covered by targeted re-examination was supplemented by characteristics of domestic importance. This leads to conclusions that the approach to targeted re-examination should be individualised within the countries.

The presented research has two limitations that should be kept in mind when interpreting the results. Analysing the problem of information inconsistency, we rely on the fact that households participate in risky assets instead of on their amounts. This is due to the limited availability of appropriate data for households in selected countries. However, since we focus solely on risk-averse respondents, i.e., the most conservative ones regarding their risk attitude, we can expect them to be risk-free. The second limitation has to do with the factors omitted by us, which are also presented in the literature as determinants of households' risk attitudes and risk behaviour, such as psychological traits. This also stems from their unavailability in the database. Moreover, we were primarily interested in applying the households' characteristics which are readily available for practitioners and thus could facilitate the identification of potential providers of inconsistent information. It is worth noting that there is no alternative database to the HFCS, which would allow us to take up the discussed issue for such a large group of euro area countries.

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Appendix A

Table A1. Summary statistics for independent variables—stage 1 of the study.

Variable	Country							
	AT	BE	CY	DE	EE	ES	FI	FR
	%							
<i>Educ_1L</i>	0.45	9.55	24.15	1.62	2.60	38.28	1.68	16.37
<i>Educ_2L1S</i>	14.07	16.96	7.31	9.56	13.90	15.44	25.13	13.58
<i>Educ_2L2S</i>	65.02	33.33	42.62	57.79	49.51	17.61	39.99	41.23
<i>Educ_3L</i>	20.46	40.16	25.93	31.03	33.99	28.66	33.19	28.82
<i>I_Empl</i>	57.76	57.49	65.29	63.39	68.97	62.16	66.15	60.24
<i>I_SEmpl</i>	13.23	9.57	16.41	12.72	4.89	14.87	14.65	7.93
<i>I_Pens</i>	46.24	36.40	32.28	36.65	51.41	39.61	43.80	41.87
<i>I_STrans</i>	30.02	41.04	30.47	38.33	34.20	25.53	55.29	47.61
<i>MS_S</i>	22.08	18.43	13.83	26.93	29.26	14.13	37.74	29.93
<i>MS_M&CU</i>	50.13	52.35	64.11	47.99	38.28	62.42	36.87	45.32
<i>MS_Wid</i>	12.04	14.77	11.17	10.84	16.80	14.80	9.44	12.38
<i>MS_Div</i>	15.75	14.45	10.90	14.23	15.65	8.65	15.94	12.38
<i>Gender (Men)</i>	63.32	62.11	58.27	64.04	50.43	68.72	56.86	58.72
<i>A < 25</i>	3.37	0.64	0.10	4.02	3.67	0.35	6.07	3.75
<i>A_25–39</i>	19.42	22.02	26.02	21.81	24.57	22.49	22.98	21.57
<i>A_40–54</i>	28.04	28.64	34.44	28.98	27.35	32.00	25.21	27.62
<i>A_55+</i>	49.17	48.70	39.44	45.20	44.42	45.16	45.74	47.07
	Averages							
<i>TGI</i>	43,667.93	51,744.16	30,312.60	48,205.63	17,027.73	31,866.33	50,015.19	37,552.46
<i>N_Adult</i>	1.72	1.71	1.95	1.64	1.74	2.02	1.58	1.65
<i>N_Child</i>	0.42	0.62	0.81	0.38	0.51	0.61	0.46	0.57
	IE	IT	LU	MT	NL	PT	SK	SI
	%							
<i>Educ_1L</i>	14.07	23.23	20.50	22.16	3.24	53.03	1.12	4.95
<i>Educ_2L1S</i>	17.28	28.87	9.48	33.55	24.82	16.47	11.42	17.23
<i>Educ_2L2S</i>	34.68	34.47	38.36	26.67	36.00	13.54	67.96	56.30
<i>Educ_3L</i>	33.97	13.43	31.66	17.62	35.94	16.96	19.50	21.52
<i>I_Empl</i>	63.73	54.20	71.61	62.27	65.25	60.86	64.44	57.23
<i>I_SEmpl</i>	18.68	15.88	8.14	17.29	14.86	15.93	17.65	10.83
<i>I_Pens</i>	33.18	47.62	34.58	43.39	36.28	46.77	48.80	52.63
<i>I_STrans</i>	59.67	5.57	36.10	40.57	59.97	27.46	40.59	28.81
<i>MS_S</i>	27.90	17.24	27.17	16.32	34.08	14.98	12.02	17.34
<i>MS_M&CU</i>	54.60	56.34	49.57	64.27	46.66	60.33	59.22	59.01
<i>MS_Wid</i>	8.59	16.83	9.61	11.68	7.77	15.36	15.95	17.62
<i>MS_Div</i>	8.91	9.59	13.64	7.73	11.49	9.33	12.81	6.04
<i>Gender (Men)</i>	58.80	64.63	67.12	72.69	61.84	59.44	64.08	56.47
<i>Age < 25</i>	1.99	0.51	1.79	1.18	0.60	0.74	0.62	1.21
<i>A_25–39</i>	29.71	14.49	26.20	21.20	24.48	20.97	20.89	17.82
<i>A_40–54</i>	31.02	31.83	32.98	28.55	29.20	30.51	33.02	29.26
<i>A_55+</i>	37.28	53.17	39.03	49.07	45.72	47.78	45.48	51.71
	Averages							
<i>TGI</i>	54,644.09	33,373.89	86,778.41	27,670.56	50,430.71	21,555.82	15,297.52	19,858.43
<i>N_Adult</i>	1.88	1.91	1.78	2.01	1.64	2.00	2.10	1.91
<i>N_Child</i>	0.84	0.55	0.63	0.60	0.55	0.61	0.71	0.61

Notes: *TGI*—total gross income of a household. Source: The authors' own calculations.

Table A2. Summary statistics for independent variables—stage 2 of the study.

Variable	Country							
	AT	BE	CY	DE	EE	ES	FI	FR
%								
<i>Educ_1L</i>	0.73	11.96	26.56	2.22	3.22	40.88	1.42	18.25
<i>Educ_2L1S</i>	18.77	19.53	8.12	12.03	15.52	15.55	30.15	14.38
<i>Educ_2L2S</i>	64.24	35.34	42.24	60.78	50.82	17.59	41.30	41.96
<i>Educ_3L</i>	16.26	33.18	23.08	24.97	30.44	25.99	27.13	25.40
<i>I_Empl</i>	48.63	53.47	63.72	58.57	61.83	60.92	60.26	57.87
<i>I_SEmpl</i>	10.57	7.05	16.15	9.46	4.07	13.57	13.50	7.18
<i>I_Pens</i>	58.21	39.11	32.30	42.68	60.20	41.22	49.47	44.93
<i>I_STrans</i>	29.05	41.65	30.36	37.94	30.18	26.06	54.84	47.59
<i>MS_S</i>	19.50	18.14	13.57	21.93	23.18	13.86	34.80	28.81
<i>MS_M&CU</i>	45.96	48.59	63.55	49.16	38.86	61.61	36.07	44.47
<i>MS_Wid</i>	16.58	16.83	11.81	13.43	20.82	15.68	11.33	13.78
<i>MS_Div</i>	17.95	16.43	11.07	15.48	17.14	8.85	17.80	12.93
<i>Gender (Men)</i>	57.21	58.35	57.05	60.57	46.04	67.79	52.93	57.16
<i>A < 25</i>	2.68	0.62	0.08	3.40	2.52	0.36	5.67	3.28
<i>A_25–39</i>	13.55	20.41	24.05	18.46	17.13	22.34	19.32	20.01
<i>A_40–54</i>	24.43	27.24	35.06	27.27	26.62	31.07	23.64	26.94
<i>A_55+</i>	59.34	51.73	40.80	50.86	53.73	46.23	51.37	49.77
Averages								
<i>TGI</i>	38,586.49	46,238.90	28,813.69	40,705.45	13,903.49	29,127.54	43,700.65	35,172.24
<i>N_Adult</i>	1.67	1.66	1.97	1.64	1.72	2.02	1.56	1.64
<i>N_Child</i>	0.34	0.58	0.78	0.35	0.42	0.59	0.44	0.55
%								
	IE	IT	LU	MT	NL	PT	SK	SI
%								
<i>Educ_1L</i>	16.72	30.05	25.00	28.58	3.99	55.30	1.26	6.37
<i>Educ_2L1S</i>	19.71	31.35	11.26	38.04	29.74	16.43	13.22	18.80
<i>Educ_2L2S</i>	36.27	29.42	40.11	23.78	37.62	13.21	69.31	56.37
<i>Educ_3L</i>	27.30	9.18	23.64	9.60	28.66	15.07	16.21	18.46
<i>I_Empl</i>	60.18	50.44	69.11	54.33	59.74	59.55	60.05	50.49
<i>I_SEmpl</i>	16.56	13.11	7.29	15.14	13.08	15.04	15.31	8.73
<i>I_Pens</i>	37.00	53.20	38.37	49.47	41.67	48.40	52.67	57.99
<i>I_STrans</i>	60.47	5.43	35.08	40.98	64.05	27.62	39.95	26.93
<i>MS_S</i>	26.29	15.86	26.26	16.99	31.39	14.65	11.09	17.22
<i>MS_M&CU</i>	53.63	52.93	48.36	61.04	46.22	59.65	57.12	55.69
<i>MS_Wid</i>	10.20	21.39	11.74	14.85	9.30	16.26	18.41	20.46
<i>MS_Div</i>	9.87	9.82	13.63	7.12	13.09	9.44	13.39	6.63
<i>Gender (Men)</i>	56.72	60.16	63.73	70.17	56.79	58.29	62.74	55.54
<i>Age < 25</i>	1.92	0.33	1.61	0.90	0.48	0.65	0.58	1.15
<i>A_25–39</i>	27.03	13.32	24.584	16.42	22.81	20.00	19.15	14.71
<i>A_40–54</i>	30.05	29.17	32.29	27.99	25.85	30.29	30.22	26.93
<i>A_55+</i>	41.01	57.17	41.51	54.70	50.86	49.05	50.05	57.20
Averages								
<i>TGI</i>	47,497.86	28,000.76	74,750.70	23,057.74	45,665.12	20,306.43	13,651.80	17,238.21
<i>N_Adult</i>	1.87	1.88	1.79	2.02	1.62	1.99	2.08	1.84
<i>N_Child</i>	0.83	0.50	0.63	0.58	0.52	0.60	0.66	0.53

Notes: TGI—total gross income of a household. Source: The authors' own calculations.

Table A3. Parameter estimates of logit regression model for individual countries—stage 1 of the study (dependent variable—*R_averse*).

Variable	Country							
	AT	BE	CY	DE	EE	ES	FI	FR
Intersept	-0.3877	2.4914	2.1675	x	0.7342	2.2638	x	1.8870
TGI_2Q	-0.3446	-0.7959	x	x	x	x	-0.3999	0.2735
TGI_3Q	-0.4560	-0.6618	-0.6920	-0.3728	x	-0.2974	-0.8151	x
TGI_4Q	-0.6921	-1.0336	-0.9770	-0.7834	-0.3266	-0.7114	-1.1198	-0.3883
TGI_5Q	-1.0198	-1.4327	-1.3664	-1.4857	-0.8618	-1.3342	-1.7248	-1.1126
I_Empl	0.3395	x	0.5423	x	-0.6589	0.2336	x	x
I_SEmpl	x	-0.5089	x	-0.3252	x	-0.3161	-0.2416	-0.1610
I_Pens	0.9159	x	x	x	x	0.3374	x	0.1813
I_STrans	0.2570	0.2541	x	x	x	0.3458	x	0.1478
N_Adult	x	0.2215	0.2586	0.3262	0.1641 ¹	0.1088 ¹	0.4224	0.1378
N_Child	x	x	x	x	-0.1042	x	0.1418	x
Educ_2L1S	x	x	x	x	x	-0.4600	0.7830	-0.5404
Educ_2L2S	-0.5065	-0.5658	-0.4456 ¹	-0.3765	x	-0.5827	0.4837	-0.7697
Educ_3L	-0.7817	-1.2253	-0.6478	-0.8554	-0.5668	-0.9550	x	-1.3481
MS_M&CU	x	x	x	0.4449	0.3745	0.2052 ¹	0.1774	x
MS_Wid	x	x	x	0.8045	0.6244 ¹	0.2817	0.4747	0.2374 ¹
MS_Div	x	0.4765	x	0.3120	0.3697 ¹	0.3047	0.3004	0.1695 ¹
A_25-39	x	x	-0.6104	0.6830	0.4951 ¹	x	0.4893	0.7789
A_40-54	0.5051	x	x	0.9226	1.0441	0.1792	0.8038	0.9539
A_55+	0.7623	x	0.3946	0.9317	1.5788	x	1.0467	0.9281
Gender	-0.3734	-0.4809	-0.3923	-0.3056	-0.3271	-0.3091	-0.3835	-0.3796
Variable	IE	IT	LU	MT	NL	PT	SK	SI
Intersept	1.7464	0.8925	1.8688	0.7887	1.2701	2.4058	1.2537	2.1290
TGI_2Q	x	-0.1740	x	-0.8383	x	x	x	x
TGI_3Q	-0.2248	-0.3031	x	-1.4938	-0.7478	-0.4115	-0.5512	x
TGI_4Q	-0.4880	-0.5108	-0.3961	-1.7184	-0.7559	-0.6519	-0.7229	-0.2943
TGI_5Q	-1.1262	-0.8242	-0.9015	-2.2892	-1.0579	-1.2766	-0.9495	-0.6702
I_Empl	x	0.3177	x	x	x	x	-0.5400	x
I_SEmpl	-0.4970	x	x	x	-0.3231 ¹	-0.3654	-0.6828	-0.3110
I_Pens	0.2865	0.3598	x	x	0.3422 ¹	0.2711	x	0.4594
I_STrans	0.2676	x	x	x	0.5545	x	x	x
N_Adult	0.1725	x	0.3212	0.5159	0.2856	x	0.3324	-0.1839
N_Child	0.0825	x	x	x	x	x	x	x
Educ_2L1S	x	-0.2875	x	x	x	-0.3630	x	-1.0209
Educ_2L2S	-0.5915	-0.6747	-0.7023	x	-0.4413 ¹	-0.6031	x	-1.0938
Educ_3L	-1.1660	-1.0291	-1.3963	-0.5924	-0.9318	-1.0890	-0.6961	-1.4455
MS_M&CU	0.2698	0.1392 ¹	x	x	x	x	x	0.2448
MS_Wid	0.4941	0.2975	0.8207	0.5936	x	x	0.7187	x
MS_Div	0.3745	x	x	x	x	x	0.4564	0.4881 ¹
A_25-39	x	x	x	x	x	1.3261	x	x
A_40-54	x	x	x	0.3218	x	1.4023	0.3101 ¹	0.2549
A_55+	0.2111 ¹	x	x	x	0.5185	1.4387	0.5990	0.3776
Gender	-0.4258	-0.3195	-0.5649	-0.2990 ¹	-0.5671	-0.4736	x	x

Notes: ¹ denotes significance at the level of 0.051–0.1. Source: The authors' own calculations.

Table A4. Parameter estimates of logit regression model for individual countries—stage 2 of the study (dependent variable—*R_assets*).

Variable	Country							
	AT	BE	CY	DE	EE	ES	FI	FR
Intersept	-2.9169	-3.2795	-2.9992	-2.9960	-5.2245	-3.3758	-3.0878	-4.0022
TGI_2Q	0.9944	0.8798	0.7549	0.5289 ²	x ¹	0.7434	0.3519	0.6494
TGI_3Q	1.2824	1.0478	0.9141	0.8301	x	1.1636	0.6816	1.0600
TGI_4Q	1.9035	1.6981	1.1937	1.3629	0.7711	1.5707	1.0786	1.6487
TGI_5Q	2.6461	1.9135	1.6131	2.1006	1.3479	2.5583	1.4407	2.5852
I_Empl	x	x	-0.7856	-0.4274	x	-0.7550	x	x
I_SEmpl	x	x	x	x	0.7771	x	0.4949	x
I_Pens	0.6247	0.6639	x	x	x	x	0.2125	x
I_STrans	0.5615	0.3252 ²	x	x	-0.6062	-0.2161 ²	-0.2345	-0.2122

Table A4. Cont.

Variable	Country							
	AT	BE	CY	DE	EE	ES	FI	FR
<i>N_Adult</i>	−0.5260	−0.4661	x	−0.3553	x	−0.2092	0.2709	−0.2426
<i>N_Child</i>	x	0.2007	x	x	0.3269	x	x	−0.0685 ²
<i>Educ_2L1S</i>	−1.1546	x	x	x	Ref.	0.5063	1.0341	0.4797
<i>Educ_2L2S</i>	−0.4529	x	x	1.2456	1.7242	0.9907	1.0667	0.4904
<i>Educ_3L</i>	x	0.2658 ²	x	1.5354	2.2438	1.4262	1.3098	0.9037
<i>MS_M&CU</i>	x	0.3549 ²	0.6441	x	x	−0.2927	x	x
<i>MS_Wid</i>	−0.8086	x	x	x	x	−0.3965	x	x
<i>MS_Div</i>	x	−0.5303	x	−0.5201	x	−0.5799	x	−0.2132
<i>A_25–39</i>	x	Ref. ³	Ref.	−0.6298	Ref.	Ref.	x	0.7376 ²
<i>A_40–54</i>	−0.5360	0.8249	0.9631	x	x	0.6700	0.1555	0.9644
<i>A_55+</i>	x	1.0623	0.9150	x	x	1.5214	0.4858	1.0043
<i>Gender</i>	x	x	x	x	x	x	x	0.2234
Variable	IE	IT	LU	MT	NL	PT	SK	SI
Intersept	−3.6318	−4.6027	−2.9229	−2.6711	−3.2135	−4.0706	−4.1166	−3.3556
<i>TGI_2Q</i>	x	1.4840	x	1.6362	x	x	x	0.7546
<i>TGI_3Q</i>	0.5968	2.2040	x	2.2453	x	0.8005	x	1.5385
<i>TGI_4Q</i>	1.1490	3.3642	0.6570	2.9769	x	1.0847	x	1.2610
<i>TGI_5Q</i>	2.0575	4.1353	1.3133	3.7597	x	1.6707	x	1.8135
<i>I_Empl</i>	−0.3107 ²	−0.2860	x	−0.6770	x	−0.2445 ²	x	−0.4239
<i>I_SEmpl</i>	0.2738	x	0.4902	x	x	0.3156	1.9934	x
<i>I_Pens</i>	x	0.6000	x	x	x	x	x	x
<i>I_STrans</i>	−0.3788	x	−0.3956	x	−9.4554	−0.4911	x	x
<i>N_Adult</i>	x	−0.4624	−0.2648	−0.6790	x	x	x	x
<i>N_Child</i>	x	x	x	−0.3736	x	x	−0.3973	x
<i>Educ_2L1S</i>	x	x	1.6494	x	x	0.3946	Ref.	x
<i>Educ_2L2S</i>	0.7182	0.2496	1.4188	x	0.9023	0.8009	x	x
<i>Educ_3L</i>	1.1823	0.4761	1.9743	x	0.9813	0.9462	0.7876	0.8182
<i>MS_M&CU</i>	x	x	x	x	x	x	0.8786	x
<i>MS_Wid</i>	x	x	x	x	x	x	x	0.5472
<i>MS_Div</i>	x	x	x	x	x	x	0.8492	x
<i>A_25–39</i>	−0.6582	x	−1.6315	x	Ref.	x	x	Ref.
<i>A_40–54</i>	x	x	−0.7804	x	x	x	x	x
<i>A_55+</i>	0.4274	x	x	0.7599	0.9615	0.4544	x	x
<i>Gender</i>	0.4155	x	0.4273	0.6578	x	x	x	x

Notes: ¹ denotes significance at level 0.011–0.05; ² denotes significance at the level of 0.051–0.1; ³ Reference variable, lack of observations in the HFCS database for a lower range of a feature. Source: The authors' own calculations.

Table A5. Jaccard distance matrix.

	AT	BE	CY	DE	EE	ES	FI	FR	IE	IT	LU	MT	NL	PT	SI	SK
AT	0.00	0.50	0.70	0.55	0.92	0.67	0.79	0.67	0.93	0.60	0.85	0.73	1.00	0.92	0.91	0.82
BE	0.50	0.00	0.50	0.62	0.77	0.50	0.54	0.63	0.79	0.55	0.79	0.67	0.86	0.78	0.87	0.89
CY	0.70	0.50	0.00	0.70	0.90	0.56	0.60	0.69	0.80	0.78	0.91	0.62	0.86	0.78	0.87	0.89
DE	0.55	0.62	0.70	0.00	0.73	0.55	0.79	0.46	0.75	0.44	0.75	0.73	0.78	0.83	0.67	0.82
EE	0.92	0.77	0.90	0.73	0.00	0.83	0.75	0.88	0.56	0.67	0.56	0.91	0.71	0.67	0.57	0.62
ES	0.67	0.50	0.56	0.55	0.83	0.00	0.45	0.46	0.75	0.60	0.64	0.60	0.78	0.60	0.80	0.92
FI	0.79	0.54	0.60	0.79	0.75	0.45	0.00	0.69	0.67	0.64	0.67	0.75	0.80	0.50	0.82	0.83
FR	0.67	0.63	0.69	0.46	0.88	0.46	0.69	0.00	0.73	0.71	0.64	0.50	0.85	0.71	0.77	0.87
IE	0.93	0.79	0.80	0.75	0.56	0.75	0.67	0.73	0.00	0.70	0.60	0.70	0.57	0.38	0.78	0.80
IT	0.60	0.55	0.78	0.44	0.67	0.60	0.64	0.71	0.70	0.00	0.70	0.67	0.71	0.80	0.75	0.90
LU	0.85	0.79	0.91	0.75	0.56	0.64	0.67	0.64	0.60	0.70	0.00	0.70	0.89	0.56	0.63	0.80
MT	0.73	0.67	0.62	0.73	0.91	0.60	0.75	0.50	0.70	0.67	0.70	0.00	0.87	0.80	0.89	1.00
NL	1.00	0.86	0.86	0.78	0.71	0.78	0.80	0.85	0.57	0.71	0.89	0.87	0.00	0.71	0.83	0.86
PT	0.92	0.78	0.78	0.83	0.67	0.60	0.50	0.71	0.38	0.80	0.56	0.80	0.71	0.00	0.75	0.78
SI	0.91	0.87	0.87	0.67	0.57	0.80	0.82	0.77	0.78	0.75	0.63	0.89	0.83	0.75	0.00	0.87
SK	0.82	0.89	0.89	0.82	0.62	0.92	0.83	0.87	0.80	0.90	0.80	1.00	0.86	0.78	0.87	0.00

Source: The authors' own calculations.

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