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Risky assets in Europe and the US: Risk vulnerability, risk aversion and economic environment

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Risky assets in Europe and the US:
risk vulnerability, risk aversion and
economic environment



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Household Finance and Consumption Network (HFCN)

This paper contains research conducted within the Household Finance and Consumption Network (HFCN). The HFCN consists of survey specialists, statisticians and economists from the ECB, the national central banks of the Eurosystem and a number of national statistical institutes.

The HFCN is chaired by Ioannis Ganoulis (ECB) and Oreste Tristani (ECB). Michael Haliassos (Goethe University Frankfurt), Tullio Jappelli (University of Naples Federico II) and Arthur Kennickell act as external consultants, and Juha Honkkila (ECB) and Jiri Slacalek (ECB) as Secretaries.

The HFCN collects household-level data on households' finances and consumption in the euro area through a harmonised survey. The HFCN aims at studying in depth the micro-level structural information on euro area households' assets and liabilities. The objectives of the network are:

- 1) understanding economic behaviour of individual households, developments in aggregate variables and the interactions between the two;
- 2) evaluating the impact of shocks, policies and institutional changes on household portfolios and other variables;
- 3) understanding the implications of heterogeneity for aggregate variables;
- 4) estimating choices of different households and their reaction to economic shocks;
- 5) building and calibrating realistic economic models incorporating heterogeneous agents;
- 6) gaining insights into issues such as monetary policy transmission and financial stability.

The refereeing process of this paper has been co-ordinated by a team composed of Pirmin Fessler (Oesterreichische Nationalbank), Michael Haliassos (Goethe University Frankfurt), Tullio Jappelli (University of Naples Federico II), Juha Honkkila (ECB), Jiri Slacalek (ECB), Federica Teppa (De Nederlandsche Bank) and Philip Vermeulen (ECB).

The paper is released in order to make the results of HFCN research generally available, in preliminary form, to encourage comments and suggestions prior to final publication. The views expressed in the paper are the author's own and do not necessarily reflect those of the ESCB.

Abstract

We use cross-country microdata to analyse the risk taking of households in Europe and the US. Concerning the extensive as well as the intensive margin of risky assets, European households differ substantially from US households; but also inside Europe we document substantial differences. Furthermore, average risk aversion is strongly correlated with the share of households holding risky assets across countries. We decompose the observed differences into two parts. A part explainable by household characteristics as well as differences in risk aversion and a remainder. We employ the unexplained part resulting from our microeconomic decomposition analysis together with country-level variables on the economic environment to relate observed differences in risky asset holdings to institutional ones. We find that institutional differences such as shareholder protection are strongly correlated with the unexplainable differences with regard to holdings of risky assets.

JEL Classifications: D12, D14, D31, G11

Key Words: household finance, portfolio choice, background risk, HFCS, SCF

Non-technical summary

The relatively large differences between the returns of risky and safe assets, known as the “equity premium puzzle” have preoccupied economists for many decades. The “puzzle” consists of the - through the participation rates - implied unrealistically large level of risk aversion among households. Various potential explanations such as transaction costs implying that not everybody is active in financial markets, a negative or mean-zero background risk which also might explain non-participation or the higher tail risks in financial markets and potential total losses have been put forward. Yet other potential candidates are a premium for bearing non-diversifiable risk, borrowing constraints, liquidity premia, taxes and regulation. Although previously predicted to diminish, the low fraction of households holding risky assets remained rather stable also in recent decades.

This paper contributes to the literature of household finance by providing a cross country analysis of the role of individual characteristics, risk aversion and economic environment with regard to ownership and holdings of risky assets. The novel features of our paper are the following: First, we include the full household population. Second, we include 20 European countries, including the whole euro area, and the US. Third, on top of the full set of socioeconomic characteristics we are also able to include a subjective measure of risk aversion based on a harmonized survey question across all countries. That allows us to additionally assess the role of risk aversion. Fourth, we create counterfactual distributions for the US and the euro area in order to decompose how much of the differences in the ownership of risky assets across the full distribution of net wealth is due to individual characteristics and risk aversion and how much is left for other explanatory factors such as the economic environment. Fifth, we use the cross country variation of 17 countries to examine how unexplained parts of observed differences are correlated with the economic environment and institutions.

We find that the share of households holding risky assets is generally rising with net wealth in both, the euro area and the United States. However, in the United States the share of households with risky assets is higher for households with the lowest, i.e. negative, net wealth levels than for those with zero net wealth. This is not the case in the euro area, where households generally hold lower levels of debt. The rise in the share of risky asset holders is also much steeper in the United States. The share of risky assets in total financial wealth conditional on owning is in the United States almost constant at about 40% and rises up to 60% within the top 20% of net wealth, whereas in the euro area it lies between 30% and 40% across the net wealth distribution. Households show much higher risk aversion in the euro area than in the United States. Mean observed risk aversion across countries is a strong predictor for the share of households holding risky assets. Risk aversion is decreasing with net wealth, but this relationship is much stronger in the United States compared to the euro area. If one controls for background risks by filtering out socioeconomic characteristics of households the relationship almost vanishes in the euro area but not in the United States. Counterfactual analyses show that household characteristics explain

a sizeable amount of the differences between the euro area and the United States with regard to ownership of risky assets. This means that risk vulnerability and risk aversion explain a fair amount of the differences between the euro area and the US with regard to ownership of risky assets. However, they explain hardly anything with regard to the differences in the share of risky assets in financial wealth (i.e. the intensive margin) for those holding risky assets. Using the cross country variation of the unexplained differences between European countries and the United States to correlate it with indicators of economic environment point towards the importance of institutions and the economic environment such as the degree of financial intermediation.

1 Introduction

The relatively large differences between the returns of risky and safe assets, known as the “equity premium puzzle” (Mehra and Prescott, 1985) have preoccupied economists for many decades. The “puzzle” consists of the - through the participation rates - implied unrealistically large level of risk aversion among households. Mankiw and Zeldes (1991) explain this by the mere fact that due to transaction costs not everybody is active in financial markets and stockholders have different risk aversion than non-stockholders. A negative or mean-zero background risk also might explain non-participation (Gollier and Pratt, 1996). Others explain the large difference in returns by the higher tail risks in financial markets and potential total losses. Yet other potential candidates are a premium for bearing non-diversifiable risk, borrowing constraints, liquidity premia, taxes and regulation. Some also predict that as households learn, the equity premium puzzle will diminish over time (Mehra and Prescott, 2003). However, the low fraction of households holding risky assets remained rather stable also in recent decades (Bertaut and Star-McCluer, 2001).

This paper contributes to the literature of household finance by providing a cross country analysis of the role of individual characteristics, risk aversion and economic environment with regard to ownership and holdings of risky assets. We follow Christelis et al. (2013) in using counterfactual methods to document these international differences. The novel features of our paper are the following: First, while the data used by Christelis et al. (2013) only covered households including members aged 50 or more, we include the full household population. Second, we include 20 European countries, including the whole euro area, and the US. Third, on top of the full set of socioeconomic characteristics we are also able to include a subjective measure of risk aversion based on a harmonized survey question across all countries. That allows us to additionally assess the role of risk aversion with regard to differences in the ownership and holdings of risky assets. Fourth, we are able to create counterfactual distributions for the US and the euro area in order to decompose how much of the differences in the ownership of risky assets across the full distribution of net wealth is due to individual characteristics and risk aversion and how much is left for other explanatory factors such as the economic environment. Fifth, we use the cross country variation of 17 countries to examine how unexplained parts of observed differences are correlated with the economic environment and institutions.

We find that the share of households holding risky assets is generally rising with net wealth in both, the euro area and the United States. However, in the United States the share of households with risky assets is higher for households with the lowest, i.e. negative, net wealth levels than for those with zero net wealth. This is not the case in the euro area, where households generally hold lower levels of debt. The rise in the share of risky asset holders is also much steeper in the United States, where above median net wealth more than 50% of households hold risky assets reaching more than 80% at the 80th net wealth percentile. In the euro area the share of households with risky assets is only 10% at median net wealth and just below 30% at the 80th percentile. While the share of households holding risky assets is rising with net wealth, this is not true for the

share of risky assets in the financial wealth of households who hold risky assets. In the United States this share is almost constant at about 40% and rises up to 60% within the top 20% of net wealth, whereas in the euro area it lies between 30% and 40% across the net wealth distribution and is only rising slowly from the middle of the distribution onwards.

Households show much higher risk aversion in the euro area than in the United States. Whereas in the euro area more than 70% say, that they are not willing to take any financial risks, this number is below 40% for the United States. This result is rather robust also for individual European countries compared to the United States. Mean observed risk aversion across countries is a strong predictor for the share of households holding risky assets. Risk aversion is decreasing with net wealth, but this relationship is much stronger in the United States compared to the euro area. If one controls for background risks by filtering out socioeconomic characteristics of households the relationship almost vanishes in the euro area but not in the United States.

Counterfactual analyses show that household characteristics explain a sizeable amount of the differences between the euro area and the United States with regard to ownership of risky assets. However, they explain hardly anything with regard to the differences in the share of risky assets in financial wealth for those holding risky assets.

Using the cross country variation of the unexplained differences between European countries and the United States to correlate it with indicators of economic environment leads to similar results as already shown by [Christelis et al. \(2013\)](#) for the elderly; the significant results point towards the importance of institutions and the economic environment.

The literature on household finance has been growing steadily in recent years. [Badarinza et al. \(2016\)](#) give an excellent review of the subfield of international comparative household finance. They discuss data issues, which are one reason for the still rather limited size of the literature and they sum up the most important findings on retirement savings, unsecured debt, mortgages and investment in risky assets. [Guiso et al. \(2002\)](#) were among the first to discuss similarities and differences in household portfolios for the United States and selected European countries. They also documented the considerable deviations of household portfolio choice from the predictions of theory, particularly with regard to the non-participation in risky asset markets. There is some empirical literature trying to identify the determinants of non-participation. Besides genetic factors ([Barnea et al., 2010](#)), financial literacy ([van Rooij et al., 2011](#)), trust ([Guiso et al., 2008](#)), past experiences ([Malmendier and Nagel, 2011](#)), neighbourhood effects through information ([Kaustia and Knüpfer, 2012](#)), and the role of risk aversion itself has been discussed as potential factor shaping risky asset participation. Risk aversion is particularly important as it mediates the potential endogeneity of risktaking with regard to wealth. Different curvatures of utility functions of basic versus luxury goods - which seem rather plausible - would imply decreasing risk aversion with wealth, which in turn might partly explain non-participation for lower wealth levels ([Badarinza et al., 2016](#); [Wachter and Yogo, 2010](#)).

A negative or mean-zero background risk also leads to an increased risk aversion measure and therefore reduces the willingness to accept additional risks which is another potential explana-

tion for non-participation in the market for risky assets. This concept is called risk vulnerability and was introduced by [Gollier and Pratt \(1996\)](#). Empirically, [Guiso and Paiella \(2008\)](#) confirm this connection of risk vulnerability and participation in the market for risky assets. Our paper is closest to the recent contribution of [Christelis et al. \(2013\)](#), who decompose portfolio differences between countries into effects attributable to household characteristics and economic environment. They find that differences in ownership and amounts are primarily linked to economic environments and therefore suggest that there is a considerable potential for harmonization especially among European countries. We extend this approach to include risk aversion, counterfactual distributions for the euro area and the United States and estimates for the full household population instead of only the elderly.

The remainder of this paper is structured as follows. Section 2 introduces the data, its main properties and differences to data used in the existing literature. In section 3 we discuss the microeconomic tools we use in the analysis. The main part of the paper is section 4, which discusses the results reached from our empirical exercise. Section 5 concludes.

2 Data

Measurement of household balance sheets is difficult. In most countries there is hardly any administrative data available and if it is, it only exists for particular assets and liabilities. International comparative household finance, therefore, often has to rely on household surveys, especially if in addition to information on the household balance sheet also data on socioeconomic characteristics or beliefs are needed. As our goal is to study the relations between the holdings of risky assets, risk vulnerability and risk aversion at the micro level, household survey data is the only option for an international comparison.

We use the two most comprehensive surveys for the United States and Europe to do so. The Survey of Consumer Finances (SCF) in its current form surveys United States households every two years since the 1980ies. It is the gold standard of wealth surveys using state of the art techniques in all steps of data production ([Kennickell, 2012, 2017](#)). The Board of Governors of the Federal Reserve System runs the SCF and provides detailed documentation (<https://www.federalreserve.gov/econres/scfindex.htm> [accessed on November 15th, 2018]). The net sample size is about 6000 households representing about 120 million US households. We use the 2013 wave of the SCF.

The Household Finance and Consumption Survey (HFCS) of the European Central Bank (ECB) started in 2010 and gathers information for all euro area countries. We use the second wave, which was mostly collected in 2014 and 2015, i.e. relatively close to the collection period of the SCF wave. The HFCS is a large scale a priori harmonized wealth survey following closely

the US SCF. The survey consists of country-level surveys which are coordinated at the ECB and follow closely the common rules with regard to all steps of data production. All the data is then validated at and provided by the ECB. The net sample size for the euro area is about 85,000 households representing about 145 million European households. As Hungary and Poland also joined the effort to produce comparable household balance sheet statistics, we include these countries in all country-level analyses. Note, however, that they are not included in the euro area, which includes Austria (AT), Belgium (BE), Cyprus (CY), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Ireland (IE), Italy (IT), Latvia (LV), Luxembourg (LU), Malta (MT), the Netherlands (NL), Portugal (PT), Slovakia (SK), Slovenia (SI) and Spain (ES). If they are added to any aggregate statistics, we mention them (e.g. euro area (plus Hungary [HU] and Poland [PL])). A detailed overview of the first results of the second wave of the HFCS is presented in ECB (2016a), while ECB (2016b) delivers a detailed methodological report including information about data gathering, sampling, editing and multiple imputation. The HFCS data has already been used by the Eurosystem, international organisations like the OECD and the IMF as well as many academic researchers on a large variety of topics. For information and a bibliography see https://www.ecb.europa.eu/home/pdf/research/hfcn/Bibliography_of_the_HFCS.pdf?670aecfc4a887d7615e2befee496713c [accessed on 26th November 2018].

Both, the SCF and the HFCS produce population weights to reweight samples to the overall household population as well as multiple imputations to account for item non-response and provide replicate weights to produce variance estimates which take into account the complex survey design.

We define risky assets as direct holdings of stocks and bonds and indirect holdings via mutual funds as is commonly done in the literature (see e.g. Mehra and Prescott (2003) or Arrondel et al. (2016)). Although these three types of assets, as well as the underlying particular investment, comes with different levels of risk, we include all three in the definition of risky assets since there appears a clear break between savings that are usually held by the majority of households and these types which are commonly held by a smaller group. Table 1 shows the share of households holding risky assets as well as the average conditional share of these assets in the households financial wealth portfolio for the euro area and the United States. We observe, that the share of risky asset holders is considerably lower in the euro area (about 18%) than in the United States (just below 50%). We also observe, that conditional on holding risky assets, the share of these assets in financial wealth is considerably lower in the euro area (about 36%) compared to the United States (about 46 %).¹ Results for HU and PL are provided for completeness. These basic facts are deviating from the predictions of classical portfolio theory.

Given the stronger European welfare states and therefore potentially lower risk vulnerability in the euro area, this seems rather odd at first sight. These two differences at the extensive and

¹We show results for all countries underlying the euro area figure in the appendix in table A.1

intensive margins of risky assets will be our main object of investigation. We use the share in financial assets instead of absolute values because in that way we do not have to deal with questions of comparability of absolute values across countries. Also the fact that the data is not all gathered in the same year is a reason to focus on outcome variables which are rather stable over time such as cross country patterns in participation rates and relative magnitudes (Badarinza et al., 2016).

Table 1: Risky assets

	Holders / population	Risky assets / financial assets
United States	0.491 (0.006)	0.460 (0.004)
Euro area	0.176 (0.003)	0.361 (0.005)
Overall (excl. HU, PL)	0.321 (0.004)	0.430 (0.004)
HU	0.117 (0.005)	0.567 (0.012)
PL	0.075 (0.006)	0.378 (0.021)

Notes: Country level descriptives in annex; standard errors in parentheses

Source: SCF 2013 and HFCS 2014.

The second important variable we use is the question with regard to risk aversion, which was asked identically in the SCF as well as the HFCS and is directly aimed at the willingness to take financial risks.² Figure 1 shows the resulting distribution of answers for the euro area and the United States, which we use as indicator for risk aversion. While in the euro area more than 70% of households are “not willing to take any financial risks” less than 40% give that answer in the United States.³

Besides these two main variables we use standard household characteristics which are gathered in both the SCF and the HFCS in a comparable way to control for risk vulnerability. Descriptives of these for the whole data we use are shown in table 2. In both, the euro area and the United States, household size is slightly larger for households holding risky assets. They

²The wording of the question is: *Which of the statements on this page comes closest to the amount of financial risk that you are willing to take when you save or make investments?*

(1) *Willing to take substantial risk if substantial return is expected*

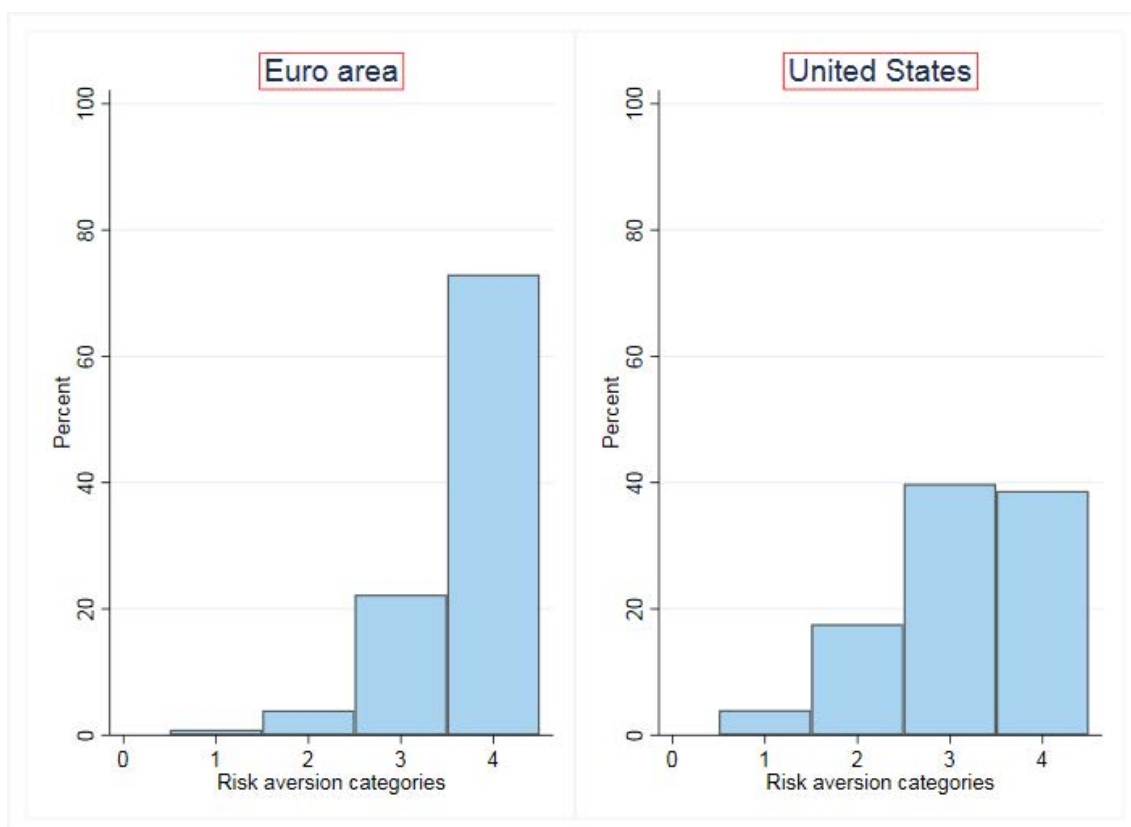
(2) *Willing to take above average risk if above average return is expected*

(3) *Willing to take average risk if average return is expected*

(4) *Not willing to take any financial risks*

³Again, we show country specific results in figure A.1 in the appendix.

Figure 1: Risk attitude in investment decisions



Source: SCF 2013 and HFCS 2014;

Which of the statements on this page comes closest to the amount of financial risk that you are willing to take when you save or make investments?

- (1) Willing to take substantial risk if substantial return is expected*
- (2) Willing to take above average risk if above average return is expected*
- (3) Willing to take average risk if average return is expected*
- (4) Not willing to take any financial risks*

have higher average household income and are less often liquidity constrained. They rent their home less often, i.e. are more often owner occupiers and hold more often (only slightly though in the euro area) debt and more often still expect an inheritance. The reference persons of the households holding risky assets are slightly older, more often males and have less often migration background or minority status.

While these patterns are similar in the euro area and the United States, the actual levels are sometimes considerably different. Average income is significantly larger for holders of risky assets in the United States. Household size as well as the share of households which are liquidity constrained are also significantly larger. According to international classification standards, householders have on average higher education levels in the United States. The share of householders in low skill jobs is higher in the United States, more households are in debt and there are more people with migration background or minority status. These differences raise the question of how much of the observed differences between the euro area and the United States with regard to risk taking, i.e. holding risky assets and their share in financial wealth, can be explained by differences in these observable characteristics. Or posed differently, what differences between the euro area and the United States remain once we filter out all differences stemming from differences in these characteristics. This is what we investigate below.

Furthermore, we employ the following macroeconomic institutional indicators in order to discuss their correlation with the part of the differences in investment behaviour between the euro area and the United States that is not explained by the background characteristics laid out above. Table 3 provides summary statistics for these indicators. To comply with the interview period we generally take the macroeconomic indicators for euro area countries from 2014 whereas for the United States we take the year 2013

- Market capitalization: We take the market capitalization of listed domestic companies as a % of GDP from the World Banks World Development Indicators.
- Internet connection per 100 inhabitants: The World Development Indicators of the World Bank provide the fixed broadband subscriptions per 100 people. This is taken for the analysis.
- Antidirector rights: We use the index provided by Djankov et al. (2008) which measures the protection of minority shareholders against insiders. We opt for this index since it includes countries under investigation to the greatest extent.
- Trust index: We take the information of trust in a society from the ASEP/JDS databank (as is done in Christelis et al. (2013)), who define the⁴

$$Trust\ index = 100 + (\% \text{ Most people can be trusted}) - (\% \text{ Cant be too careful}).$$

⁴See <http://www.jdsurvey.net/jds/jdsurveyMaps.jsp?Idioma=I&SeccionTexto=0404&NOID=104> [accessed on November 15th, 2018] for a more detailed discussion.

Table 2: Descriptive statistics of covariates: Means of household characteristics

	All EA	Holders EA	Non-holders EA	All US	Holders US	Non-holders US
Mean age	53.63 (0.07)	55.25 (0.26)	53.28 (0.09)	50.55 (0.13)	50.93 (0.19)	50.18 (0.23)
Mean income (tsd.)	39.40 (0.30)	65.04 (1.10)	33.92 (0.30)	83.88 (1.41)	130.93 (2.64)	38.48 (0.57)
Female	0.47 (0.00)	0.37 (0.01)	0.49 (0.00)	0.53 (0.01)	0.46 (0.01)	0.58 (0.01)
Mean household size	2.29 (0.00)	2.32 (0.02)	2.28 (0.01)	2.58 (0.01)	2.62 (0.02)	2.53 (0.02)
Liquidity constrained	0.08 (0.00)	0.03 (0.00)	0.09 (0.00)	0.29 (0.00)	0.23 (0.01)	0.36 (0.01)
Primary education	0.15 (0.00)	0.06 (0.00)	0.17 (0.00)	0.02 (0.00)	0.00 (0.00)	0.03 (0.00)
Lower secondary education	0.17 (0.00)	0.10 (0.00)	0.18 (0.00)	0.04 (0.00)	0.01 (0.00)	0.06 (0.00)
Upper secondary education	0.41 (0.00)	0.38 (0.01)	0.42 (0.00)	0.33 (0.00)	0.20 (0.01)	0.46 (0.01)
Tertiary education	0.26 (0.00)	0.45 (0.01)	0.22 (0.00)	0.61 (0.01)	0.79 (0.01)	0.44 (0.01)
Unemployed	0.07 (0.00)	0.03 (0.00)	0.08 (0.00)	0.05 (0.00)	0.03 (0.00)	0.07 (0.00)
Low skill job	0.05 (0.00)	0.02 (0.00)	0.06 (0.00)	0.17 (0.00)	0.16 (0.00)	0.18 (0.00)
Divorced	0.25 (0.00)	0.18 (0.01)	0.26 (0.00)	0.23 (0.00)	0.18 (0.00)	0.28 (0.01)
Renter	0.33 (0.00)	0.20 (0.01)	0.36 (0.00)	0.33 (0.01)	0.22 (0.01)	0.45 (0.01)
Indebted	0.43 (0.00)	0.45 (0.01)	0.42 (0.00)	0.75 (0.00)	0.82 (0.00)	0.67 (0.01)
Migrant / minority	0.23 (0.00)	0.16 (0.01)	0.24 (0.00)	0.30 (0.01)	0.19 (0.01)	0.41 (0.01)
Expect inheritance	0.15 (0.00)	0.22 (0.01)	0.13 (0.00)	0.13 (0.00)	0.18 (0.01)	0.08 (0.00)
Number of observations	74,887	18,886	56,001	6,015	3,435	2,580

Notes: Standard errors based on 1,000 replicate weights in parentheses

Source: SCF 2013 and HFCS 2014.

As it is based on survey information these indicators comes for different years in the different countries not necessarily reflecting the year of the HFCS or the SCF.

- Financial intermediation: For the degree of financial intermediation we use the ratio of financial assets of financial cooperations to total financial assets taken from the OECD database.
- Social security spending: Social security spending is taken from the OECD database for the United States and from Eurostat for European countries. All values are at constant prices of 2010. Euro values are converted to US-Dollars with the exchange rate taken from the OECD database.

We included these particular institutional factors to be comparable with the literature. Additionally, we included public social security spending to cover aspects of background risks of personal circumstances in different countries that are not yet covered by the individual information. Obviously, the choice of macroeconomic indicators is also limited by data availability.

Table 3: Descriptive statistics of macroeconomic indicators

	Obs	Mean	Median	Variance	Min	Max
Market capitalization	21	46.6	34.4	1,438.2	3.7	146.5
Internet connections per 100 inhabitants	20	29.3	28.0	33.5	18.9	40.8
Revised antidirector rights index	17	2.7	2.5	0.8	1.0	5.0
Interpersonal Trust Index	21	54.4	48.4	556.4	21.2	117.5
Degree of financial intermediation	19	0.53	0.50	0.02	0.36	0.95
Social security expenditure pc (log)	21	8.8	8.8	0.5	7.6	10.1

Source: World Bank, WDI, Eurostat, OECD, and [Djankov et al. \(2008\)](#).

3 Estimation strategy

In this section we shortly sum up the microeconometric tools we use in our analysis. Our main workhorse is reweighting with the propensity score ([Rosenbaum and Rubin, 1983](#)), as summarized in, for example, [Fortin et al. \(2011\)](#). This allows us to produce counterfactual distributions of our statistical objects of interest across the full wealth distribution. We explain in subsection [3.1](#) how it is derived. Using the same methodology we derive our cross-country decomposition analysis at the mean. We choose the mean as the study of [Christelis et al. \(2013\)](#), to which our research is closest too, is using the Blinder-Oaxaca framework ([Blinder, 1973](#); [Oaxaca, 1973](#)), which in turn is based on a decomposition at the mean. In that way our results with regard to the cross country correlation of unexplained differences with economic environment are directly comparable to those of [Christelis et al. \(2013\)](#). We explain that approach in subsection [3.2](#) and lay out how we

correlate unexplained parts of risktaking with economic environment indicators in subsection 3.3.

3.1 Counterfactual analysis for risk taking in the euro area and the United States

Formally, we observe cross-sections with draws from the country-distribution functions P^c of the matrix (R, X) consisting of a matrix of outcome variables on risktaking R and household level information X . In particular R includes an indicator variable indicating if a household holds risky assets or not as well as a variable indicating the share of risky assets in financial wealth for those households who hold risky assets. Besides standard socioeconomic characteristics, including those relevant for measuring risk vulnerability (background risk) X also includes our measure of risk aversion.

Our goal is to identify and estimate differences in the distribution of risktaking $P(R)$, or differences in statistics with regard to this distribution, $\nu(P(R))$, which are due to differences in household characteristics X between countries $c \in C$.

Let $P^{ea}(R, X)$ denote the overall distribution of (R, X) in the euro area, which is defined as the union of all euro area member countries and $P^{us}(R, X)$ denote the overall distribution of (R, X) in the United States. We then want to identify the counterfactual distribution $P_{ea}^{us}(R)$, in which the differences in the distribution of R between the euro area and the United States which are due to differences in X are eliminated. The differences between $P^{US}(R)$ and $P_{ea}^{US}(R)$, as well as differences between measures $\nu(P^{us}(R))$ and $\nu(P_{ea}^{us}(R))$ are the differences which are due to household characteristics X . Formally we can write the counterfactual of interest for the euro area,

$$P_{ea}^{us}(R) := \int_X P^{us}(R, X) dP^{ea}(X). \quad (1)$$

We can rewrite the counterfactual distribution in equation 1

$$P_{ea}^{us}(R) = \int_X P^{us}(R, X) \Psi_X(X) dP^{us}(X), \quad (2)$$

where the re-weighting function Ψ_X is defined as

$$\Psi_X := \frac{P^{ea}(X)}{P^{us}(X)} \quad (3)$$

Reweighting requires the estimation of the ratio Ψ_X . We estimate the propensity of each individual household to live in the United States or the euro area using a logit regression and then reweight each individual US household to create the counterfactual for the euro area. Note, that we analogously are able to create a counterfactual for the United States consisting of reweighted

euro area households. The difference is to which benchmark we balance the marginal distribution of X .

3.2 Identifying the unexplained parts for all countries

Note that analogous to the counterfactual distribution for the euro area $P_{ea}^{us}(R)$ we can produce counterfactual distributions for all countries c in the euro area, $P_c^{us}(R)$. By doing so we can decompose the differences between any measure of the observed distributions $\nu(P^{us}(R))$ and $\nu(P^c(R))$ in the following way:

$$\nu(P^{us}(R)) - \nu(P^c(R)) = [\nu(P^{us}(R)) - \nu(P_c^{us}(R))] + [\nu(P_c^{us}(R)) - \nu(P^c(R))], \quad (4)$$

where the first term reflects the differences explained by differences in household structure and the second term reflects the remaining unexplained differences. In particular, we can produce a decomposition of the difference between the overall share of households holding risky assets. If ν is considered to be the mean and R the indicator variable of holding risky assets at the household level, then the difference in the share of risky asset holders between country c and the United States, which is not explained by differences in household characteristics between these two countries, is given by,

$$\Delta \mu_{unexplained}^{c \rightarrow us} = [\nu(P_c^{us}(R)) - \nu(P^c(R))]. \quad (5)$$

3.3 Cross country analysis of the role of economic environment

In this stage of our framework, we correlate the unexplained parts of the differences in risktaking, with selected macroeconomic indicators that have been shown to be relevant for the financial literacy at the country-level (Christelis et al., 2013). Formally, we can write these country level relationship as a regression of our estimated unexplained parts on indicators of economic environment,

$$\Delta \mu_{unexplained}^{c \rightarrow us} = \alpha + E\zeta' + \varepsilon \quad (6)$$

where α is a constant, E refers to a set of country level indicators of economic environment, and ζ is the according slope parameter. $\hat{\zeta}$ is then our estimate of the relationship between unexplained parts $\Delta \mu_{unexplained}^{us \rightarrow c}$ and indicators of economic environment. ε is a standard normally distributed error term with mean zero. We allow for serially correlated errors as we report robust standard errors.

4 Results

4.1 Ownership and relative magnitude of risky assets

We start by examining ownership and relative magnitude of risky assets along the net wealth distribution in the euro area and the United States. Figure 2 shows the share of households holding risky assets as well as the conditional share of risky assets in terms of financial assets for households who hold risky assets across the net wealth distribution (including all households). Both shares are estimated by means of local linear regressions. In the euro area the share of households with risky assets is only about 10% at median net wealth and just reaches below 30% at the 80th percentile. In the United States almost 50% of households hold risky assets at median wealth and more than 70% at the 80th percentile. While the share of households holding risky assets is rising with net wealth, this is not true for the share of risky assets relative to financial wealth of households who hold risky assets. In the United States this share is almost constant at about 40% and rises up to 60% within the top 20% of net wealth, whereas in the euro area it lies between 30% and 40% across the net wealth distribution.

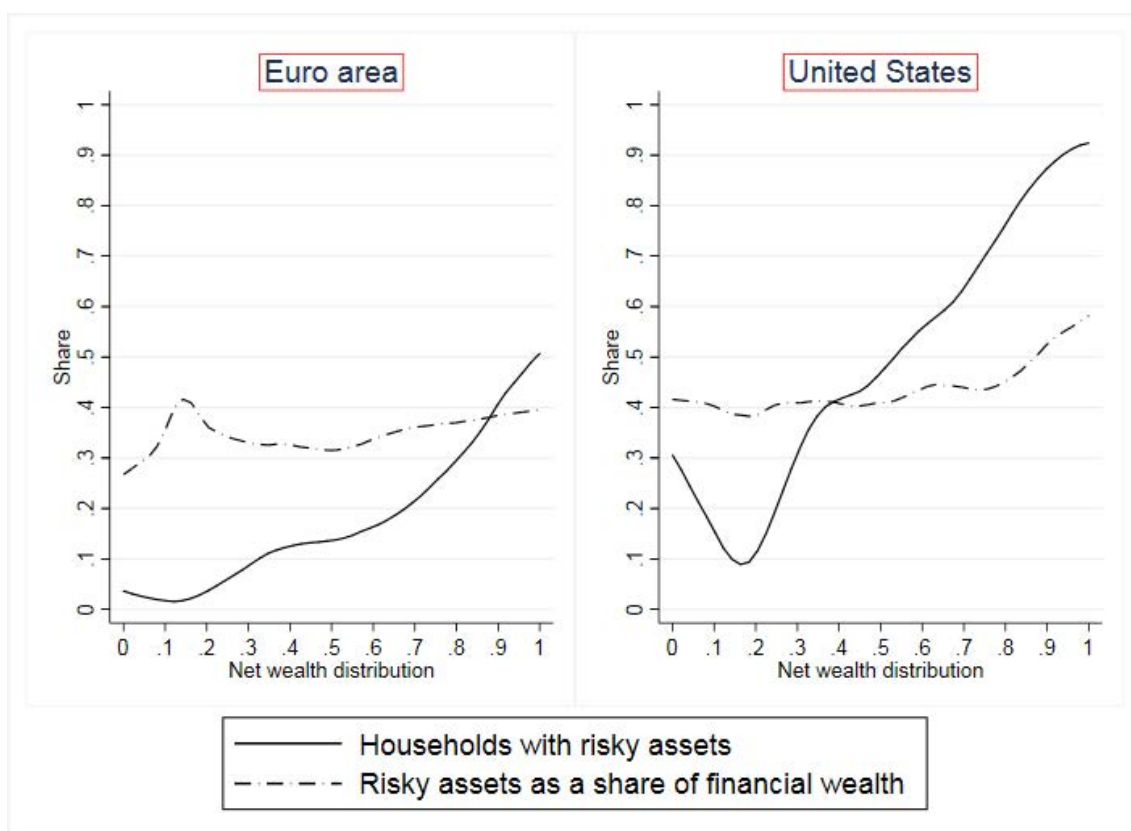
Figure 3 shows the share of households holding risky assets over the risk indicator categories. This share is almost constant up to category 4, “Not willing to take any financial risk” where it drops considerably in the euro area. Similarly in the United States, the share of risky asset holders is considerably lower in this last category. It is also lower in the United States in the first category, “Willing to take substantial risk if substantial return is expected”, but sample size is rather small for this category in the United States. However, risk taking seems to be, as expected, negatively correlated with risk aversion.

Similarly, we can investigate the correlation between risk aversion and risk taking at the country level. As figure 4 shows, there is a clear negative correlation between average risk aversion and the share of households holding risky assets. Generally euro area countries show lower shares of risky asset holders and higher risk aversion, but also inside Europe the negative correlation is clearly visible and statistically significant. Overall, a simple regression in all countries gives a highly significant (at the 1%-level) coefficient of about -0.5 . Given this birds eye perspective it seems to be likely that quite some part of the differences in risk taking might be explained by differences in risk aversion. Put differently, attitudes towards risk seem to be somewhat in line with actual behaviour with regard to portfolio choice.

4.2 Risk vulnerability and risk aversion

As differences in risk aversion also might stem from risk vulnerability as pointed out by Guiso and Paiella (2008) we control for risk vulnerability by a set of household characteristics likely to be capturing background risk (see table 2 for the descriptives of the control variables).

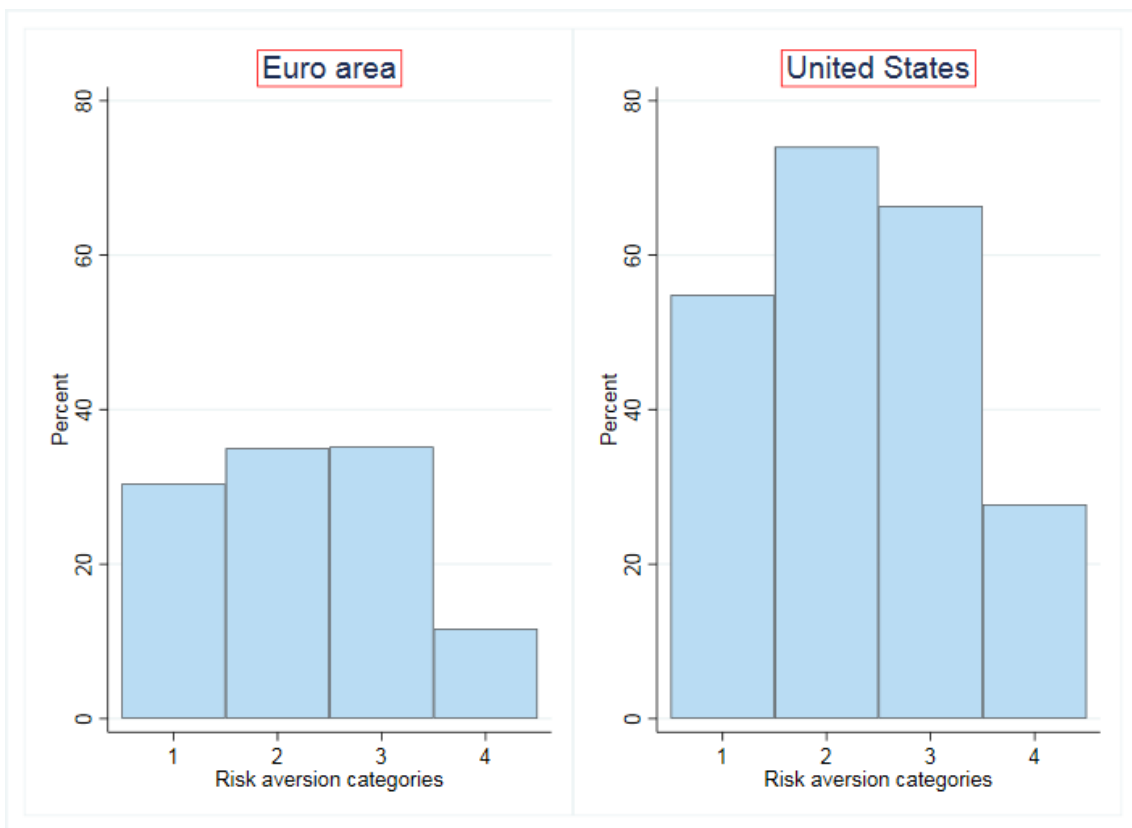
Figure 2: Risky assets over the net wealth distribution



Notes:

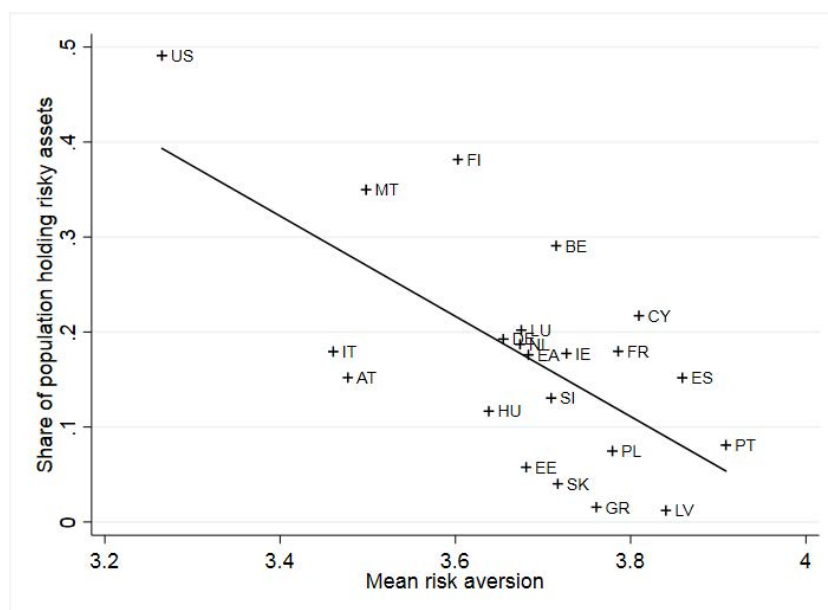
- (i) This graph shows ownership and relative magnitude of risky assets conditional on holding risky assets estimated by local linear regressions (with degree zero and bandwidth 0.05) across the distribution of net wealth.
- (ii) *Source:* HFCS 2014 for the euro area. SCF 2013 for the United States.

Figure 3: Shares of households holding risky assets across risk aversion



Source: HFCS 2014 for the euro area. SCF 2013 for the United States.

Figure 4: Share of households holding risky assets and mean risk aversion



Source: HFCS 2014 for the euro area. SCF 2013 for the United States.

Figure 5 shows the counterfactual distributions as described in subsection 3.1 for the share of households holding risky assets. While in the left panel we created a counterfactual for the euro area by reweighting the US households to match with the euro area household characteristics and euro area level of risk aversion, the right panel shows a counterfactual for households in the United States constructed by reweighting euro area households. The remaining difference between the original and the counterfactual distributions is then the difference not explainable by household characteristics and risk aversion. Put differently, the remaining difference is the difference we observe when we only compare US and EA households with similar household characteristics and risk aversion. Therefore differences stemming from different population shares of households with different characteristics and risk aversion are filtered out.

The euro area counterfactual shows that compared to their counterparts in the United States (in terms of characteristics and risk aversion) euro area households generally hold less often risky assets at the very bottom of the distribution, where negative net wealth prevails. These are typically households with gross wealth in the form of housing but substantial debt. Between the 10th and 30th net wealth percentile household characteristics do explain almost all of the observed difference and euro area households hold risky assets with a similar probability as their US counterparts. From the 30th percentile upwards a decreasing share of the observed difference is explained by household characteristics and the gap remaining between the euro area households and their counterparts is widening. The wealthier households in the euro area participate

much less often in the market for risky assets than their US counterparts.

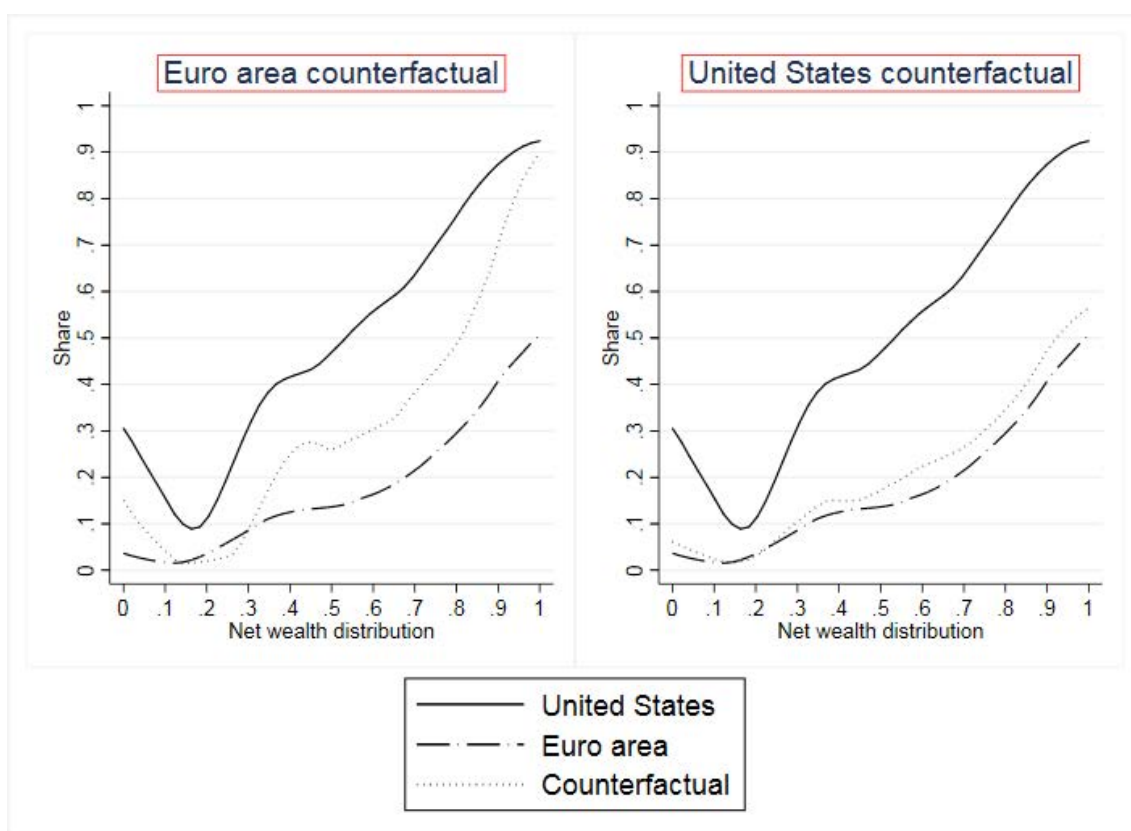
The counterfactual for the United States shows that compared only to their EA counterparts US households still hold much more often risky assets. The share of the difference being explained by differences in household characteristics and risk aversion varies, but is generally much smaller than in the euro area case. Note, that the reason why in one case much more of the observed differences can be explained than in the other case is that the benchmarks are very different. In the euro area counterfactual case the covariate distributions of the household characteristics of the euro area households are fixed and households in the United States reweighted in a way that they balance these distributions as closely as possible. In the US counterfactual case the covariate distributions of the household characteristics of the households in the United States are fixed and euro area households reweighted in a way that they balance these distributions as closely as possible. As household characteristics in the United States are very different from euro area household characteristics (see also table 2), the resulting counterfactual distributions differ substantially. Figure B.1 in appendix B.1 shows a robustness check for our counterfactual analysis where we reweight both the euro area and the United States to their overall joint distribution of household characteristics.

Figure 6 shows the counterfactual distributions as described in subsection 3.1 for the share of risky assets in total financial assets for households which own risky assets. In both cases, the counterfactual for the euro area based on reweighted US households as well as the counterfactual for the United States based on reweighted euro area household characteristics as well as risk aversion does hardly explain much of the differences in the share of risky assets in financial wealth. Filtering out differences due to characteristics or risk aversion does hardly change the magnitudes for households holding risky assets.

Risk aversion might matter considerably with regard to this decomposition. It is also noteworthy, that the small amount explainable by differences in household characteristics in case of the United States counterfactual in figure 5 is mostly related to risk aversion (see robustness check excluding risk aversion in appendix B.2 in figures B.2 and B.3). One might argue that it is endogenous in the sense that respondents might just try to answer in a consistent way that fits their investment behavior. Another argument could be, that risk aversion means something different in the euro area versus the United States because of the different institutional settings insuring individuals differently against contingencies of life. To investigate more closely how risk aversion itself might influence our analysis Figure 7 shows mean risk aversion over net wealth for the euro area and the United States.⁵ Risk aversion is generally higher in the euro area but in addition it is also less downward sloping with net wealth. We also show filtered risk aversion. Filtered risk aversion is created by filtering out variation of risk aversion explainable by risk

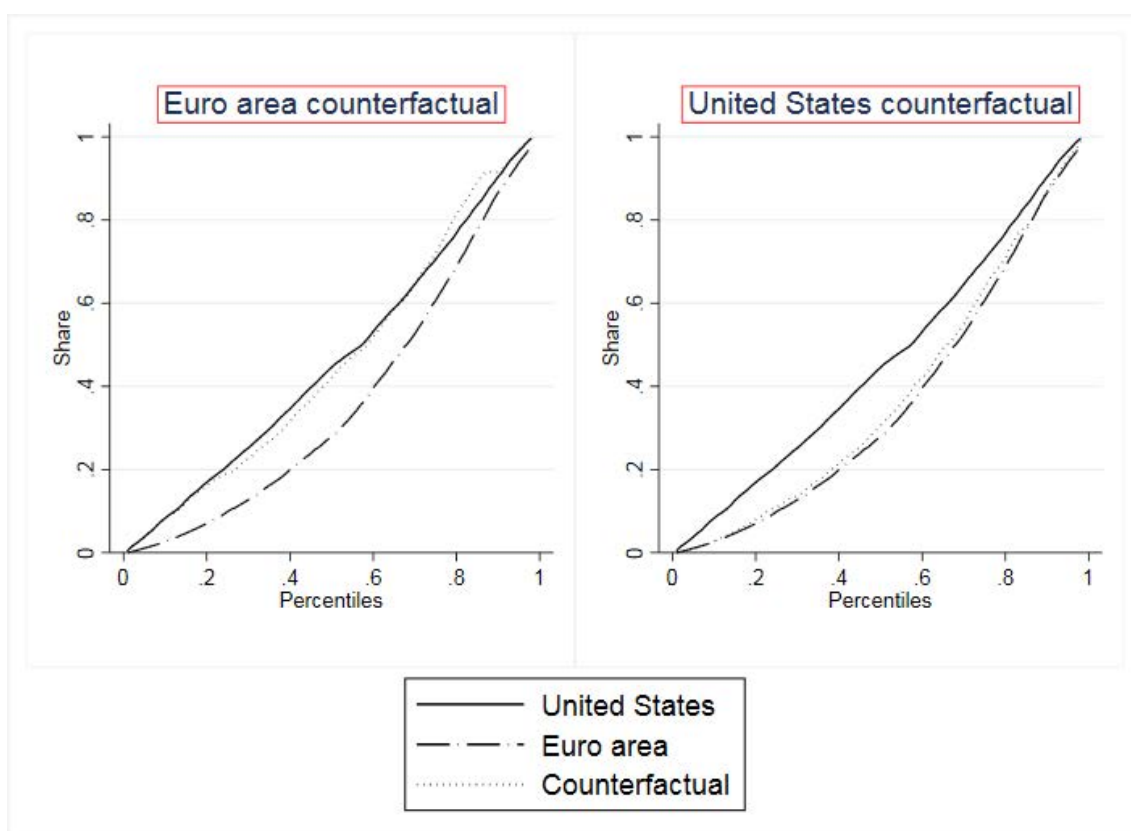
⁵In order to be comparable, we restricted the range of net wealth in the United States for this graph to about the same level the maximum wealth levels observed in the euro area.

Figure 5: Shares and counterfactual shares of households holding risky assets



Source: HFCS 2014 for the euro area. SCF 2013 for the United States.

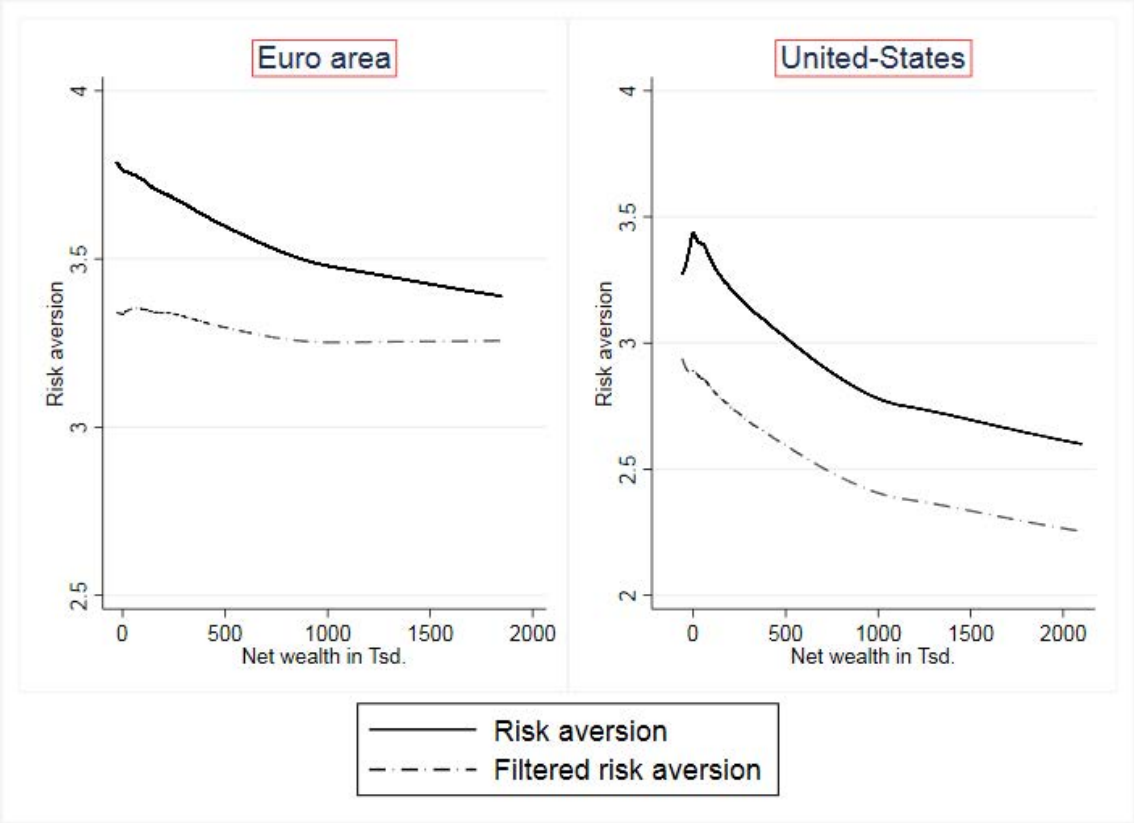
Figure 6: Share of risky assets in financial wealth for households holding risky assets



Source: HFCS 2014 for the euro area. SCF 2013 for the United States.

vulnerability. To do so we regress risk aversion on background risk variables (see table 2 for a list of variables and the according descriptives) and then plot residualized risk aversion adding the mean. In both, the EA as well as the US background risk explains a substantial part of risk aversion (with regard to financial risks) as theory predicts. It also - as theory predicts - explains more in the lower part of the net wealth distribution as low-wealth households are more exposed to background risks than wealthier households. However, this effect is much stronger in the euro area than in the United States. Whereas after filtering out risk vulnerability, risk aversion is almost constant across net wealth in the euro area, the downward slope is still clearly visible in the United States.

Figure 7: Risk aversion over the net wealth distribution



Source: HFCS 2014 for the euro area. SCF 2013 for the United States.

In appendix B.2 we show that our counterfactual results are robust to excluding the covariate balancing for risk aversion.

4.3 Differences in risktaking and the economic environment

Table 5 shows regressions of the unexplained parts of cross country differences (between euro area countries and the United States) on aggregate indicators of the economic environment similar to those presented by Christelis et al. (2013), but including risk aversion in the reweighting procedure underlying the decomposition (see sections 3.2 and 3.3). The regression results are based on 17 countries due to missing data from CY, EE, MT, and SI at the aggregate level. First, table 4 shows descriptive statistics of the unexplained part used in the regression analysis. As discussed above, we see that the unexplained part of the participation is larger than the invested share due to a smaller difference in the invested share. Risk aversion reduces the unexplained part for holders to a sizeable extent. The impact on the invested share, however, is very much smaller.

Table 4: Descriptive statistics of unexplained part

DFL-unexplained part:	Obs	Mean	Median	Variance	Min	Max
Holders - risk aversion controlled	21	0.203	0.209	0.011	0.000	0.460
Holders - risk aversion NOT controlled	21	0.286	0.285	0.022	0.000	0.571
Share - risk aversion controlled	21	0.102	0.116	0.012	-0.096	0.333
Share - risk aversion NOT controlled	21	0.115	0.121	0.012	-0.098	0.331

Source: SCF 2013 and HFCS 2014.

We find that controlling for other factors larger market capitalization, stronger shareholder protection - measured by the revised antidirector rights index - and stronger interpersonal trust are associated with smaller differences - unexplained by household characteristics - in the share of risky asset holders with respect to the United States (see table 5, column 1). If we add a variable measuring the degree of financial intermediation, we can clearly see its complementary nature with regard to holding risky assets. The larger the degree of financial intermediation the larger the remaining unexplained differences in the share of households holding risky assets of a European country with respect to the United States. Social security spending on the other hand does not show up with a significant coefficient, indicating that there is only a weak correlation between the per capita spending and participation in risky financial assets. Table B.1 in appendix B.3 serves as a robustness check, again excluding risk aversion from the decomposition procedure. This specification is then similar to those presented by Christelis et al. (2013). Even though the results in Christelis et al. (2013) are based on a different set of countries, include only the elderly, and use the stock ownership instead of risky assets, results are very similar. Their coefficient of market capitalization is -0.0008, for internet connections 0.0001, for antidirector rights -0.0573 and for interpersonal trust -0.0035.

Tables 6 shows the correlation of differences in shares of risky assets in financial wealth of risky

Table 5: Share of risky asset holders in population (unexplained part):
Risk aversion dummies included in reweighting procedure

	(1)	(2)	(3)	(4)
Market capitalization	-0.0014** (0.0006)	-0.0019*** (0.0004)	-0.0016*** (0.0005)	-0.0016*** (0.0004)
Internet connections per 100 inhabitants	0.0034 (0.0035)	0.0013 (0.0023)	0.0053 (0.0032)	0.0053 (0.0031)
Revised antidirector rights index	-0.0511** (0.0219)	-0.0345** (0.0141)	-0.0359** (0.0145)	-0.0357** (0.0129)
Interpersonal Trust Index	-0.0006 (0.0010)	-0.0007 (0.0008)	0.0000 (0.0008)	
Degree of financial intermediation		0.4130*** (0.0656)	0.5410*** (0.0922)	0.5399*** (0.0857)
Log(Social security expenditure per capita)			-0.0908 (0.0614)	-0.0898 (0.0546)
Observations	17	17	17	17
R^2	0.497	0.691	0.790	0.790

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: HFCS 2014 for the euro area. SCF 2013 for the United States.

asset holders not explainable by household characteristics and risk aversion and the economic environment. Similarly to our counterfactual distribution the relationships between unexplained parts and economic environment indicators break down when it comes to the intensive margin. Again, Table B.2 in appendix B.3 serves as a robustness check excluding risk aversion from the decomposition procedure.

Table 6: Share of risky asset in financial assets (unexplained part):
Risk aversion dummies included in reweighting procedure

	(1)	(2)	(3)	(4)
Market capitalization	-0.0005 (0.0006)	-0.0005 (0.0007)	-0.0006 (0.0006)	-0.0006 (0.0006)
Internet connections per 100 inhabitants	0.0062 (0.0040)	0.0062 (0.0042)	0.0046 (0.0078)	0.0046 (0.0075)
Revised antidirector rights index	-0.0104 (0.0334)	-0.0102 (0.0369)	-0.0097 (0.0400)	-0.0146 (0.0298)
Interpersonal Trust Index	-0.0010 (0.0015)	-0.0010 (0.0016)	-0.0014 (0.0019)	
Degree of financial intermediation		0.0055 (0.1464)	-0.0440 (0.2237)	-0.0108 (0.1862)
Log(Social security expenditure per capita)			0.0352 (0.1069)	0.0050 (0.0884)
Observations	17	17	17	17
R^2	0.104	0.104	0.116	0.068

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: HFCS 2014 for the euro area. SCF 2013 for the United States.

Inspecting the r-squared reported in tables 5 and 6 we find that the first set of regressions on the share of households owning risky assets shows larger values than in the second set. This fact comes from the smaller differences in the share of investments in terms of financial wealth between the United States and the euro area countries.

5 Summary remarks

The relatively large differences between the returns of risky and safe assets, known as the “equity premium puzzle” (Mehra and Prescott, 1985) have preoccupied economists for many decades. Nevertheless, the low fraction of households holding risky assets remained rather stable also in recent decades (Bertaut and Star-McCluer, 2001). Household seem not to take advantage of

the high returns on risky assets (Badarinza et al., 2016). Some have argued, that a negative or mean-zero background risk also might explain non-participation (Gollier and Pratt, 1996). Guiso et al. (2002) were among the first to discuss similarities and differences in household portfolios for the US and selected European countries. They also documented the considerable deviations of household portfolio choice from the predictions of theory, particularly with regard to the non-participation in risky asset markets. Empirically, Guiso and Paiella (2008) confirmed the connection of risk vulnerability and participation in the market for risky assets.

In this paper we contributed to this literature of household finance by providing a cross country analysis of the role of individual characteristics, risk aversion and economic environment with regard to ownership and holdings of risky assets. We employed the SCF and the HFCS to construct counterfactual distributions in order to decompose differences in the risk taking of households between the euro area and the US into two parts: first one part explainable by household characteristics measuring risk vulnerability (background risk) as well as risk aversion; and second an unexplainable part. Our decomposition technique allowed us to investigate these differences across the full distribution of net wealth. We found that risk vulnerability and risk aversion explain a fair amount of the differences between the euro area and the US with regard to ownership of risky assets.

The euro area counterfactual shows that compared to their US counterparts euro area households generally hold less often risky assets at the very bottom of the distribution, where negative net wealth prevails. These are typically households with gross wealth in the form of housing but substantial debt. Between the 10th and 30th net wealth percentile household characteristics do explain almost all of the observed difference and euro area households hold risky assets with a similar probability as their counterparts in the United States. From the 30th percentile upwards a decreasing share of the observed difference is explained by household characteristics and the gap remaining between the euro area households and their counterparts is widening. The wealthier households in the euro area participate much less often in the market for risky assets than their US counterparts.

The US counterfactual shows that compared only to their euro area counterparts households in the United States still hold much more often risky assets. The share of the difference being explained is generally much smaller than in the euro area case. This small amount explained by differences in household characteristics in case of the US counterfactual is mostly related to risk aversion and not to risk vulnerability.

However, for both, the United States and the euro area, risk vulnerability and risk aversion explain hardly anything with regard to the differences in the intensive margin. The differences in the share of risky assets in financial wealth for those holding risky assets are almost independent of observed characteristics.

Using the same methodology, we also identify unexplained parts of differences at the exten-

sive and intensive margins of risk taking for all European countries in our sample with regard to the United States. By doing so we are able to exploit differences in economic environment inside Europe to investigate whether the unexplained gap between the United States and Europe is indeed related to differences in the economic environment. Therefore we regress the country-specific unexplained differences to the United States on indicators of economic environment. This exercise leads to similar results as already shown by [Christelis et al. \(2013\)](#) for the elderly; the significant results point towards the importance of institutions and the economic environment. We find that controlling for other factors, e.g. larger market capitalization, stronger shareholder protection and stronger interpersonal trust are associated with smaller differences - unexplained by household characteristics - in the share of risky asset holders with respect to the United States. If we add a variable measuring the degree of financial intermediation, we can clearly see its complementary nature with regard to holding risky assets. The larger the degree of financial intermediation the larger the remaining unexplained differences in the share of households holding risky assets of a European country with respect to the United States.

References

- Arrondel, Luc, Laura Bartiloro, Pirmin Fessler, Peter Lindner, Thomas Mathä, Cristiana Rampazzi, Frédérique Savignac, Tobias Schmidt, Martin Schürz, and Philip Vermeulen**, “How Do Households Allocate Their Assets? Stylized Facts from the Eurosystem Household Finance and Consumption Survey,” *International Journal of Central Banking*, 2016, 12 (2), 129–220.
- Badarinza, Cristian, John Y. Campbell, and Tarun Ramadorai**, “International Comparative Household Finance,” *Annual Review of Economics*, 2016, 8 (1), 111–144.
- Barnea, Amir, Henrik Cronqvist, and Stephan Siegel**, “Nature or nurture: What determines investor behavior?,” *Journal of Financial Economics*, 2010, 98 (3), 583 – 604.
- Bertaut, Carol C. and Martha Star-McCluer**, “Household Portfolios in the US,” in Haliassos M. Guiso L. and Jappelli T, eds., *Household Portfolios*, 1 ed., The MIT Press, 2001.
- Blinder, Alan S.**, “Wage Discrimination: Reduced Form and Structural Estimates,” *The Journal of Human Resources*, 1973, 8 (4), 436–455.
- Christelis, Dimitris, Dimitris Georgarakos, and Michael Haliassos**, “Differences in Portfolios across Countries: Economic Environment versus Household Characteristics,” *The Review of Economics and Statistics*, 2013, 95 (1), 220–236.
- Djankov, Simeon, Rafael La Porta, Florencio Lopez de Silanes, and Andrei Shleifer**, “The law and economics of self-dealing,” *Journal of Financial Economics*, 2008, 88 (3), 430 – 465. Darden - JFE Conference Volume: Capital Raising in Emerging Economies.
- ECB**, “The Household Finance and Consumption Survey: results from the second wave,” *ECB Statistical Paper Series*, December 2016, (18).
- , “Methodological Report,” *ECB Statistical Paper Series*, December 2016, (17).
- Fortin, Nicole, Thomas Lemieux, and Sergio Firpo**, “Chapter 1 - Decomposition Methods in Economics,” in Orley Ashenfelter and David Card, eds., *Orley Ashenfelter and David Card, eds.*, Vol. 4 of *Handbook of Labor Economics*, Elsevier, 2011, pp. 1 – 102.
- Gollier, Christian and John W. Pratt**, “Risk Vulnerability and the Tempering Effect of Background Risk,” *Econometrica*, 1996, 64 (5), 1109–1123.
- Guiso, Luigi and Monica Paiella**, “Risk Aversion, Wealth, and Background Risk,” *Journal of the European Economic Association*, 2008, 6 (6), 1109–1150.
- , **Michael Haliassos, and Tullio Jappelli**, *Household Portfolios*, MIT Press, 2002.

- , **Paola Sapienza, and Luigi Zingales**, “Trusting the Stock Market,” *The Journal of Finance*, 2008, *63* (6), 2557–2600.
- Kaustia, Markku and Samuli Knüpfer**, “Peer performance and stock market entry,” *Journal of Financial Economics*, 2012, *104* (2), 321 – 338. Special Issue on Investor Sentiment.
- Kennickell, Arthur B.**, “Changes in U.S. Family Finances from 2007 to 2010: Evidence from the Survey of Consumer Finances,” *Federal Reserve Bulletin*, 2012, *98*.
- , “Look again: editing and imputation of SCF panel data,” *Statistical Journal of the IAOS*, 2017, *33* (1), 195–202.
- Malmendier, Ulrike and Stefan Nagel**, “Depression Babies: Do Macroeconomic Experiences Affect Risk Taking?,” *The Quarterly Journal of Economics*, 2011, *126* (1), 373–416.
- Mankiw, N. Gregory and Stephen P. Zeldes**, “The consumption of stockholders and non-stockholders,” *Journal of Financial Economics*, 1991, *29* (1), 97 – 112.
- Mehra, Rajnish and Edward C. Prescott**, “The equity premium: A puzzle,” *Journal of Monetary Economics*, 1985, *15* (2), 145 – 161.
- **and** – , “The equity premium in retrospect,” in G.M. Constantinides, M. Harris, and R. M. Stulz, eds., *Handbook of the Economics of Finance*, 1 ed., Vol. 1, Part 2, Elsevier, 2003, chapter 14, pp. 889–938.
- Oaxaca, Ronald**, “Male-Female Wage Differentials in Urban Labor Markets,” *International Economic Review*, 1973, *14* (3), 693–709.
- Rosenbaum, Paul R. and Donald B. Rubin**, “The Central Role of the Propensity Score in Observational Studies for Causal Effects,” *Biometrika*, 1983, *70* (1), 41–55.
- van Rooij, Maarten, Annamaria Lusardi, and Rob Alessie**, “Financial literacy and stock market participation,” *Journal of Financial Economics*, 2011, *101* (2), 449 – 472.
- Wachter, Jessica A. and Motohiro Yogo**, “Why Do Household Portfolio Shares Rise in Wealth?,” *The Review of Financial Studies*, 2010, *23* (11), 3929–3965.

Appendix

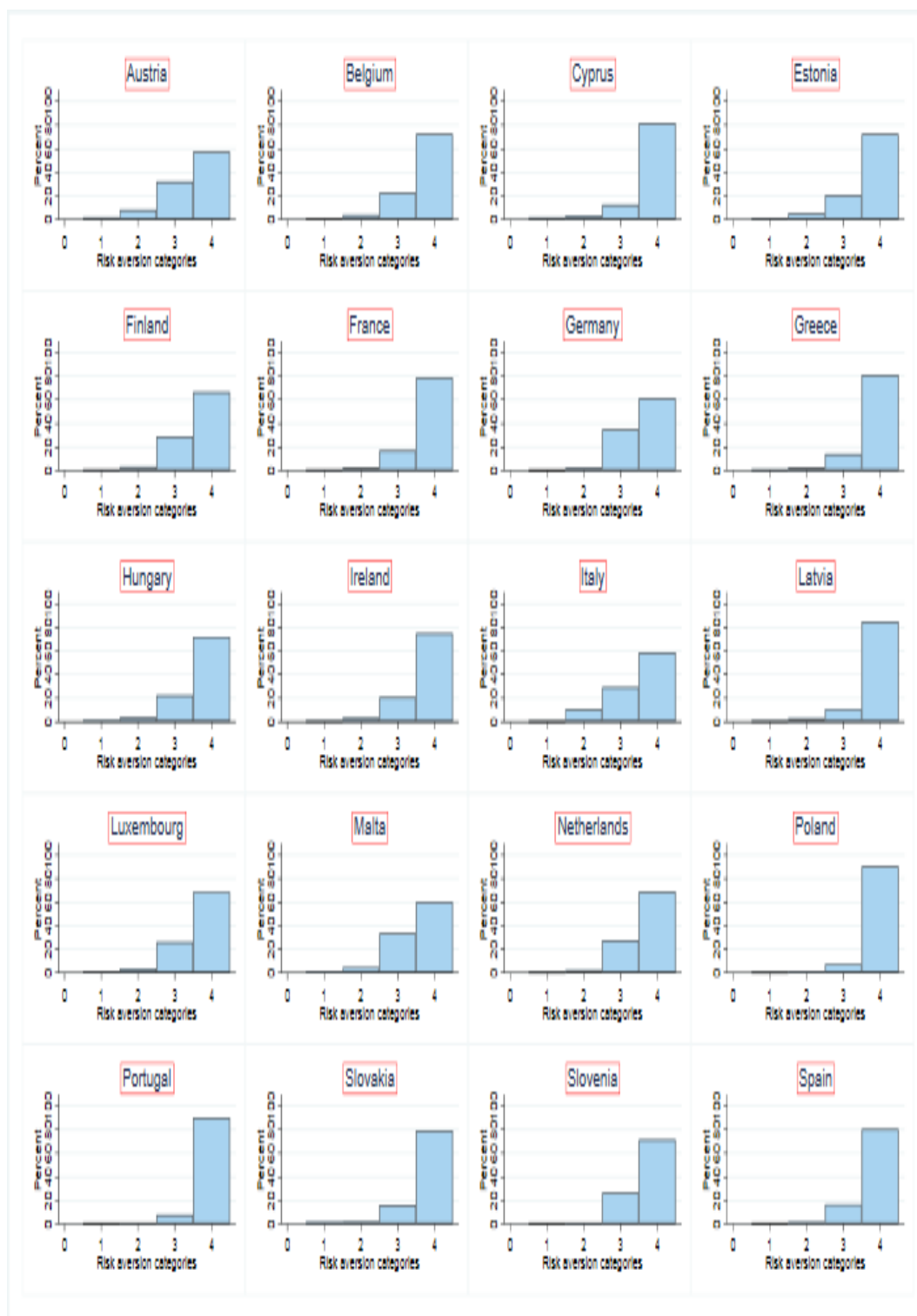
A Additional descriptives

Table A.1: Risky assets

	Holders / population	Risky assets / financial assets
Austria	0.152 (0.008)	0.398 (0.015)
Belgium	0.291 (0.013)	0.389 (0.015)
Cyprus	0.217 (0.020)	0.214 (0.040)
Germany	0.193 (0.008)	0.317 (0.012)
Estonia	0.058 (0.005)	0.269 (0.028)
Spain	0.152 (0.008)	0.371 (0.015)
Finland	0.382 (0.003)	0.338 (0.005)
France	0.180 (0.005)	0.242 (0.007)
Greece	0.016 (0.003)	0.388 (0.055)
Hungary	0.117 (0.005)	0.567 (0.012)
Ireland	0.177 (0.006)	0.329 (0.012)
Italy	0.179 (0.005)	0.601 (0.011)
Luxembourg	0.202 (0.011)	0.371 (0.020)
Latvia	0.012 (0.004)	0.470 (0.123)
Malta	0.350 (0.013)	0.411 (0.014)
Netherlands	0.187 (0.011)	0.292 (0.020)
Poland	0.075 (0.006)	0.378 (0.021)
Portugal	0.081 (0.005)	0.222 (0.017)
Slovenia	0.130 (0.006)	0.376 (0.019)
Slovakia	0.040 (0.007)	0.252 (0.056)

Source: SCF 2013 and HFCS 2014;

Figure A.1: Risk Attitude in Investment Decisions: European Countries



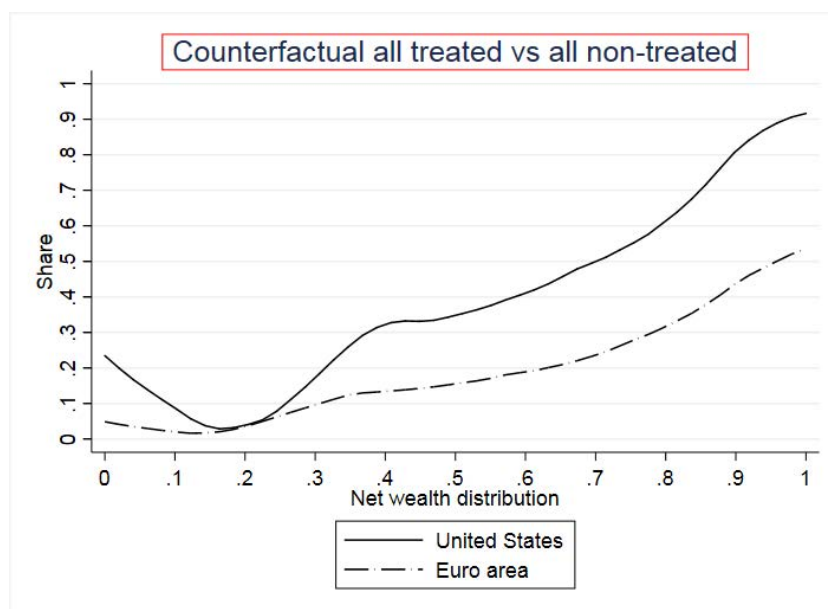
Source: HFCS 2014 for the euro area. SCF 2013 for the United States.

B Counterfactual analysis robustness checks

B.1 Reweighting to overall marginal distribution

Figure B.1 shows a robustness check for our counterfactual analysis where we reweight both the euro area and the United States to their overall joint distribution of household characteristics. The solid line, therefore, is a hypothetical probability of holding risky assets across the net wealth distribution if all households (euro area as well as United States) would live in the institutional setting of the United States, whereas the dashed line is a hypothetical probability of holding risky assets across the net wealth distribution if all households would live in the institutional setting of the euro area. The difference between the solid and the dashed line is the effect of the differences of the institutional setting, i.e. the difference not explainable by household characteristics.

Figure B.1: Reweighting to overall joint distribution of characteristics

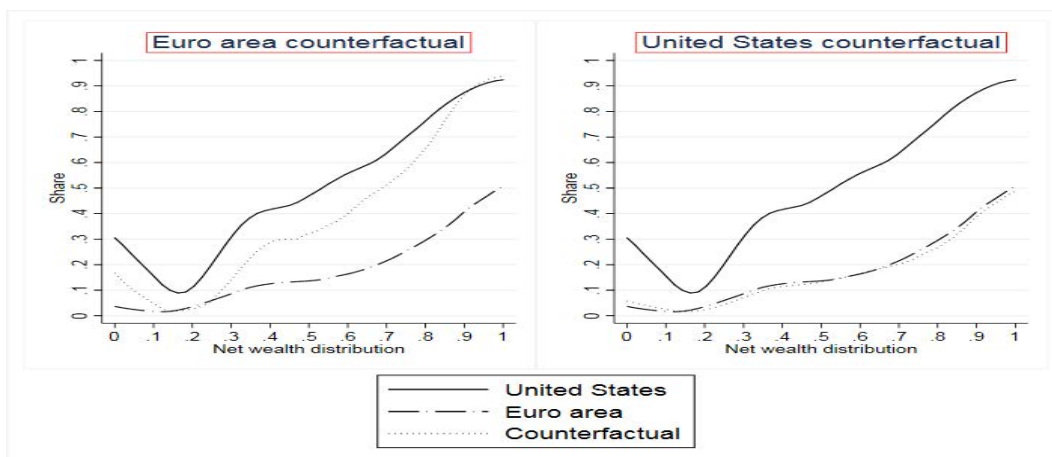


Source: HFCS 2014 for the euro area. SCF 2013 for the United States.

B.2 Counterfactual analysis without risk aversion

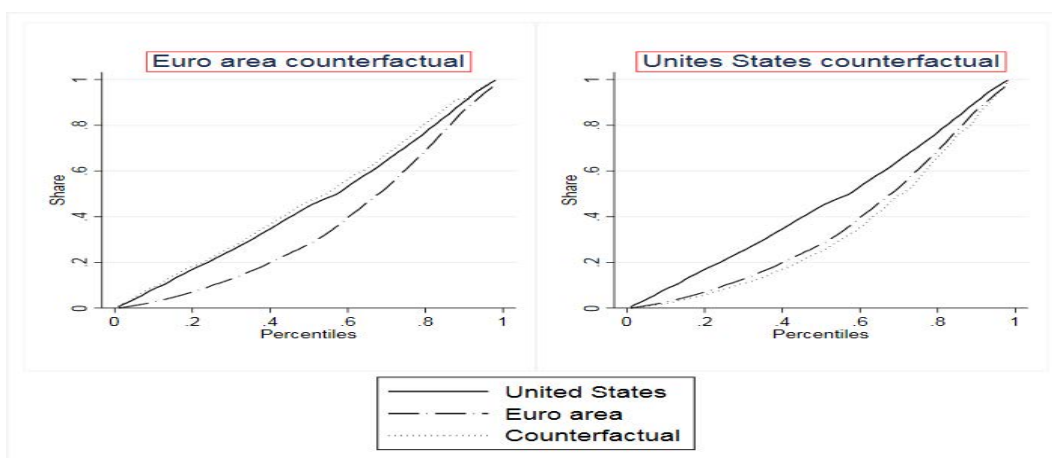
This section serves as a robustness check and replicates results of section 4.2 but without using the risk aversion measure to rebalance covariates in our counterfactual exercise outlined in section 3.1.

Figure B.2: Shares and counterfactual shares of households holding risky assets



Source: HFCS 2014 for the euro area. SCF 2013 for the United States.

Figure B.3: Share of risky assets in financial wealth for households holding risky assets



Source: HFCS 2014 for the euro area. SCF 2013 for the United States.

B.3 Correlation of unexplained parts with economic environment excluding risk aversion

This section serves as a robustness check and replicates results of section 4.3 but without using the risk aversion measure to rebalance covariates in our counterfactual exercise outlined in section 3.2 and 3.3.

Table B.1: Share of risky asset holders in population (unexplained part):
Risk aversion dummies not included in reweighting procedure

	(1)	(2)	(3)	(4)
Market capitalization	-0.0019** (0.0007)	-0.0022*** (0.0006)	-0.0016* (0.0008)	-0.0016* (0.0008)
Internet connections per 100 inhabitants	0.0008 (0.0066)	-0.0009 (0.0064)	0.0064 (0.0059)	0.0065 (0.0056)
Revised antidirector rights index	-0.0620** (0.0232)	-0.0493* (0.0236)	-0.0519** (0.0202)	-0.0515** (0.0184)
Interpersonal Trust Index	-0.0013 (0.0011)	-0.0014 (0.0010)	0.0001 (0.0010)	
Degree of financial intermediation		0.3152** (0.1140)	0.5503*** (0.1357)	0.5480*** (0.1228)
Log(Social security expenditure per capita)			-0.1667** (0.0745)	-0.1647** (0.0635)
Observations	17	17	17	17
R^2	0.541	0.599	0.769	0.768

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: HFCS 2014 for the euro area. SCF 2013 for the United States.

Table B.2: Share of risky asset in financial assets (unexplained part):
Risk aversion dummies not included in reweighting procedure

	(1)	(2)	(3)	(4)
Market capitalization	-0.0005 (0.0006)	-0.0006 (0.0006)	-0.0008 (0.0006)	-0.0008 (0.0006)
Internet connections per 100 inhabitants	0.0105*** (0.0034)	0.0101** (0.0035)	0.0078 (0.0072)	0.0077 (0.0070)
Revised antidirector rights index	0.0047 (0.0309)	0.0076 (0.0338)	0.0084 (0.0373)	0.0025 (0.0264)
Interpersonal Trust Index	-0.0011 (0.0014)	-0.0011 (0.0015)	-0.0016 (0.0018)	
Degree of financial intermediation		0.0716 (0.1293)	-0.0024 (0.2028)	0.0367 (0.1675)
Log(Social security expenditure per capita)			0.0525 (0.1010)	0.0170 (0.0836)
Observations	17	17	17	17
R^2	0.198	0.203	0.231	0.165

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: HFCS 2014 for the euro area. SCF 2013 for the United States.

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