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Financial Fragility across Europe and the US: The Role of Portfolio Choices, Household Features and Economic- institutional Setup

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**Financial fragility across Europe and the US:
The role of portfolio choices, household features and economic-institutional setup**

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Abstract

This paper investigates households' financial fragility in twelve European countries and in the US by employing the first wave of the Household Finance and Consumption Survey (HFCS) and the 2010 Survey of Consumer Finances (SCF), respectively. Financial fragility is defined by taking into account both income constraints and portfolio composition (liquidity and indebtedness). Three main results emerge. First, the estimation of bivariate probit models reveals that in all countries holding an illiquid portfolio increases the likelihood of being financially fragile, while having a mortgage generally reduces it. Second, there are relevant differences among countries in their estimated average probability of financial fragility. Finally, decomposition of these differences by means of counterfactual methods provides evidence of a significant role of the country's economic-institutional setup in providing a safety net against financial fragility. This is more true in Europe than in the US.

Keywords: household financial fragility, portfolio liquidity, mortgage, HFCS, SCF

JEL Codes: D12, D14, C25

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1. Introduction

The issue of short-term households' financial fragility was brought to the forefront by the 2007-08 financial crisis (see, among others, Haliassos et al., 2011). It has become even more relevant with the recent outbreak of the Covid-19 pandemic, which has led to an unexpected and unprecedented economic shock at global level. This is putting a strain on the economic system of all the countries hit by the health emergency. Liquidity problems involving households (and firms) have already arisen and are likely to become more severe. Identification and analysis of possible areas of financial distress among households is therefore necessary in order to put forth all the necessary policy measures to support incomes and prevent households from defaulting.¹

The existing literature focusing on household financial fragility has so far relied on a variety of indicators, most of them related to indebtedness and/or subjective measures of self-reported distress, and only a few present international comparative evidence. In order to fill this gap, this paper investigates the determinants of household financial fragility at a comparative level in Europe and the United States using an indicator of financial fragility that is objective and not necessarily anchored to (over-)indebtedness. To this end, we implement a variation of Brunetti et al. (2016) indicator of fragility, which is free of the subjectivity-bias and can be applied to all households, regardless of their debt position. Specifically, households are identified as financially fragile when meeting two conditions: (i) having sufficient income to cover regular expenses, and (ii) having insufficient liquidity to face unexpected expenses.

This paper evolves from Brunetti et al. (2016) along two dimensions. First, our analyses extend theirs by looking at financial fragility across countries instead of focusing on Italy only. Herein, we use two comparable surveys, namely the Household Finance and Consumption Survey (HFCS) for Europe and the Survey of Consumer Finances (SCF) for the US. Financial fragility is empirically modelled by means of a bivariate probit model, which jointly models the two conditions defining fragility. As in Brunetti et al. (2016), in addition to the standard demographic and socio-economic controls, we include two indicators of household's portfolio illiquidity to pinpoint new drivers of financial fragility other than income. Second, we compute average estimated probabilities by country and, by applying counterfactual methods, we

¹ A preliminary analysis of households' resilience to the shock in Italy can be found in Guiso and Terlizzese (2020).

decompose the observed differences with respect to the US (used as the reference country) into two components, one arising from differences in household characteristics (household effect) and one arising from differences in the economic-institutional setting (economic-institutional effect).

The estimation results of the bivariate probit model highlight three main conclusions. First, they emphasize the importance of including portfolio controls: on the pooled sample, we find that an increase of 1 percentage point in the illiquidity degree of a household portfolio increases household's chances of being financially fragile by as much as 12.96 percentage points. Moreover, having a mortgage displays the opposite effect, suggesting that a (well-planned) indebtedness can help in avoiding financial fragility. Single-country bivariate probit models confirm that 'illiquidity due to housing' is always significant and positive, but at the same time they provide evidence of country differences with respect to indebtedness.

Second, estimates of average probabilities of financial fragility by country display a high variability: they range from around 11% in Luxembourg and the Netherlands to 45.6% and 50.5% in Slovakia and Slovenia, while in the US, the reference country, the probability is 28%. Overall, five countries exhibit a higher probability of financial distress than the US, while the remaining seven a lower one.

Finally, the decomposition of these observed differences into household and economic-institutional effects show that, for most countries, the former contribute to an increase in financial fragility with respect to the US, while the latter act in the opposite direction. Overall, our model documents a stronger role of the economic-institutional environment in providing a safety net against financial fragility in Europe than in the US.

The remainder of the paper is structured as follows. Section 2 provides an overview of the literature on financial fragility. Section 3 introduces the definition of financial fragility, the methodology employed to estimate its determinants and that used to decompose the estimated differences with respect to the reference country. Data and descriptive statistics are presented in Section 4. The estimation results of the bivariate probit models on the pooled sample and by country are presented and discussed in Section 5. In Section 6, we decompose observed international differences in financial fragility between the contribution of the economic environment and that of the households' features. Section 7 concludes.

2. Literature on household financial fragility

A variety of indicators are used to assess household financial fragility: some of them are objective indicators, i.e. appropriately defined based on household-specific financial and economic information, while others are subjective measures, i.e. obtained from answers to questions on self-reported financial or economic distress.

Furthermore, most of the existing studies, regardless of the type of indicator used, relate the concept of financial fragility to indebtedness. For instance, Brown and Taylor (2008), Faruqui (2008), Keese (2009) and Jappelli et al. (2013) focus on objective indicators such as the debt-to-income ratio, the debt-service ratio, and the mortgage income gearing. Others, such as May and Tudela (2005), Duygan-Bump and Grant (2009), Magri and Pico (2009), Beck et al. (2010) and Georgarakos et al. (2010), rely on questions concerning the financial burden due to housing costs or being in arrears on mortgages or other debt payments.

Only a few studies are concerned with forms of financial hardship that are not necessarily due to indebtedness. Among these, some use indicators based on net wealth, saving and consumption (e.g. Brown and Taylor, 2008; Fuenzalida and Ruiz-Tagle, 2009; Giarda, 2013), while others are based on indicators such as having difficulties making ends meet (Christelis et al., 2009; McCarthy, 2011), poor living standards (Worthington, 2006) or questions over the confidence to cope with unexpected expenses (Lusardi et al., 2011). Although all these metrics are not meant to capture household poverty (as instead addressed by the literature on asset-based poverty, i.e. Brandolini et al., 2010), most of them identify poor and/or over-indebted households as financially fragile, thus failing to address other kinds of financial distress.

Brunetti et al. (2016) propose a novel characterization of financial fragility, which is not necessarily linked to indebtedness and is free of the subjectivity bias, by defining ‘financially fragile’ all households earning an income which suffices to cover all expected expenses, but that might be unable to face unexpected ones. The rationale behind this definition is that household portfolio choices may play a role in determining financial distress, whereby extremely illiquid assets (e.g. housing) may have a negative effect on household’s ability to cope with unexpected financial needs. Using data on Italian households spanning over the period 1998-2012, the authors find that the portfolio choices seem to be a relevant determinant of household’s financial fragility.

International comparative evidence is limited since most papers focus on a single country. Exceptions include ECB (2005), which looks only at mortgage-indebted households, and Jappelli et al. (2013) who investigate, for a wide range of European and extra-European countries, whether indebtedness is associated with greater financial fragility measured by the sensitivity of households' arrears and insolvencies to macroeconomic shocks. Besides, three recent contributions take advantage of the Household Finance and Consumption Survey (HFCS) to investigate the financial vulnerability of households in a cross-country perspective, namely Ampudia et al. (2016), Bankowska et al. (2015) and Gambacorta et al. (2020). Ampudia et al. (2016) propose a novel framework to identify distressed households by taking account of both their solvency and liquidity situation. Their indicator identifies distressed households as those having a financial margin - i.e. the difference between income and taxes, debt payments and basic living costs - negative for a determined number of subsequent months and lower than their liquid assets. The indicator is used to assess the impact of interest rate and income shocks on the aggregate degree of household vulnerability.² Yet, their indicator relies on the financial margin being negative, so that the proposed metric of distress seems to capture mostly an income effect. Additionally, their metric is not uniform across the countries considered, as it results from a calibration that is country-specific. The same applies to Gambacorta et al. (2020), who provide cross-country descriptive evidence on vulnerable households, i.e. those holding liquid assets (deposits, bonds, and listed equities) which are insufficient to keep the household above the national at-risk-of-poverty line for three months, i.e. the supposed length of the covid-19 pandemic lockdown.

In the same spirit, Bankowska et al. (2015) consider financially vulnerable those households with unsustainable debt both with respect to income (debt service-to-income higher than 40%) and with respect to assets (debt-to-assets higher than 100%), but again their definition is limited by construction to indebted households only.

Against this backdrop, the use of Brunetti et al.'s (2016) indicator in a cross-country comparative analysis represents a novelty, allowing us to depict potential differences in the determinants of financial fragility in countries that differ in terms of economic, institutional and cultural backgrounds. By decomposing the observed international differences in financial

² The framework of Ampudia et al. (2016), integrated with the financial distress indicator of Brunetti et al. (2016), is also applied in Bettocchi et al. (2018) to assess the impact of macroeconomic shocks on households' vulnerability in Italy.

fragility into two components, one which arises from differences in household characteristics and one from the economic environment in which comparable households live, we also deal with the literature using counterfactual analysis. Whilst this methodology has been largely used in the labour literature (see, among others, Albrecht et al., 2003; Arulampalam et al., 2007; Autor et al., 2008), to the best of our knowledge only Christelis et al. (2013) apply it to the field of household finance. However, their analysis is restricted to the over-50s and more importantly it is not applied to a financial fragility framework, rather to households' assets and mortgage holdings.

3. Methodology

3.1 Financial fragility: characterization and estimation strategy

We define 'financially fragile' households who currently are not in economic and financial trouble, but who might end up so should some unexpected expense occur. To model this definition, we classify households according to two conditions: (i) whether their income is sufficient to cover regular expenses, and (ii) whether they hold liquid assets that suffice to meet potential unexpected expenses.³ Households meeting the first condition, but not the second one are defined 'financially fragile'.

For each household i in country j , we generate the following two dichotomous variables:

$$y_{1ij} = I(\text{Income} \geq \text{regular expenses})_{ij} \quad (1)$$

$$y_{2ij} = \begin{cases} I(\text{Liquid assets} \geq 2000\$)_{ij} & \text{for } j = \text{US} \\ I(\text{Liquid assets} \geq 1500\text{€})_{ij} & \text{for } j \neq \text{US} \end{cases} \quad (2)$$

For the outcome variable y_{1ij} , we rely on a question asking the household whether last year's regular expenses were higher, about the same or lower than its income, and set the variable to 1 for each household i in country j declaring its regular expenses to be lower than or equal to income, and 0 otherwise.⁴ Variable y_{2ij} is set to 1 when household i in country j

³ Consistently with the existing literature (e.g. Lusardi et al., 2011), unexpected expenses are quantified in 1500€ for European countries and 2000\$ for the US.

⁴ For European countries we rely on question HI0600, whose exact wording is: "Aside from any purchases of assets, over the last 12 months would you say that your (household's) regular expenses were higher than your (household's) income, just about the same as your (household's) income or that (you/your household) spent less than (your/its) income?". For the US, we rely on a set of similar questions. The first (X7510) asking whether last-

holds a liquidity buffer, which is given by the sum of sight and saving accounts and certificates of deposits, worth at least 2000\$ for the US and 1500\$ for European countries.⁵

We simultaneously estimate the following two equations:

$$y_{1ij} = 1 \text{ if } (y_{1ij}^* = x'_{1ij}\beta_1 + \varepsilon_{1ij}) > 0; \quad 0 \text{ otherwise} \quad (3)$$

$$y_{2ij} = 1 \text{ if } (y_{2ij}^* = x'_{2ij}\beta_2 + \varepsilon_{2ij}) > 0; \quad 0 \text{ otherwise} \quad (4)$$

with the two error terms distributed as bivariate normal, $(\varepsilon_{1ij}, \varepsilon_{2ij} | x_{1ij}, x_{2ij}) \sim \text{BVN}(0,0,1,1, \rho)$, where $\rho \in (-1,1)$ is the correlation between the two errors. y_{1ij}^* and y_{2ij}^* are the latent variables underlying the observables y_{1ij} and y_{2ij} and are a function of the same set of covariates, therefore $x_{1ij} = x_{2ij} = x_{ij}$. Estimation of the system of equations is carried out via maximum likelihood.

Since we are interested in the determinants of financial fragility, we focus on the probability of the following state:

$$\Pr(y_{1ij} = 1; y_{2ij} = 0 | \mathbf{x}_{ij}) = \Phi_2(\mathbf{x}'_{ij}\boldsymbol{\beta}_1; -\mathbf{x}'_{ij}\boldsymbol{\beta}_2; -\rho) \quad (5)$$

where y_{1ij} and y_{2ij} are defined in Equations (1) and (2) and Φ_2 is the bivariate normal distribution.

The vector of explanatory variables \mathbf{x}_{ij} contains – besides countries fixed effects – the following groups of covariates:

year spending exceeded, was about the same, or lower than household's income; the second (X7509) asking, in case spending exceeded income, whether spending included exceptional expenses (such as the purchase of a home or automobile or spending for any investments); and, the last one (X7508) asking whether, leaving aside exceptional expenses, spending exceeded, was about the same, or lower than income. Worthy of note is that this characterization of financial fragility overlaps the one used by Brunetti et al. (2016), where financially fragility was also arising from the intersection of insufficient liquidity, coupled with income being sufficient to cover all expected expenses. The only difference is that condition (1) is now based on a household self-reported condition. The exact application of the characterization provided in Brunetti et al. (2016) is indeed unfeasible because the HFCS lacks data on disposable income as well as durable consumption and on insurance payments for all countries, and data on mortgage (and other debts) and maintenance payments for a few countries.

⁵ In general, market liquidity, a notion dating back to J.M. Keynes, refers to the ability of an asset to be converted into cash in a short time without causing a significant movement in its price and with minimum loss of value (e.g. Nikolaou, 2009). For the purposes of this paper, we want liquid assets to be characterized by a high level of liquidity which justifies the exclusion of other relatively liquid assets such as mutual funds.

- *Demographic*: number of household components, gender, age in linear and quadratic terms, marital status (single, widowed or divorced, having as reference category married and partnered) and level of education of the head of household, defined as the individual responsible for the household's financial and economic choices;
- *Socio-economic*: occupational status of the household head (self-employed, retired, unemployed, with employee as reference category), and quartiles of yearly household gross income and net wealth;

Then, we consider an additional specification in which we add the following group of variables:

- *Portfolio*: a dummy for having a mortgage, and an indicator of the portfolio illiquidity due to housing, defined as the ratio between the residential home value and household total assets.

3.2 *Decomposing international differences in financial fragility*

In order to assess international differences in the determinants of financial fragility, we estimate the bivariate probit model of equations (3) and (4) for each country separately. This allows us to compute, for each country j , the average probability of being financially fragile p_j . Then, we choose a reference or base country and we label this probability p_{base} . The difference in the average observed financial fragility between the base country and each country j is given by:

$$p_{base} - p_j \tag{6}$$

and can be decomposed as:

$$p_{base} - p_j = (p_{base} - \hat{p}_j) + (\hat{p}_j - p_j) \tag{7}$$

where \hat{p}_j is the average estimated counterfactual probability of financial fragility that households living in country j would exhibit if they lived in the reference country. It is obtained by applying the estimated coefficients of the base country to the households living in each country j .

The first term of the right hand side of equation (7) is the difference between the average probability of financial fragility in the base country and the counterfactual average probability of financial fragility that households living in another country j would exhibit if they lived in the base country. Hence, this component represents the contribution of the different households (or, more in general, population) characteristics living in each country to the observed

difference in the average probability of financial fragility between the two countries ('covariates effect' as named in Christelis et al., 2013). This term shows the extent to which differences in the probabilities of being financially fragile are due to a relatively unfavourable configuration of the characteristics of the population living in a particular country or region.

The second term is the difference between the counterfactual average probability of financial fragility that households living in country j would exhibit if they lived in the base country and the actual average probability of financial fragility in their country j . Thus, it captures the contribution of the different economic environments of each country (labelled 'coefficients effect' by Christelis et al., 2013). The more similar the countries (e.g. in terms of institutional and policy environment as well as financial development), the more similar the probabilities of financial fragility for households with a given configuration of characteristics, and the lower the relevance of this second term.

In sum, the two components capture differences in household characteristics and in the economic environment in which households live, respectively. Since the decomposition works on the average estimated probabilities, it only yields point estimates. In order to assess their statistical significance, we compute bootstrap standard errors by drawing (with replacement) from the full sample of all countries and repeating the estimation and decomposition 250 times. We take US as the reference country.

4. Dataset and descriptive statistics

We use the Household Finance and Consumption Survey (HFCS) for Europe and the Survey of Consumer Finances (SCF) for the US, which share significant portions of the questionnaire. The availability of such comparable and sufficiently detailed micro-data allows a comprehensive international comparison.

For the European countries, we employ the HFCS first wave, which gathers harmonised data on households' finances and consumption of 15 euro area countries (Austria, Belgium, Cyprus, Germany, Spain, Finland, France, Greece, Italy, Luxemburg, Malta, the Netherlands, Portugal, Slovenia, and Slovakia), and refers to 2008-2010.⁶ For the US, we rely on the 2010 wave of the SCF, which covers around 7,000 households. Then, the two datasets are joined to form one single dataset providing over 68,000 observations. We drop households where the

⁶ The reference year is 2010 for all countries, with the exception of Spain (2008), and Finland, Greece and the Netherlands (2009).

household head is under 20 or above 90 years of age, those having negative gross income, and those reporting no information on either real or financial wealth. Finally, we drop three countries – Malta, Finland and France – because of the lack of information on the age of the household head (Malta) and on the first of the two conditions required to define financial fragility (Finland and France). The final estimation sample consists of 13 countries and 40,885 observations.

Table 1 and **Table 2** report descriptive statistics of the variables used in the analysis over the full sample and by country, respectively (details on variables definition are provided in **Table A.1** in the Appendix).

TABLE 1 ABOUT HERE

Over the full sample, the average share of financially fragile households over the 13 countries under analysis is 26.5%, which stems from 85.9% of the households meeting condition (1) and 65% meeting condition (2) (**Table 1**). The household size is on average around 2.5. The majority of households have a male head (63.9%), who is married (58.4%), and on average around 52 years old. The highest educational attainment is typically upper secondary (the lowest level of compulsory education in most countries), i.e. in 33% of the cases, tertiary education is achieved by less than 1 household out of 3, while the rest attained lower levels of education. Average gross household income is €59,370 (the median is €36,250), while average (median) net wealth is €355,521 (€97,253), corroborating the distinctive asymmetry in income and wealth distributions. Finally, 34% of the households in the sample hold a mortgage, and on average, residential home represents more than 43% of households' total assets.

TABLE 2 ABOUT HERE

Table 2 shows that, while in some respects the countries are similar (e.g., the average age is between 48 and 55 years, and the household size is on average always between 2 and 2.8 members), there is a remarkable degree of variability among them. For instance, the distribution of marital status varies considerably across countries, with marriage being more widespread in the Mediterranean ones (between 63 and 70% of household heads are married), as opposed to Central European countries (between 43.5% in the Netherlands to less than 55% in Belgium), reflecting cultural differences. Moreover, in the Eastern Europe countries (Slovenia and Slovakia), female-headed households are more frequent than male-headed ones, as well as in Greece and Austria. The population structure shows differences also in terms of

education, with primary education being the most widespread level achieved in Portugal (almost 60%) as opposed to Cyprus, where tertiary education is reported as the highest level of education by more than 40% of surveyed household heads. The share of retired heads in Italy is 38.5%, i.e. twice as much the one in the US, and within Europe there is a large degree of variation, ranging from 24% of the Netherlands and Luxembourg to 40% of Slovenia. Similarly, self-employed generally are more prevalent in the Mediterranean countries than in central and eastern European ones and the US, suggesting relevant differences also in the labour market structure.

Moreover, the 13 countries under analysis differ sensibly also in terms of indebtedness and of the incidence of housing on total assets. In Italy, less than 10% of the households have a mortgage, as opposed to the Netherlands and the US where almost half hold mortgages. This suggests the existence of highly dissimilar credit markets. Similarly, despite the residential home is the most relevant asset, its relative incidence varies by more than 40pp, ranging between 30% in Germany to almost 74% in Slovakia. Most importantly, applying the same definition of financial fragility delivers a remarkable variability, ranging from 13% (in Luxemburg) to as much as 52% in Slovenia, with the US in between.

Interesting differences emerge also by separately inspecting the two conditions determining fragility. The range of variability of the first condition is 15 percentage points (from 79% in Cyprus to 95% in Slovakia), while the range of the second one is much wider, spanning from 36.4% in Slovenia to 84.5% in Luxemburg. While the first condition is more related to each country's general economic situation, the wide range of the second condition hints to different approaches to deal with the unexpected, which in turn may be explained by different cultural/socio-demographic conditions and attitudes (e.g. households do not need liquidity because they can rely on their family) or institutional features (e.g. households do not need liquidity because they can rely on consumer loans or because credit is provided also by non-financial institutions). Hence a definition of financial fragility that takes into account not only the economic dimension, but also cultural and institutional features affecting financial decisions opens to further investigation aimed to single out the role of each country cultural and institutional background.

Even more interestingly, there are some cases in which the share of financially fragile households is comparable, whilst the percentages arising from the two conditions differ. Take the case of Italy and Spain: almost all Italian households (92.5%) have sufficient income to face regular expenses, whilst the corresponding share is 10pp lower in Spain. Moreover,

holding sufficient liquid assets characterizes almost 3 Italian households out of 4 as opposed to 2 out of 3 of Spanish ones. Despite these differences, the resulting share of financially fragile households is equal to around one quarter in both countries. As for Italy, this condition seems to stem prevalently from holding insufficient liquid assets, whilst for Spain the picture is less clear.

5. Estimation results

Estimation of the bivariate probit model of equations (3) and (4) generates four outcomes corresponding to the four possible combinations of the two conditions. Since we are interested in the determinants of financial fragility, we report only the results relating to the case of interest (equation 5). The estimation results obtained over the full sample and by country are reported in **Table 3** and **Table 4**, respectively, and are expressed in terms of marginal effects.

5.1 Pooled sample

In **Table 3**, column (1) reports the results for the first model specification, including both Demographic and Socio-economic controls, whilst column (2) includes the two additional portfolio controls. In both models, the null for the absence of a correlation between the error terms of the two equations is rejected, the ρ is statistically significant at any conventional level of significance and equal to 0.145 in the first specification and 0.141 in the second. This result supports the appropriateness of a bivariate specification.

TABLE 3 ABOUT HERE

The estimated marginal effects for portfolio decisions show the importance of including these variables in our analysis. In line with expectations, we find that the higher the share of illiquid assets over total household portfolio, the higher the likelihood of incurring the financial fragility status: an increase of 1pp in the illiquidity degree of a household portfolio increases its chances of being financially fragile by as much as 12.96pp. Instead, indebtedness is associated with a reduction in the probability of financial fragility, suggesting that a (well-planned) level of indebtedness can help avoid financial fragility.

Turning to socio-economic and demographic controls and looking at our preferred specification in column (2), we observe that gender and age are not associated with financial fragility, a result consistent with Georgarakos et al. (2010), Giarda (2013) and Brunetti et al.

(2016). As for marital status, only divorced individuals are significantly more likely to be financially fragile with respect to married households. The negative gradient of education is not only robust to the inclusion of portfolio controls but also highly relevant: consistent with the literature on financial literacy – which uses educational attainment as its proxy – higher education leads to better financial planning and has been shown to be positively associated with net worth (Van Rooij et al., 2012). Financial fragility is less likely if the household head is retired and finally it is decreasing in both income and wealth quartiles.

5.2 *By country*

Table 4 reports the marginal effects of each control on the probability of observing financially fragile households by country.

TABLE 4 ABOUT HERE

In both model specifications - and for the majority of countries - the null for the absence of a correlation between the error terms of the two equations can be rejected, thus supporting the appropriateness of a bivariate specification (see Section 6 for robustness using a univariate probit model specification). The estimation results highlight the existence of common features among countries, but also of country-level specificities.

Consistently with the pooled sample, results underscore the relevance of controlling for portfolio composition. A consistent result across countries is the statistical significance (with the sole exception of Luxemburg) and positive sign of the ‘illiquidity due to housing’ indicator, whose magnitude reaches 0.2113 for Italy, 0.2666 for Portugal and 0.3582 for Slovakia. The result highlights that in these countries a 1pp increase in portfolio illiquidity is associated to an increase in the likelihood that a household may be exposed to financial fragility by way more than the pooled model average (0.1296 in **Table 3**). In the remaining countries, the estimated coefficients are below average, with a minimum of 0.0821 for Germany to 0.1163 for Greece. On the other hand, having a mortgage turns out to be only mildly relevant, if any at all, in 9 countries out of 15, having a positive impact on financial fragility only in Greece. This confirms the ability of our metric to capture difficulties other than those related to (over) indebtedness. Moreover, in the US, Austria, and Portugal, being indebted reduces the likelihood of distress, thus supporting the idea that a well-developed financial market that relies on formal credit may induce better financial planning.

As for socio-economic and demographic controls, the latter show a low statistical significance. An exception is age in Finland. Instead, education plays a role in explaining

financial fragility in France, Italy and Spain, with negative marginal effects: higher levels of education help reduce the probability of being financially fragile. No role is observed in Finland and Germany. In both models, economic controls highlight the relevance of wealth as a common feature: in all countries, higher levels of wealth reduce the likelihood of financial fragility, with the marginal effects increasing in absolute value as we move along the wealth distribution (albeit for Slovenia the effect is precisely estimated only above the 75th percentile). The result holds also for income quartiles, which are generally significant, with the expected sign and increasing magnitude in absolute value. However, for Greece, Slovenia and Slovakia, a significant reduction in the chances of being financially fragile is recorded only above the top income quartile. Moreover, for Cyprus and the Netherlands income does not seem to play a role, thus confirming the ability of the used metric to capture fragilities other than the income-related ones, at least in some countries. Consistently with the latter result, the occupational status is hardly significant in Germany, as opposed to Spain and France for instance, where unemployment significantly raises the chances of financial fragility.

6. What determines international differences in financial fragility?

Table 5 reports (i) the average estimated probabilities of being Financially Fragile by country, (ii) the corresponding differences with the estimated probability in the US, taken as base country and (iii) the decomposition of these differences into household or population (covariates) effects and economic environment (coefficients) effects.

TABLE 5 ABOUT HERE

First, we document a great variability across countries in the probability of financial fragility, which ranges from around 11% for Luxembourg and the Netherlands to more than 45% for Slovakia and 50% for Slovenia. Therefore, the differences with the US – for which the average predicted probability is 28% – vary a lot not only in magnitude but also in sign. Five countries (Cyprus, Greece, Portugal, Slovenia and Slovakia) have an average probability higher than that of the US, while the remaining seven have a lower average probability.

The decomposition of these differences into its two main components, i.e. the household effect and the economic-institutional effect, also shows a high degree of variability. In some countries, the two effects are both positive/negative thus increasing/decreasing the estimated probability with respect to the US, while in others they work in opposite directions. For instance, in Slovenia – the country displaying the highest probability of financial fragility

– both household characteristics and the specific country setting contribute to increase the average incidence of fragility compared to the US, while in Germany and the Netherlands, both effects reduce the incidence of financial fragility. By contrast, in countries such as Slovakia, Cyprus and Greece - where the average probability of financial fragility is higher than in the US - the difference is entirely driven by the configuration of the characteristics of the households and no role is played by the different economic-institutional conditions. More interestingly, for Portugal the country economic-institutional effect is negative, but this ‘protection’ is not sufficient to overcome the positive household effect, so that the final outcome is Portuguese households displaying an average estimated probability of financial fragility higher than that of the American ones.

By contrast in Italy, where household and country characteristics also have opposite effects with the former contributing positively to the likelihood of financial fragility, the protective effect of the economic-institutional setting is strong enough to offset the households characteristics effect, so that the overall difference is positive, albeit small in absolute value. For Spain, Austria, and Luxembourg the configuration of households characteristics pushes towards fragility, yet economic-institutional settings act as a protection against it. However, the magnitude of the latter effect is much higher (from 3 to 4 times), so that the final result points toward an overall lower average probability of financial fragility compared to the US. Finally, in Belgium – the country with the smallest estimated probability of financial fragility – institutional settings seem to be the only drivers.

Two final remarks emerge. On the one hand, with the exception of Germany and the Netherlands, EU households have characteristics that make them more likely to be financial fragile. On the other hand, the economic-institutional effects are for the most negative, i.e. most of the European countries exhibit conditions in their economic-institutional setup that reduce the likelihood of financial fragility with respect to the US. This seems to suggest that the EU countries’ institutional background provides ‘greater protection’ against financial fragility when compared to the US. Only Slovenia, the country with the highest average estimated probability of financial fragility, displays an effect of institutional settings that increases the likelihood of financial fragility compared to the US.⁷

⁷ Our results are robust to different settings. First, we modelled the condition of financial fragility by means of a univariate probit model, obtaining qualitatively similar results. Second, we changed condition 1 required for the status of financial fragility, i.e. by using non-poverty. To this end, we identify as non-poor those households having an annual disposable income higher than the poverty lines as reported by Eurostat. Results are available upon request.

7. Conclusions

In this paper, we empirically investigate the determinants of household financial fragility at a comparative level in Europe and the US based on two data sources: the Household Finance and Consumption Survey (HFCS) for twelve European countries (Austria, Belgium, Cyprus, Germany, Greece, Italy, Luxemburg, the Netherlands, Portugal, Spain, Slovenia, and Slovakia) and the Survey of Consumer Finances (SCF) for the US. The HFCS provides harmonized data at household level in Europe and shares very similar features with the HCS making the two surveys directly comparable.

In our analysis we take into account household portfolio choices represented by the degree of portfolio illiquidity and having a mortgage. To this end, we take from the framework originally implemented by Brunetti et al. (2016) for Italy and classify households as financially fragile if: (i) their income is sufficient to cover regular expenses, and (ii) their liquid assets do not suffice to meet potential unexpected expenses. We further decompose observed differences in average probability of financial fragility between European countries and the US (used as reference country) into differences arising from household characteristics and those arising from the economic-institutional setting of each country.

The estimation results on the pooled sample support the appropriateness of a bivariate specification and emphasize the importance of including portfolio controls, whereby an increase of 1pp in the illiquidity degree of a household portfolio increases its chances of being financially fragile by as much as 12.96pp, while having a mortgage is associated with a reduction in the probability of financial fragility. This confirms the ability of our metric to capture difficulties other than the debt-related ones. Financial fragility is not associated with age or gender, only divorced individuals are significantly more likely to be financially fragile compared to married households, while higher education, income and wealth significantly reduce financial fragility, as expected.

The main results hold for most of the countries considered, but interesting differences emerge both in terms of sizes of the marginal effects and in terms of their statistical significance. With reference to our main variables of interest, the ‘illiquidity due to housing’ indicator is always significant (with the exception of Luxemburg) and positive. However, the size of its marginal effect ranges between 8.21pp in Germany and 35.82pp in Slovakia. Moreover, having a mortgage is relevant only in Germany, Austria, the Netherlands, Greece, Portugal and the US. With the exception of Greece (positive marginal effect), in the other

countries being indebted does not play a role or is associated with an even reduced likelihood of distress.

Overall, we observe relevant differences in the estimated average value of the probability of financial fragility among countries. The lowest values are documented for Central-Northern European countries (e.g. 11.3% in the Netherlands), while the highest ones for Eastern Europe (e.g. 50.5% in Slovenia). Mediterranean countries are split into two groups, Spain and Italy with probabilities around a medium value (19.2% and 23.8%, respectively), and Cyprus, Portugal and especially Greece with values in the upper part of the range (29.4%, 33.2% and 40.9%, respectively). The US lie around the mean, with a value of 28%.

To understand what drives the estimated differences in the probability of being financially fragile we apply a counterfactual method – usually employed in the labour literature – to decompose observed differences between European countries and the US. The method is able to distinguish between the effects that arise from the households' characteristics (household effect) and those that arise from the economic-institutional setting characterising the country (economic-institutional effect).

The first takeaway of the comparative analysis is that there is a great variability among European countries in the size of the differences against the US, their sign and their statistical significance. Five countries – Cyprus, Greece, Portugal, Slovenia and Slovakia – display higher estimated probabilities of financial fragility than the US, but the differences range from -1.4pp in Cyprus to -22.4pp in Slovenia. The remaining seven European countries exhibit a lower degree of financial fragility than the US, with differences spanning from 4.3pp in Italy up to 16.7pp in Luxembourg and the Netherlands.

The second takeaway is that in all countries, excluding Germany and the Netherlands, the household effects are positive (i.e. increase in the average probability with respect to US), while the economic-institutional effects go in the opposite direction (exceptions are Slovenia and Slovakia). On the one hand, for the group of countries with a higher level of financial fragility than the US, the differences in probabilities are driven by the household characteristics that offset the role of the economic environment. An exception is Slovenia where also the coefficients effects push in the same direction. Portugal is an interesting case, since it is the only country in which both effects are statistically significant and opposite in sign: the economic environment is not strong enough to counterbalance the negative effects arising from population characteristics and thus to 'protect' households from financial fragility. On the other

hand, for the group of countries with a lower probability of financial fragility than the US, an interesting case is Italy where the economic environment effects (positive) are able to counterbalance population effects (negative) and provide a safety net to households.

Finally, most of the European countries exhibit conditions in their institutional and economic setting that work towards a reduction in financial fragility compared to the US, suggesting a greater ability of the European institutional background to provide a safer net against financial fragility than in the US.

Although the recent outbreak of the Covid-19 pandemic represents an unexpected and unprecedented economic shock at global level, the effects on households' financial fragility are likely to be asymmetric across countries. In this respect, our results can be useful to understand where differences arise from and help the set-up of appropriate policy actions.

Future research includes further investigation of the difference in financial fragility within Europe, by performing a decomposition of EU countries with respect to, for instance, Germany rather than to the US.

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TABLES

Table 1 Descriptive statistics on the pooled sample (N= 40,885)

Variable	Mean	Median	Std. Dev.	Min	Max
Meeting the first condition: Income \geq than regular expenses	0.859	1	0.348	0	1
Meeting the second condition: Liquidity > Unexpected expenses	0.650	1	0.477	0	1
Financially Fragile	0.265	0	0.441	0	1
Household size	2.491	2	1.383	1	12
Male	0.639	1	0.480	0	1
Age	51.743	51	16.726	20	90
Married	0.584	1	0.493	0	1
Single	0.171	0	0.376	0	1
Widow	0.109	0	0.311	0	1
Divorced	0.137	0	0.343	0	1
Primary	0.089	0	0.285	0	1
Lower_secondary	0.102	0	0.303	0	1
Upper_secondary	0.330	0	0.470	0	1
Post-secondary	0.166	0	0.372	0	1
Tertiary	0.313	0	0.464	0	1
Employee	0.499	0	0.500	0	1
Self Employed	0.093	0	0.290	0	1
Retired	0.246	0	0.431	0	1
Non-working	0.162	0	0.369	0	1
Gross Income	59.370	36.25	205.336	0	313350
Net Wealth	355.521	97.253	2150.210	-13420	1074911
Having a mortgage	0.340	0	0.474	0	1
Illiquidity due to housing	0.431	0.442	0.377	0	1

Note: Statistics computed using sampling weights (hw0010 for HSCF and X42001-revised Kennickell-Woodburn consistent weights- for SCF). Unexpected expenses are set equal to 1500€ for EU, 2000\$ for US. Monetary amounts expressed in thousand € for EU, in thousand \$ for the US.

Table 2 Descriptive statistics by country

Country	Germany (N=3,495)		Austria (N=2,326)		Netherlands (N=1,023)		Luxembourg (N=946)		Belgium (N=2,247)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Variable										
Meeting the first condition: Income >= expenses	0.901	0.298	0.891	0.311	0.853	0.354	0.924	0.264	0.877	0.328
Meeting the second condition: Liquidity >										
Unexpected expenses	0.772	0.420	0.833	0.373	0.813	0.390	0.845	0.362	0.775	0.418
Financially Fragile	0.188	0.391	0.142	0.349	0.140	0.347	0.131	0.338	0.170	0.376
Male	0.513	0.500	0.438	0.496	0.654	0.476	0.597	0.491	0.535	0.499
Age	52.175	17.308	51.343	16.530	53.061	14.920	49.960	15.568	52.563	17.159
Married	0.514	0.500	0.507	0.500	0.435	0.496	0.530	0.499	0.546	0.498
Single	0.238	0.426	0.239	0.426	0.348	0.477	0.243	0.429	0.190	0.392
Widow	0.124	0.329	0.108	0.310	0.075	0.263	0.092	0.289	0.128	0.334
Divorced	0.124	0.330	0.146	0.353	0.142	0.349	0.135	0.342	0.136	0.343
Primary	0.017	0.129	0.004	0.065	0.037	0.188	0.240	0.427	0.100	0.300
Lower_secondary	0.111	0.315	0.168	0.374	0.241	0.428	0.113	0.317	0.158	0.365
Upper_secondary	0.571	0.495	0.688	0.463	0.385	0.487	0.385	0.487	0.362	0.481
Tertiary	0.301	0.459	0.139	0.346	0.337	0.473	0.262	0.440	0.381	0.486
Household size	2.059	1.154	2.136	1.280	2.162	1.241	2.478	1.360	2.299	1.325
Employee	0.490	0.500	0.434	0.496	0.545	0.498	0.562	0.496	0.448	0.497
Self Employed	0.069	0.254	0.094	0.293	0.048	0.215	0.058	0.234	0.047	0.212
Retired	0.300	0.458	0.358	0.479	0.244	0.430	0.245	0.430	0.331	0.471
Non-working	0.140	0.347	0.113	0.317	0.163	0.369	0.136	0.343	0.174	0.379
Gross Income	44.716	44.276	42.311	44.465	47.273	26.954	83.727	88.520	50.746	85.984
Net Wealth	203.869	694.636	243.963	600.987	163.232	242.430	711.184	1842.924	344.020	570.585
Having a mortgage	0.186	0.389	0.171	0.377	0.447	0.497	0.327	0.469	0.288	0.453
Illiquidity due to housing	0.303	0.367	0.349	0.394	0.451	0.411	0.500	0.397	0.500	0.377

Note: Statistics computed using sampling weights (hw0010 for HSCF and X42001-revised Kennickell-Woodburn consistent weights- for SCF). Unexpected expenses are set equal to 1500€ for EU, 2000\$ for US. Monetary amounts expressed in thousand € for EU, in thousand \$ for the US.

Table 2 Descriptive statistics by country (continued)

Country	Greece (N=2,836)		Italy (N=7,836)		Portugal (N=4,272)		Spain (N=6,158)		Cyprus (N=1,200)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Variable										
Meeting the first condition: Income >= expenses	0.874	0.332	0.925	0.263	0.890	0.313	0.827	0.378	0.792	0.406
Meeting the second condition: Liquidity > Unexpected expenses	0.498	0.500	0.725	0.447	0.604	0.489	0.660	0.474	0.571	0.495
Financially Fragile	0.398	0.490	0.231	0.421	0.324	0.468	0.242	0.428	0.300	0.458
Male	0.410	0.492	0.557	0.497	0.709	0.454	0.508	0.500	0.592	0.492
Age	50.201	16.751	55.872	16.089	54.209	16.370	52.711	16.135	50.690	15.401
Married	0.653	0.476	0.630	0.483	0.669	0.470	0.641	0.480	0.699	0.459
Single	0.174	0.379	0.136	0.343	0.108	0.311	0.137	0.343	0.126	0.332
Widow	0.114	0.318	0.156	0.363	0.140	0.347	0.148	0.355	0.087	0.283
Divorced	0.059	0.235	0.078	0.269	0.083	0.275	0.074	0.262	0.088	0.283
Primary	0.319	0.466	0.252	0.434	0.599	0.490	0.349	0.477	0.179	0.383
Lower_secondary	0.111	0.314	0.277	0.448	0.147	0.354	0.201	0.401	0.076	0.265
Upper_secondary	0.363	0.481	0.356	0.479	0.144	0.351	0.190	0.393	0.338	0.473
Tertiary	0.207	0.405	0.115	0.319	0.109	0.312	0.260	0.439	0.408	0.492
Household size	2.670	1.177	2.542	1.275	2.719	1.259	2.685	1.222	2.797	1.437
Employee	0.328	0.470	0.384	0.486	0.425	0.494	0.410	0.492	0.549	0.498
Self Employed	0.152	0.359	0.111	0.314	0.116	0.321	0.084	0.277	0.103	0.304
Retired	0.281	0.450	0.385	0.487	0.347	0.476	0.207	0.406	0.231	0.422
Non-working	0.238	0.426	0.120	0.325	0.112	0.315	0.299	0.458	0.116	0.321
Gross Income	28.397	24.833	34.649	29.861	21.848	23.367	31.556	47.030	43.406	48.223
Net Wealth	152.053	186.848	278.442	528.441	161.382	559.935	292.729	1236.700	702.684	1718.768
Having a mortgage	0.145	0.352	0.097	0.296	0.346	0.476	0.270	0.444	0.358	0.480
Illiquidity due to housing	0.551	0.383	0.533	0.394	0.565	0.378	0.615	0.357	0.474	0.358

Note: Statistics computed using sampling weights (hw0010 for HSCF and X42001-revised Kennickell-Woodburn consistent weights- for SCF). Unexpected expenses are set equal to 1500€ for EU, 2000\$ for US. Monetary amounts expressed in thousand € for EU, in thousand \$ for the US.

Table 2 Descriptive statistics by country (continued)

Country	Slovenia (N=330)		Slovakia (N=2,030)		US (N=6,186)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Meeting the first condition: Income >= expenses	0.875	0.332	0.953	0.212	0.831	0.375
Meeting the second condition: Liquidity > Unexpected expenses	0.364	0.482	0.498	0.500	0.583	0.493
Financially Fragile	0.522	0.500	0.445	0.497	0.303	0.460
Male	0.418	0.494	0.446	0.497	0.738	0.440
Age	51.213	15.977	48.136	15.241	50.546	16.689
Married	0.618	0.487	0.567	0.496	0.596	0.491
Single	0.146	0.354	0.194	0.396	0.150	0.357
Widow	0.165	0.372	0.143	0.351	0.087	0.282
Divorced	0.070	0.255	0.096	0.294	0.167	0.373
Primary	0.037	0.189	0.005	0.070	0.022	0.145
Lower_secondary	0.195	0.397	0.065	0.246	0.034	0.182
Upper_secondary	0.537	0.499	0.766	0.423	0.244	0.429
Post-secondary	0.000	0.000	0.000	0.000	0.318	0.466
Tertiary	0.231	0.422	0.164	0.371	0.382	0.486
Household size	2.589	1.341	2.840	1.531	2.612	1.480
Employee	0.409	0.492	0.563	0.496	0.549	0.498
Self Employed	0.033	0.180	0.074	0.261	0.100	0.300
Retired	0.405	0.492	0.261	0.439	0.192	0.394
Non-working	0.154	0.361	0.102	0.303	0.159	0.366
Income	22.662	20.956	13.564	11.328	78.556	279.938
Net Wealth	146.910	166.014	79.630	84.157	464.446	2886.475
Having a mortgage	0.125	0.331	0.094	0.291	0.468	0.499
Illiquidity due to housing	0.680	0.361	0.736	0.306	0.408	0.356

Note: Statistics computed using sampling weights (hw0010 for HSCF and X42001-revised Kennickell-Woodburn consistent weights- for SCF). Unexpected expenses are set equal to 1500€ for EU, 2000\$ for US. Monetary amounts expressed in thousand € for EU, in thousand \$ for the US.

Table 3 Bivariate probit: marginal effects on being financially fragile, pooled sample

Variable	(1)	(2)	Variable	(1)	(2)
Male	0.0036 (0.008)	0.0056 (0.008)	Austria	-0.1703*** (0.010)	-0.1722*** (0.011)
Age	-0.0003 (0.000)	-0.0005 (0.000)	Belgium	-0.1224*** (0.012)	-0.1392*** (0.012)
Single	0.0157 (0.011)	0.0168 (0.011)	Cyprus	-0.0062 (0.016)	-0.0186 (0.016)
Widowed	-0.0026 (0.013)	-0.0075 (0.013)	Germany	-0.1048*** (0.011)	-0.1000*** (0.011)
Divorced	0.0391*** (0.012)	0.0405*** (0.012)	Spain	-0.0927*** (0.011)	-0.1229*** (0.011)
Lower secondary edu	-0.0562*** (0.013)	-0.0481*** (0.012)	Greece	0.0713*** (0.012)	0.0381*** (0.013)
Upper secondary edu	-0.0850*** (0.012)	-0.0756*** (0.012)	Italy	-0.0883*** (0.010)	-0.1128*** (0.010)
Post-secondary	-0.0522*** (0.016)	-0.0437*** (0.016)	Luxemburg	-0.2045*** (0.012)	-0.2143*** (0.012)
Tertiary edu	-0.1546*** (0.014)	-0.1399*** (0.013)	Netherlands	-0.1542*** (0.016)	-0.1578*** (0.016)
Household size	0.0164*** (0.003)	0.0146*** (0.003)	Portugal	-0.0400*** (0.012)	-0.0606*** (0.012)
Gross income quartile 2	-0.0889*** (0.011)	-0.0833*** (0.011)	Slovenia	0.2085*** (0.032)	0.1528*** (0.032)
Gross income quartile 3	-0.1554*** (0.012)	-0.1446*** (0.012)	Slovakia	0.1313*** (0.015)	0.0603*** (0.016)
Gross income quartile 4	-0.2212*** (0.013)	-0.2039*** (0.014)	Has a mortgage		-0.0542*** (0.009)
Net wealth quartile 2	-0.1555*** (0.011)	-0.1933*** (0.012)	Illiquidity due to housing		0.1296*** (0.012)
Net wealth quartile 3	-0.2619*** (0.012)	-0.3185*** (0.013)			
Net wealth quartile 4	-0.3414*** (0.012)	-0.3816*** (0.013)			
Self employed	-0.0087 (0.013)	0.0049 (0.013)	Observations	40,885	40,885
Retired	-0.0441*** (0.013)	-0.0515*** (0.012)	Log pseudo-likelihood	-181600868	-179838594
Non-working	0.0090 (0.010)	0.0042 (0.010)	Rho	0.145	0.141
			Wald test of rho = 0, chi2(1)	46.6536	43.7304
			Pval of Wald test	0.000	0.000

Note: Regressions are run using sample weights. Marginal effects are the weighted average of the marginal change in each household's probability of being financially fragile when each of the explanatory variables changes from 0 to 1 if dichotomous, or by a marginal amount if continuous.

*significant at 10%; **significant at 5%; ***significant at 1%.

Table 4 Bivariate probit: marginal effects on being financially fragile, by country

Country	Germany (N=3,495)		Austria (N=2,326)		Netherlands (N=1,023)		Luxembourg (N=946)		Belgium (N=2,247)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Male	0.0207 (0.015)	0.0216 (0.015)	0.0491*** (0.014)	0.0506*** (0.014)	-0.0176 (0.032)	-0.0185 (0.032)	0.0349 (0.023)	0.0366 (0.023)	-0.0209 (0.018)	-0.0177 (0.018)
Age	-0.0008 (0.001)	-0.0009 (0.001)	-0.0012* (0.001)	-0.0013** (0.001)	0.0006 (0.002)	0.0007 (0.002)	0.0005 (0.001)	0.0008 (0.001)	-0.0013 (0.001)	-0.0015 (0.001)
Single	-0.0099 (0.025)	-0.0080 (0.025)	-0.0300 (0.021)	-0.0280 (0.021)	0.0530 (0.041)	0.0548 (0.041)	0.0146 (0.033)	0.0121 (0.033)	0.0223 (0.030)	0.0244 (0.030)
Widowed	-0.0195 (0.031)	-0.0178 (0.030)	-0.0057 (0.027)	-0.0020 (0.027)	-0.0294 (0.055)	-0.0353 (0.050)	0.1510** (0.074)	0.1611** (0.077)	0.0349 (0.036)	0.0244 (0.034)
Divorced	0.0179 (0.028)	0.0195 (0.028)	0.0260 (0.024)	0.0294 (0.024)	0.0272 (0.046)	0.0321 (0.046)	-0.0038 (0.031)	-0.0076 (0.031)	0.0277 (0.029)	0.0350 (0.030)
Lower secondary edu	-0.0062 (0.075)	0.0002 (0.074)	0.1707*** (0.053)	0.1583*** (0.059)	0.0051 (0.059)	0.0085 (0.057)	-0.0361 (0.047)	-0.0382 (0.046)	-0.0117 (0.042)	-0.0151 (0.041)
Upper secondary edu	-0.0538 (0.074)	-0.0474 (0.072)	0.0938* (0.051)	0.0884 (0.057)	-0.0155 (0.059)	-0.0131 (0.056)	-0.0751** (0.034)	-0.0746** (0.034)	-0.1048*** (0.039)	-0.1013*** (0.039)
Tertiary edu	-0.0907 (0.075)	-0.0800 (0.073)	0.0569 (0.054)	0.0538 (0.060)	-0.0132 (0.062)	-0.0075 (0.059)	-0.1482*** (0.034)	-0.1463*** (0.034)	-0.1384*** (0.041)	-0.1376*** (0.040)
Household size	-0.0021 (0.009)	-0.0021 (0.009)	-0.0071 (0.009)	-0.0063 (0.009)	0.0231* (0.014)	0.0214 (0.013)	0.0166 (0.011)	0.0149 (0.011)	0.0262*** (0.008)	0.0253*** (0.008)
Gross income quartile 2	-0.0771*** (0.028)	-0.0773*** (0.027)	-0.0751*** (0.021)	-0.0712*** (0.020)	0.0269 (0.041)	0.0263 (0.041)	-0.1228*** (0.038)	-0.1316*** (0.038)	-0.0647** (0.027)	-0.0641** (0.026)
Gross income quartile 3	-0.1231*** (0.032)	-0.1154*** (0.032)	-0.0874*** (0.024)	-0.0778*** (0.024)	-0.0098 (0.042)	-0.0122 (0.043)	-0.1430*** (0.039)	-0.1519*** (0.039)	-0.0991*** (0.030)	-0.0939*** (0.028)
Gross income quartile 4	-0.1376*** (0.036)	-0.1269*** (0.036)	-0.1324*** (0.026)	-0.1186*** (0.026)	-0.0247 (0.043)	-0.0249 (0.042)	-0.1738*** (0.043)	-0.1810*** (0.043)	-0.0509 (0.037)	-0.0367 (0.036)
Net wealth quartile 2	-0.3143*** (0.032)	-0.3312*** (0.034)	-0.3069*** (0.027)	-0.3561*** (0.030)	-0.2475*** (0.052)	-0.2599*** (0.053)	-0.1408*** (0.040)	-0.1894*** (0.054)	-0.1359*** (0.035)	-0.2839*** (0.050)
Net wealth quartile 3	-0.3457*** (0.035)	-0.3898*** (0.040)	-0.2883*** (0.029)	-0.3699*** (0.036)	-0.2310*** (0.053)	-0.2529*** (0.055)	-0.2228*** (0.038)	-0.2629*** (0.053)	-0.2543*** (0.034)	-0.3947*** (0.046)
Net wealth quartile 4	-0.4135***	-0.4526***	-0.3205***	-0.3926***	-0.2678***	-0.2947***	-0.1760***	-0.2178***	-0.2812***	-0.3974***

	(0.033)	(0.037)	(0.030)	(0.036)	(0.051)	(0.054)	(0.052)	(0.058)	(0.035)	(0.044)
Self employed	0.0350	0.0409	0.0759**	0.0899***	0.0621	0.0856	0.0055	0.0233	0.0767*	0.1015**
	(0.035)	(0.035)	(0.030)	(0.032)	(0.091)	(0.095)	(0.055)	(0.056)	(0.045)	(0.047)
Retired	-0.0495	-0.0548*	0.0106	0.0064	0.0090	0.0109	-0.0811**	-0.0763**	0.0626	0.0641
	(0.031)	(0.031)	(0.021)	(0.021)	(0.048)	(0.048)	(0.039)	(0.039)	(0.041)	(0.039)
Non-working	0.0298	0.0270	0.0179	0.0175	-0.0162	-0.0111	-0.0114	-0.0053	0.0953***	0.0905***
	(0.023)	(0.023)	(0.022)	(0.021)	(0.041)	(0.041)	(0.034)	(0.033)	(0.028)	(0.027)
Has a mortgage		-0.0475*		-0.0478**		-0.0749*		0.0532		-0.0265
		(0.025)		(0.022)		(0.040)		(0.037)		(0.025)
Illiquidity due to housing		0.0821**		0.1015***		0.1068**		0.0079		0.1658***
		(0.035)		(0.027)		(0.054)		(0.053)		(0.037)
Log pseudo-likelihood	-25420670	-25236928	-2384715.4	-2364647.7	-4347264	-4314738	-99640.6	-99105.2	-3412854.3	-3374240.8
Rho	0.092	0.078	0.061	0.074	0.126881	0.138623	-0.1033	-0.1009	0.234	0.242
Wald test of rho = 0	2.062	1.571	0.672	0.991	1.67541	1.97072	0.616385	0.591397	11.773	12.761
Pval of Wald test	0.151	0.210	0.412	0.320	0.196	0.160	0.432	0.442	0.001	0.000

Note: Regressions are run using sample weights. Marginal effects are the weighted average of the marginal change in each household's probability of being financially fragile when each of the explanatory variables changes from 0 to 1 if dichotomous, or by a marginal amount if continuous.

*significant at 10%; **significant at 5%; ***significant at 1%.

Table 4 Bivariate probit: marginal effects on being financially fragile, by country (continued)

Variable	Greece (N=2,836)		Italy (N=7,836)		Portugal (N=4,272)		Spain (N=6,158)		Cyprus (N=1,200)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Male	0.0009 (0.021)	0.0045 (0.021)	-0.0167 (0.014)	-0.0163 (0.014)	-0.0253 (0.026)	-0.0259 (0.025)	-0.0333** (0.017)	-0.0342** (0.017)	0.0037 (0.034)	0.0229 (0.034)
Age	-0.0013 (0.001)	-0.0013 (0.001)	-0.0007 (0.001)	-0.0008 (0.001)	-0.0007 (0.001)	-0.0004 (0.001)	-0.0019** (0.001)	-0.0017** (0.001)	-0.0010 (0.002)	-0.0010 (0.002)
Single	0.0479 (0.033)	0.0566* (0.033)	-0.0146 (0.022)	-0.0218 (0.022)	0.0361 (0.031)	0.0465 (0.031)	0.0004 (0.025)	0.0113 (0.026)	0.0444 (0.064)	0.0419 (0.063)
Widowed	0.0290 (0.037)	0.0266 (0.037)	0.0249 (0.022)	0.0205 (0.022)	0.0529* (0.032)	0.0380 (0.031)	0.0383 (0.028)	0.0364 (0.027)	0.1022 (0.068)	0.1072 (0.066)
Divorced	0.0766** (0.039)	0.0867** (0.039)	0.0555** (0.026)	0.0499* (0.026)	0.0824** (0.035)	0.0834** (0.034)	0.0335 (0.032)	0.0371 (0.033)	0.0940 (0.066)	0.0902 (0.066)
Lower secondary edu	-0.0829** (0.034)	-0.0871** (0.035)	-0.0715*** (0.020)	-0.0626*** (0.019)	-0.0289 (0.027)	-0.0260 (0.027)	-0.0362 (0.022)	-0.0288 (0.022)	0.0348 (0.074)	0.0194 (0.072)
Upper secondary edu	-0.1438*** (0.030)	-0.1481*** (0.030)	-0.0908*** (0.022)	-0.0800*** (0.022)	-0.0879*** (0.028)	-0.0786*** (0.028)	-0.0675*** (0.024)	-0.0608** (0.024)	-0.0624 (0.055)	-0.0653 (0.054)
Tertiary edu	-0.1534*** (0.035)	-0.1575*** (0.034)	-0.1068*** (0.027)	-0.0935*** (0.026)	-0.1647*** (0.032)	-0.1453*** (0.034)	-0.0749*** (0.025)	-0.0676*** (0.025)	-0.0886 (0.062)	-0.0961 (0.062)
Household size	0.0364*** (0.010)	0.0304*** (0.010)	0.0320*** (0.007)	0.0305*** (0.007)	0.0362*** (0.009)	0.0321*** (0.008)	0.0234*** (0.009)	0.0251*** (0.009)	-0.0010 (0.014)	-0.0037 (0.014)
Gross income quart. 2	-0.0278 (0.029)	-0.0205 (0.029)	-0.1345*** (0.022)	-0.1212*** (0.021)	-0.0522** (0.025)	-0.0361 (0.024)	-0.0867*** (0.025)	-0.0818*** (0.025)	-0.0042 (0.048)	-0.0034 (0.047)
Gross income quart. 3	-0.0399 (0.031)	-0.0301 (0.031)	-0.2126*** (0.023)	-0.1919*** (0.023)	-0.1008*** (0.027)	-0.0763*** (0.027)	-0.1508*** (0.027)	-0.1495*** (0.027)	-0.0003 (0.056)	0.0033 (0.056)
Gross income quar. 4	-0.1074*** (0.035)	-0.0964*** (0.035)	-0.2731*** (0.025)	-0.2370*** (0.025)	-0.1654*** (0.031)	-0.1185*** (0.031)	-0.2080*** (0.030)	-0.1990*** (0.031)	-0.0580 (0.060)	-0.0559 (0.060)
Net wealth quartile 2	-0.0769*** (0.029)	-0.1495*** (0.034)	-0.1232*** (0.020)	-0.2916*** (0.029)	-0.1297*** (0.027)	-0.2544*** (0.029)	-0.0938*** (0.026)	-0.1534*** (0.030)	-0.1030** (0.048)	-0.1891*** (0.053)
Net wealth quartile 3	-0.1906*** (0.028)	-0.2586*** (0.033)	-0.1626*** (0.021)	-0.3594*** (0.030)	-0.2157*** (0.025)	-0.3359*** (0.028)	-0.2161*** (0.025)	-0.2639*** (0.028)	-0.1090** (0.049)	-0.1735*** (0.053)
Net wealth quartile 4	-0.2228***	-0.2644***	-0.1978***	-0.3748***	-0.3250***	-0.4086***	-0.2733***	-0.3014***	-0.2082***	-0.2336***

	(0.030)	(0.033)	(0.023)	(0.031)	(0.029)	(0.030)	(0.026)	(0.028)	(0.050)	(0.052)
Self employed	-0.0149	-0.0044	-0.0148	0.0250	-0.0249	0.0068	0.0042	0.0260	-0.0298	-0.0033
	(0.029)	(0.030)	(0.022)	(0.023)	(0.032)	(0.032)	(0.033)	(0.034)	(0.052)	(0.052)
Retired	-0.0297	-0.0303	-0.0789***	-0.0786***	-0.0292	-0.0365	0.0100	0.0141	-0.0426	-0.0285
	(0.038)	(0.038)	(0.022)	(0.022)	(0.034)	(0.032)	(0.027)	(0.027)	(0.069)	(0.068)
Non-working	0.0116	0.0141	0.0160	0.0129	-0.0427	-0.0340	0.0068	0.0113	-0.0339	-0.0135
	(0.028)	(0.028)	(0.024)	(0.023)	(0.027)	(0.026)	(0.021)	(0.021)	(0.051)	(0.052)
Has a mortgage		0.1068***		-0.0348		-0.0548**		0.0087		0.0289
		(0.030)		(0.021)		(0.024)		(0.020)		(0.037)
Illiquidity due to housing		0.1163***		0.2113***		0.2666***		0.1106***		0.1834***
		(0.033)		(0.026)		(0.029)		(0.028)		(0.053)
Log pseudo-likelihood	-3821048	-3776950	-17514459	-17261786	-3449857	-3361290	-16020286	-15866096	-321069.74	-315698.15
Rho	0.240234	0.23773	0.1692967	0.1833386	0.134291	0.12795	0.1859028	0.1768198	0.176	0.167
Wald test of rho = 0	29.1621	27.8301	14.9372	17.6139	9.73831	8.87432	19.6074	17.6922	6.615	5.769
Pval of Wald test	0.000	0.000	0.000	0.000	0.002	0.003	0.000	0.000	0.010	0.016

Note: Regressions are run using sample weights. Marginal effects are the weighted average of the marginal change in each household's probability of being financially fragile when each of the explanatory variables changes from 0 to 1 if dichotomous, or by a marginal amount if continuous.

*significant at 10%; **significant at 5%; ***significant at 1%.

Table 4 Bivariate probit: marginal effects on being financially fragile, by country (continued)

Variable	Slovenia (N=330)		Slovakia (N=2,030)		US (N=6,186)	
	(1)	(2)	(1)	(2)	(1)	(2)
Male	0.0602 (0.053)	0.0474 (0.053)	0.0717*** (0.027)	0.0845*** (0.025)	0.0041 (0.017)	0.0056 (0.016)
Age	-0.0070** (0.003)	-0.0075*** (0.003)	-0.0019 (0.002)	-0.0025* (0.001)	0.0006 (0.000)	0.0005 (0.000)
Single	-0.1607 (0.102)	-0.1707* (0.096)	-0.0154 (0.040)	-0.0059 (0.040)	0.0063 (0.020)	0.0071 (0.020)
Widowed	0.1387 (0.090)	0.1021 (0.087)	0.0661 (0.052)	0.0575 (0.052)	-0.0294 (0.027)	-0.0381 (0.027)
Divorced	-0.0929 (0.124)	-0.0724 (0.110)	0.1041*** (0.040)	0.1102*** (0.039)	0.0220 (0.019)	0.0224 (0.019)
Lower secondary education	0.0438 (0.126)	0.0240 (0.128)	-0.0792 (0.185)	-0.0521 (0.192)	-0.1393*** (0.052)	-0.1384*** (0.050)
Upper secondary education	-0.1267 (0.119)	-0.1293 (0.119)	-0.1794 (0.177)	-0.1364 (0.184)	-0.1937*** (0.042)	-0.1819*** (0.041)
Post-secondary education					-0.1740*** (0.041)	-0.1635*** (0.040)
Tertiary education	-0.2007 (0.144)	-0.2150 (0.141)	-0.2942* (0.179)	-0.2285 (0.186)	-0.2878*** (0.042)	-0.2712*** (0.041)
Household size	0.0040 (0.025)	-0.0012 (0.024)	0.0397** (0.017)	0.0397*** (0.015)	0.0103** (0.004)	0.0086** (0.004)
Gross income quartile 2	-0.1436* (0.084)	-0.1470* (0.081)	-0.0451 (0.040)	-0.0385 (0.041)	-0.0818*** (0.019)	-0.0753*** (0.019)
Gross income quartile 3	-0.1442 (0.089)	-0.1552* (0.087)	-0.0655 (0.044)	-0.0566 (0.044)	-0.1609*** (0.021)	-0.1482*** (0.021)
Gross income quartile 4	-0.3153*** (0.097)	-0.3119*** (0.093)	-0.1944*** (0.049)	-0.1521*** (0.049)	-0.2467*** (0.023)	-0.2284*** (0.024)
Net wealth quartile 2	-0.0502 (0.077)	-0.1226 (0.092)	-0.1091*** (0.041)	-0.2111*** (0.040)	-0.1265*** (0.019)	-0.1414*** (0.019)
Net wealth quartile 3	0.0286	-0.0653	-0.2392***	-0.3361***	-0.2783***	-0.3069***

	(0.086)	(0.099)	(0.043)	(0.041)	(0.020)	(0.021)
Net wealth quartile 4	-0.1812**	-0.2253**	-0.2726***	-0.3532***	-0.3864***	-0.3984***
	(0.088)	(0.092)	(0.045)	(0.041)	(0.021)	(0.021)
Self employed	-0.3312***	-0.2709**	-0.0836*	-0.0610	-0.0196	-0.0110
	(0.101)	(0.119)	(0.046)	(0.045)	(0.020)	(0.020)
Retired	0.1775*	0.1566	0.0766	0.0610	-0.0381*	-0.0507**
	(0.099)	(0.098)	(0.058)	(0.057)	(0.022)	(0.022)
Non-working	-0.1032	-0.0993	0.0454	0.0350	-0.0106	-0.0162
	(0.082)	(0.081)	(0.045)	(0.045)	(0.016)	(0.016)
Has a mortgage		-0.0954		0.0525		-0.0602***
		(0.085)		(0.036)		(0.015)
Illiquidity due to housing		0.1761*		0.3582***		0.1115***
		(0.100)		(0.044)		(0.021)
Log pseudo-likelihood	-98996238	-98203341	-595779	-568557	-1452214	-1394468
Rho	0.137	0.135	0.194632	0.118995	0.182704	0.161067
Wald test of rho = 0	17.160	16.586	1.72475	0.681919	5.44732	3.88832
Pval of Wald test	0.000	0.000	0.189	0.409	0.020	0.049

Note: Regressions are run using sample weights. Marginal effects are the weighted average of the marginal change in each household's probability of being financially fragile when each of the explanatory variables changes from 0 to 1 if dichotomous, or by a marginal amount if continuous.

*significant at 10%; **significant at 5%; ***significant at 1%.

Table 5 Decompositions of estimated differences in financial fragility probability (N= 40,885)

	Average probability of FF	Difference with respect probability of FF in US (0.2803)	Household effect	st. error	Economic-institutional effect	st. error
Netherlands	0.113	-0.167	-0.031**	0.012	-0.137***	0.015
Luxemburg	0.114	-0.167	0.046***	0.012	-0.214***	0.015
Germany	0.142	-0.138	-0.053***	0.009	-0.084***	0.010
Austria	0.143	-0.138	0.049***	0.012	-0.186***	0.015
Belgium	0.154	-0.126	0.016	0.011	-0.142***	0.014
Spain	0.192	-0.088	0.057***	0.015	-0.146***	0.017
Italy	0.238	-0.043	0.135***	0.018	-0.178***	0.019
Cyprus	0.294	0.014	0.033**	0.011	-0.021	0.020
Portugal	0.332	0.051	0.207***	0.026	-0.156***	0.027
Greece	0.409	0.129	0.134***	0.016	-0.005	0.019
Slovakia	0.456	0.176	0.140***	0.015	0.036	0.021
Slovenia	0.505	0.224	0.095***	0.022	0.124***	0.036

Note: For each country, the first and second column report the average estimated probability of being Financially Fragile, and the difference wrt the average estimated probability in the baseline country, i.e. US, respectively. The latter is then decomposed into household and economic-institutional effects, reported in the 3rd and 5th column respectively, whose standard errors have been computed using a minimum of 200 bootstrap replications. *significant at 10%; **significant at 5%; ***significant at 1%.

APPENDIX

Table A.1 Variables' definition

Variable	Description
<i>Dependent variables</i>	
Meeting the first condition: Net Income > Poverty line (60% of median equalized net income)	Dependent variable assuming value 1 if the household meets the first condition, namely if household income is about the same or higher than its regular expenses, and 0 otherwise. Question HI0600 in HSCF on European households, questions x7510, x7509 and x7508 in SCF for US households.
Meeting the second condition: Liquidity > Unexpected expenses	Dependent variable assuming value 1 if the households meets the second condition, namely if the liquid assets held by the households are higher than unexpected expenses, 0 otherwise. Liquid assets include sigh, saving and certificates of deposits, while unexpected expenses are set equal to 1500€ for European countries and 2000\$ for the US
<i>Control variables</i>	
Household size	Number of household components, ranging between 1 and 12.
Male	Binary variable assuming value 1 for households headed by a male, 0 otherwise.
Age	Integer variable representing the age of household head (values between 20 and 90).
Married or Partnered, Single, Divorced, Widow	Binary variables assuming value 1 for the corresponding marital status of the household head, 0 otherwise.
Primary, Lower secondary, Upper secondary, Tertiary	Binary variables assuming value 1 for the corresponding highest education level achieved by the head of the household, 0 otherwise.
Employee, Self-employed, Retired, Unemployed	Binary variables assuming value 1 for household heads being in the corresponding occupational status, 0 otherwise.
Income quartiles	Binary variables assuming value 1 if the household income is within the relevant distribution quartile, 0 otherwise.
Net wealth quartiles	Binary variables assuming value 1 if the household net wealth (sum of real and financial assets net of liabilities) is within the relevant distribution quartiles, 0 otherwise.
Having a mortgage	Binary variables assuming value 1 for households having a mortgage, 0 otherwise.
Illiquidity due to housing	Continuous variable defined as the residential home value over total assets; it ranges between 0 and 1.

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