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by Marianna Brunetti, Elena Giarda, Costanza Torricelli

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CEFIN – Centro Studi di Banca e Finanza
Dipartimento di Economia Aziendale – Università di Modena e Reggio Emilia
Viale Jacopo Berengario 51, 41100 MODENA (Italy)
tel. 39-059.2056711 (Centralino) fax 059 205 6927

Is financial fragility a matter of illiquidity?
An appraisal for Italian households

Marianna Brunetti
University of Roma Tor Vergata, CEFIN & CHILD

Elena Giarda
Prometeia, Bologna & University of Bologna

Costanza Torricelli*
University of Modena and Reggio Emilia & CEFIN

Abstract

In this paper we investigate household financial fragility and assess the role played by the composition of the household portfolio besides standard determinants of this condition (e.g. income, indebtedness, age, gender, financial literacy). We take the case of Italy, given the very peculiar portfolio composition (high level of housing and low level of indebtedness and portfolio diversification) and provide two main contributions. First, we propose a novel definition of financial fragility. Second, based on this new measure, we use data from the 1998-2010 Bank of Italy Survey on Household Income and Wealth to investigate the determinants of this condition. Our results confirm most usual markers of financial fragility and additionally highlight the role of homeownership, which is not related to the presence of mortgages but it is rather connected to specific socio-demographic features such as age and marital status.

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* Corresponding author: costanza.torricelli@unimore.it, Phone +390592056733, Fax +390592056947.
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1. Introduction

In recent years, household portfolios have attracted much attention and research efforts in a life cycle perspective, also due to a progressive shift from public to private pension schemes which force households to take a long-term perspective when deciding the portfolio composition. However, the 2007-08 financial crisis has brought to the forefront short term financial problems of the households and has given impetus to a literature on this issue, which is normally referred to as "household financial fragility". Actually, the very same definition of household financial fragility is by itself not univocal and remains somewhat controversial (see, e.g. Christelis et al., 2009; McCarthy, 2011). Moreover, according to the definition taken, the literature uses different measures of household financial fragility, most of them based on the degree of indebtedness, whereby financially fragile households are those unable to repay debts (Worthington, 2006; Jappelli et al., 2008; Anderloni and Vandone, 2010; Georgarakos et al., 2010).

The aim of this paper is to investigate household financial fragility and to assess the role played by the composition of the household portfolio besides standard determinants of financial fragility (e.g. income, indebtedness, age, gender, financial literacy). More specifically, the analyses we perform mean to answer a set of related questions: are households' portfolios too illiquid and, in particular, is there too much housing in them? If so, does the effect of homeownership change according to the family structure? More generally, does financial fragility change in a regular pattern over the life-cycle?

Our analyses provide a contribution on these issues by taking the case of Italy, which lends itself to the investigation given the very peculiar portfolio composition (high level of housing on the one hand, low level of indebtedness and financial diversification on the other) and the very pronounced demographic structure (strong population ageing, whereby elderly are typically "house rich and cash poor"). We use data drawn from the 1998-2010 Bank of Italy Survey on Household Income and Wealth (SHIW), which provides a complete picture of the socio-economic and financial condition of around 8,000 households every two years.

First, we focus on the measurement issue. In our view, the definitions of household financial fragility based on the degree of indebtedness often provide ex-post measures more suitable to capture realized households' arrears or defaults, but they are unsuitable for countries such as Italy, where the percentage of indebted households is very low, especially in an international comparison (e.g. ECB, 2005 and OECD, 2006). In contrast, by means of a new definition we mean to capture households potentially unable to finance unexpected expenses (even if possibly small) in a short time and without incurring additional costs. Thus, we define as financially fragile those households

whose income suffices to cover the expected expenses but whose liquid assets are lower than a certain threshold, required to cope with possible unexpected expenses. In this way, a more comprehensive measure of financial fragility is obtained, which includes households that are not necessarily indebted but have small or inexistent liquid savings and households with positive but totally illiquid net wealth. In sum, our measure of financial fragility applies to all households, regardless of their being indebted or not. Our results can be usefully confronted with Lusardi et al. (2011), who present a comparable analysis for the US.

Second, based on this new measure, we perform an empirical analysis to investigate the main characteristics associated with financial fragility. Specifically, we analyse the typical socio-economic characteristics - e.g. income, wealth, age, gender, position in the labour market and education - of financially fragile households. Besides these traditional features however, we investigate the association between financial fragility of households and their portfolio choices, with particular attention to the liquidity of the assets. These analyses allow gauging to what extent the excessive weight placed on an illiquid asset such as housing accounts for the financial fragility of some households with specific demographic features (e.g. over the life-cycle).

The rest of the paper is organized as follows. Section 2 recalls the related literature, discussing the indicators of household financial fragility and highlighting some limitations of the measures so far used. Section 3 describes the methodology, including our novel definition of financial fragility, and presents our dataset. The results of the empirical analyses are presented and discussed in Section 4 along with the robustness analyses. Last Section concludes.

2. Related literature

The definition of households' financial fragility, sometimes denominated vulnerability or distress, is not univocal. It follows that the relatively recent literature on the issue has been developing along different strands. A main distinctive feature of the existing studies relates to the nature of the indicator used to measure financial distress and to the household's type on which the attention is placed. As for the indicator, some analyses use objective indicators appropriately defined on the basis of household-specific financial and economic information, while others use subjective indicators derived from household surveys (mainly answers to specific questions). As for the type of household considered, while a few studies consider all households, other restrict the attention to specific categories such as indebted households and specific age groups (e.g. over 65 years old).

Overall most of the literature, independently of the use of objective or subjective indicators, is concerned with a concept of financial distress which is merely related to indebted households. Some authors study the ability of households to service debt, secured and/or unsecured by means of measures such as the debt-to-income ratio, the debt service ratio, and the mortgage income gearing. Examples are Brown and Taylor (2008), Dey et al. (2011), Faruqui (2008), Jappelli et al. (2008), and Keese (2009). This literature has been fostered by the increasing indebtedness of households against buying a house in the housing boom period[1] so that the use of indicators based on the loan-to-value ratio and on arrears in the payment of mortgage instalments is also frequent (e.g. Bonaccorsi et al., 2008; Cuhna et al., 2009, Kida, 2009). Other analyses are based on answers to questions concerning the financial burden due to housing costs (Beck et al., 2010; Georgarakos et al., 2010; May and Tudela, 2005) or being in arrears on mortgages or other debt payments (Duygan-Bump and Grant, 2008; Magri and Pico, 2009). 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, 2010) while a few others are based on subjective indicators such as having difficulties making ends meet (Chritselis et al., 2009) or questions over the confidence to cope with unexpected expenses (Lusardi et al., 2011). As for the determinants of the condition of financial distress, in the majority of cases, most of the informative content of these measures can be explained by income. Concerning the geographical scope of the analyses, the range is quite wide and some papers present comparative evidence (e.g. European Central Bank, 2005; Jappelli et al., 2008), although sometimes restricted to the sample of the over 65 (Christelis et al., 2009). However, most of the existing papers using survey data consider just one wave or a time span which does not cover a whole economic cycle. As for the methodology, financial fragility is typically modelled as a dichotomic variable, where fragile households are those meeting certain conditions, for instance a loan to value ratio above 33-40%, negative net wealth, arrears on debt repayments, or low confidence in the ability to cope with unexpected expenses, etc. As a result estimation is usually carried out by means of binary choice models.

In sum, no approach is problem free: measures based on answers to specific questions may suffer from a strong subjectivity and perception bias, while quantitative indicators so far analysed hinge too much on indebtedness or negative net wealth and, in general, most of the financial hardship can be explained by income conditions.

[1] On the default risk of high loan-to value mortgages see Olsen and Dunn (2010).

3. Methodology and Dataset

3.1 Financial Fragility: a new definition

The shortcomings of the existing financial fragility indicators discussed in the previous section are particularly severe for countries, such as Italy, where the degree of indebtedness is low and the proportion of households with negative net wealth is very limited. We believe it is important to have a definition of financial fragility with four main features: i) it does not refer to a specific household group only, e.g. in terms of age or indebtedness position; ii) it is quantitative, i.e. possibly free of subjectivity biases; iii)it is related to portfolio composition; and iv) it takes the short run into account, and in particular allows to separate the role played by expected and unexpected expenses.

In particular, we define as financially fragile those households who are able to afford expected expenses, but do not have a sufficient liquidity buffer to face unexpected ones. Thus, our measure of financial fragility does not aim to capture difficulties arising from insufficient income or over-indebtedness, rather it aims to capture cases of "non-optimal" portfolio allocation, whereby by non-optimal we mean a portfolio that is too exposed to liquidity risk. In other words, our financially fragile households are not necessarily poor, rather they hold assets which are too illiquid, such as real estate.

We thus classify households according to two conditions:

1) whether income suffices to meet expected expenses;
2) whether liquid assets held by the household suffice to meet potential unexpected expenses.

The above variables are defined as follows:

- "Income" is total yearly disposable income; [2]
- "Expected expenses" measure the planned expenditures of the household, and are here measured as the sum of yearly nondurable consumption, payments for rent and/or mortgages, maintenance payments and insurances (life, health and indemnity insurances);
- "Liquid assets" of the households are the sum of cash and bank and postal deposits;[3]
- "Unexpected expenses" correspond to "non-planned" outflows, such as the restoration of household capital stocks, including cars, housing and its appliances and other household

[2] The total disposable income provided in the SHIW historical archive conventionally includes, when applicable, the (imputed) rents from housing. The effects of this accounting convention are discussed in the robustness section.

[3] The amount of cash held by households is not available in the 2006 and 2010 waves. For this reason we imputed missing values by regressing cash, for all available years, on a set of controls, such as year, region, income, wealth and consumption. The SHIW provides information on the amounts held in banks and postal deposits, including both current and savings accounts, which represent on average the 86% and 14% respectively of total deposits.

durables, unexpected medical expenses, or even temporary income losses, e.g. resulting from changing jobs, reduction of wages and employment layoffs or temporary cessation. Herein we quantify them with 1500 € (in real terms), which is coherent with Lusardi et al. (2011).[4]

According to the conditions they meet, households can be thus classified in four groups, which we label as follows:

- *Unconstrained*: if Income ≥ Expected Expenses and Liquidity ≥ Unexpected Expenses;
- *Financially Fragile*: if Income ≥ Expected Expenses and Liquidity < Unexpected Expenses;
- *Over-consuming but liquid*: if Income < Expected Expenses and Liquidity ≥ Unexpected Expenses;
- *Constrained*: if Income < Expected Expenses and Liquidity < Unexpected Expenses.

Notice that the definition adopted allows to depict as Financially Fragile all households that earn an income at least sufficient to cover all expected expenses, but that might not be able to face unexpected expenses. In this way, we can identify those households which are not currently in economic or financial troubles, rather those which might potentially be so.

3.2 Methodology

The dependent variable Y_i represents the financial condition of each household as defined in the previous Section and hence takes m = 1, .., 4 unordered values: 1 when household i is Unconstrained, 2 when Financially Fragile, 3 when Over-consuming and 4 when Constrained. The empirical strategy relies therefore on the estimation of a multinomial logit model.[5] For each household i and for each category m of the outcome Y_i, the probabilistic model has the following specification:

[4] The amount of 1500€ represents the median monthly disposable income over the full period (constant across all waves considered). To express all monetary amounts in real terms, we use the consumption deflator (base 2010=100) provided by ISTAT.

[5] The multinomial logit model makes the so-called Independence of Irrelevant Alternatives (IIA) assumption, meaning that the odds do not depend on the other alternatives that are available. Performing both the Hausman and the Small-Hsiao tests, we found evidence against the IIA hypothesis. This hypothesis can be relaxed, but this generally leads to conceptually and computationally more complicated models so that, as a result, in applied work "*the multinomial logit model is the most frequently used nominal regression model*" (Long and Freese, 2006, p. 223). For additional details on the IIA and on the possible solutions in case of its rejection, see Long and Freese (2006), p. 243.

$$\Pr(Y_i = m \mid X_i) = \frac{\exp(\beta'_{(m|b)} X_i)}{\sum_{j=1}^{J} \exp(\beta'_{(j|b)} X_i)} \qquad \text{for } m = 1, \ldots, J, \text{ with } J = 4, \text{ and } b = 2$$

For identification purposes, one category has to be taken as the base *b*. Here we chose to normalize the model with respect to category 2, thus estimating the parameters of the remaining three categories. The choice is arbitrary and does not affect the computation of marginal effects and predicted probabilities shown later.

The vector of explanatory variables X_i contains different kinds of variables:

- **Fixed** controls: year of interview and region of residence;
- **Demographic** controls: number of household components as well as gender, age and age squared, marital status and level of education of the head of household;[6]
- **Economic** controls: occupational status of the head of household (dummies for being employee, self-employed, retired, unemployed), as well as household disposable income and household net wealth quintiles;
- **Portfolio** controls: dummy for having mortgages, dummy for having debt towards other families or relatives, dummy for being homeowner.

Estimating a multinomial model on a dependent variable with *J* alternatives amounts to simultaneously estimate (*J* – 1) binary models for all comparisons among the alternatives, which inevitably translates into a lengthy output. Additionally, the attention in this study is specifically on one out of the four possible household types, namely the Financially Fragile. Hence, in order to ensure concise and readable results, in what follows only the marginal effects of each control over the probability of observing $Y_i = 2$ are presented.[7]

3.3 Dataset and Descriptive statistics

Our dataset spans over the period 1998-2010 and draws from the Survey on Household Income and Wealth (SHIW), which specifically provides over that period seven waves (1998, 2000, 2002, 2004, 2006, 2008 and 2010) each interviewing around 8,000 households, for a total of 54,517

[6] The head of household is defined as the individual who declares herself/himselfresponsible for the financial and economic choices of the household.

[7] The marginal effects are computed as the average of the marginal change of each household's probability of belonging to one of the *m* types (in our case, being financially fragile) when each of the explanatory variables changes from 0 to 1, if dichotomic, or by a marginal amount, if continuous.

households.[8] The SHIW basic sample unit is the household defined as "a group of cohabiting people who, regardless for their relationships, satisfy their needs by pooling all or part of their incomes". For each household, the SHIW provides plenty of demographic information, including the number of household components as well as their age, level of education, gender and marital status. Beside demographic information, the SHIW also offers economic information at the household level, including net wealth (real and financial assets net of financial liabilities) as well as the amounts invested in a variety of financial assets.

Table 1 reports some descriptive statistics of the variables used in the analysis (see Table A.1 in the Appendix for a detailed description).

Table 1. Descriptive statistics

Variable	Mean	Standard deviation	Min	Max
Household type				
Unconstrained	0.634	0.482	0	1
Financially Fragile	0.148	0.355	0	1
Over-consuming	0.137	0.344	0	1
Constrained	0.081	0.273	0	1
Controls				
Male	0.636	0.481	0	1
Age	55.371	16.052	20	90
Married	0.640	0.480	0	1
Single	0.126	0.332	0	1
Divorced	0.066	0.249	0	1
Widow	0.168	0.374	0	1
Level of Education 1 (no title)	0.064	0.245	0	1
Level of Education 2 (primary)	0.259	0.438	0	1
Level of Education 3 (lower secondary)	0.301	0.459	0	1
Level of Education 4 (upper secondary)	0.283	0.451	0	1
Level of Education 5 (university)	0.088	0.283	0	1
Level of Education 6 (post-graduate)	0.005	0.070	0	1
Household size	2.589	1.288	1	12
Income	33,753	29,060	-52,123	1,147,231
Wealth	241,152	481,688	-823,364	29,000,000
Employee	0.345	0.475	0	1
Self-employed	0.154	0.361	0	1
Retired	0.402	0.490	0	1
Unemployed	0.027	0.161	0	1
Homeowner	0.685	0.465	0	1
Having a mortgage	0.082	0.274	0	1
Having debts towards family	0.023	0.151	0	1

Notes: All statistics are computed using sample weights.

[8] From the original sample we dropped all the households declaring negative consumption (5 observations), reporting no information on neither real nor financial wealth (3 observations) or with household head aged less than 20 or more than 90 (342 observations).

Most of the Italian households (63.4%) can be defined as Unconstrained, but the share of the Financially Fragile is the second highest in the sample, with an average of 14.8% and showing an increasing trend over time (from 12% in1998 to 14.2% in 2010). Average age is rather high, 55.4 years, reflecting the Italian population composition and its ageing process, thus resulting in a high percentage of heads of household who are retired (40.2%). The majority of households has a male head (63.6%), who is married (64%) and whose household owns the house they live in (68.5%). Only 8.2% of households has a mortgage and as little as 2.3% owns money to relatives or friends.[9]

As for educational attainment, heads with a lower secondary level (compulsory education) represent the highest percentage (30.1%), while a university degree is held by only the 8.8% of heads. Average disposable income is 33,753 euro at 2010 prices (while its median value is 27,814, reflecting the standard asymmetry detected in income distribution), while the average (median) net wealth is 241,152 (147,776) euro in real terms.

4. Results

4.1 Main results

First, we run a multinomial logistic regression based on the standard controls listed in the previous Section. Table 2 reports the marginal effects of each control over the probability of the household belonging to the Financially Fragile type.

Table 2. The determinants of financial fragility

Variables	Average marginal effect *(1)*	Average marginal effect *(2)*
2000	0.0464 ***	0.0460 ***
	(0.007)	*(0.007)*
2002	0.0265 ***	0.0258 ***
	(0.007)	*(0.007)*
2004	0.0159 **	0.0153 **
	(0.007)	*(0.007)*
2006	0.0202 ***	0.0197 ***
	(0.007)	*(0.007)*
2008	0.0444 ***	0.0435 ***
	(0.007)	*(0.007)*
2010	0.0296 ***	0.0289 ***
	(0.008)	*(0.008)*

[9]Consistently the households with arrears in mortgage instalments longer than 90 days (information available only in the 2008 and 2010 waves) are only 157, corresponding to the 0.99% of the households interviewed in those waves.

Male	-0.0192 ***	-0.0198 ***
	(0.006)	*(0.006)*
Age	-0.0006	-0.0004
	(0.001)	*(0.001)*
Age^2	0.0008	0.0007
	(0.001)	*(0.001)*
Single	0.0109	0.0109
	(0.008)	*(0.008)*
Divorced	0.0418 ***	0.0409 ***
	(0.011)	*(0.011)*
Widow	0.0129 *	-0.0151
	(0.007)	*(0.010)*
Education level 2	-0.0440 ***	-0.0450 ***
	(0.010)	*(0.010)*
Education level 3	-0.0888 ***	-0.0894 ***
	(0.011)	*(0.011)*
Education level 4	-0.1151 ***	-0.1155 ***
	(0.011)	*(0.011)*
Education level 5	-0.1066 ***	-0.1069 ***
	(0.014)	*(0.014)*
Education level 6	-0.1686 ***	-0.1693 ***
	(0.022)	*(0.022)*
Household Size	0.0096 ***	0.0098 ***
	(0.002)	*(0.002)*
Income quintile 2	0.0120 *	0.0108 *
	(0.006)	*(0.006)*
Income quintile 3	-0.0061	-0.0061
	(0.007)	*(0.007)*
Income quintile 4	-0.0278 ***	-0.0276 ***
	(0.008)	*(0.008)*
Income quintile 5	-0.0511 ***	-0.0506 ***
	(0.009)	*(0.009)*
Wealth quintile 2	-0.1858 ***	-0.1893 ***
	(0.015)	*(0.015)*
Wealth quintile 3	-0.2197 ***	-0.2215 ***
	(0.016)	*(0.016)*
Wealth quintile 4	-0.2423 ***	-0.2434 ***
	(0.017)	*(0.017)*
Wealth quintile 5	-0.2689 ***	-0.2697 ***
	(0.017)	*(0.017)*
Employee	0.0068	0.0063
	(0.009)	*(0.009)*
Self-employed	0.0078	0.0089
	(0.011)	*(0.011)*
Retired	0.0139	0.0141
	(0.009)	*(0.009)*

Unemployed	0.0579 ***	0.0580 ***
	(0.018)	*(0.018)*
Having Mortgage	-0.0695 ***	-0.0665 ***
	(0.007)	*(0.008)*
Having debt towards family	0.0828 ***	0.0821 ***
	(0.018)	*(0.018)*
Homeowner	0.1401 ***	0.1318 ***
	(0.007)	*(0.008)*
Homeowner*Widow		0.0458 ***
		(0.013)
Observations	54516	54516
Pseudo R^2	0.2883	0.2886

Notes: Average marginal effects based on the estimation of a multinomial logit with robust standard errors (in parenthesis) clustered at the regional level. The marginal effect of age is the overall effect of age and age squared. Each regression includes time and regional dummies.* significant at 10%; ** significant at 5%; *** significant at 1%.

Column 1 shows that the time dimension indicates some degree of procyclicality of this condition, possibly due to overall portfolio cyclicality. In fact, household portfolios tend to be riskier also in terms of liquidity during stock market booms (as shown for Italy by Brunetti and Torricelli, 2010) and too illiquid during real estate market booms.

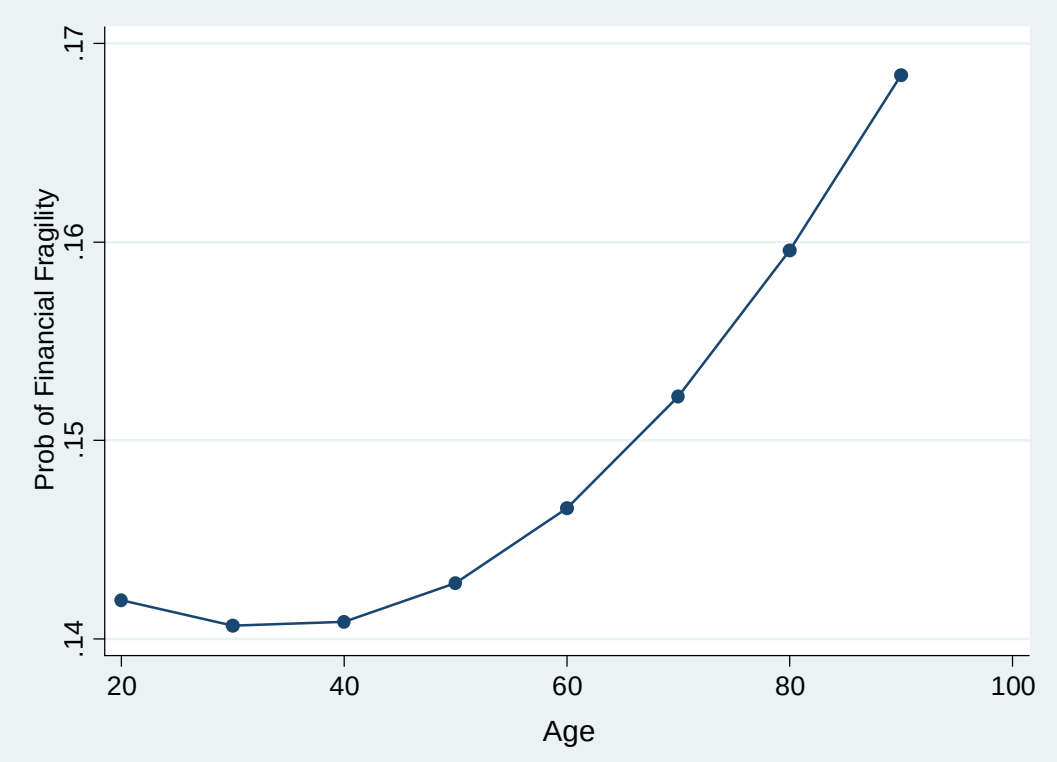
As for the demographic dimension, it is to be noted that on average male-headed households have a lower probability of being financially fragile, while the opposite is observed for larger households and for those whose head is divorced or, even if only weakly, widow. The negative gradient of education is highly relevant: consistently with the literature on financial literacy - for which the educational attainment can be taken as a proxy -a higher education might lead to a better financial planning, and hence reduce the probability of undergoing a situation of financial fragility. The marginal effects of age and age squared are not statistically significant. Yet, once the probability of being financially fragile is computed at each point in the life-cycle, evidence of some variation is obtained, with financial fragility being higher for older households (see Figure 1).

As for the economic dimension, financial fragility is decreasing in income and wealth quintiles, albeit in the former case a statistically significant effect appears only as from the 4th quintile. As for the occupational status, financial fragility does not seem to be associated with any status for which an income flow is somehow present (employee, self-employed or retired), while liquidity shortage is clearly much more likely whenever the household head is non-occupied.

Next, all the controls concerning the portfolio choices of the households are highly significant. Interestingly, being indebted might have a different effect depending on who is the lender: households indebted with friends or relatives are on average more likely to be financially fragile, while those indebted with banks would be less likely so. This might reflect the fact that

relying on formal credit might actually imply a better financial planning. Also, it has to be recalled that in Italy households who have access to credit are typically highly selected, and hence most likely to be Unconstrained. In the same spirit, the positive effect of debt towards family might be indicating a state of financial distress possibly due to the fact that households have already been rated low by banks. Finally, according to expectations, having a highly illiquid asset such as housing strongly increases the likelihood of liquidity burden.

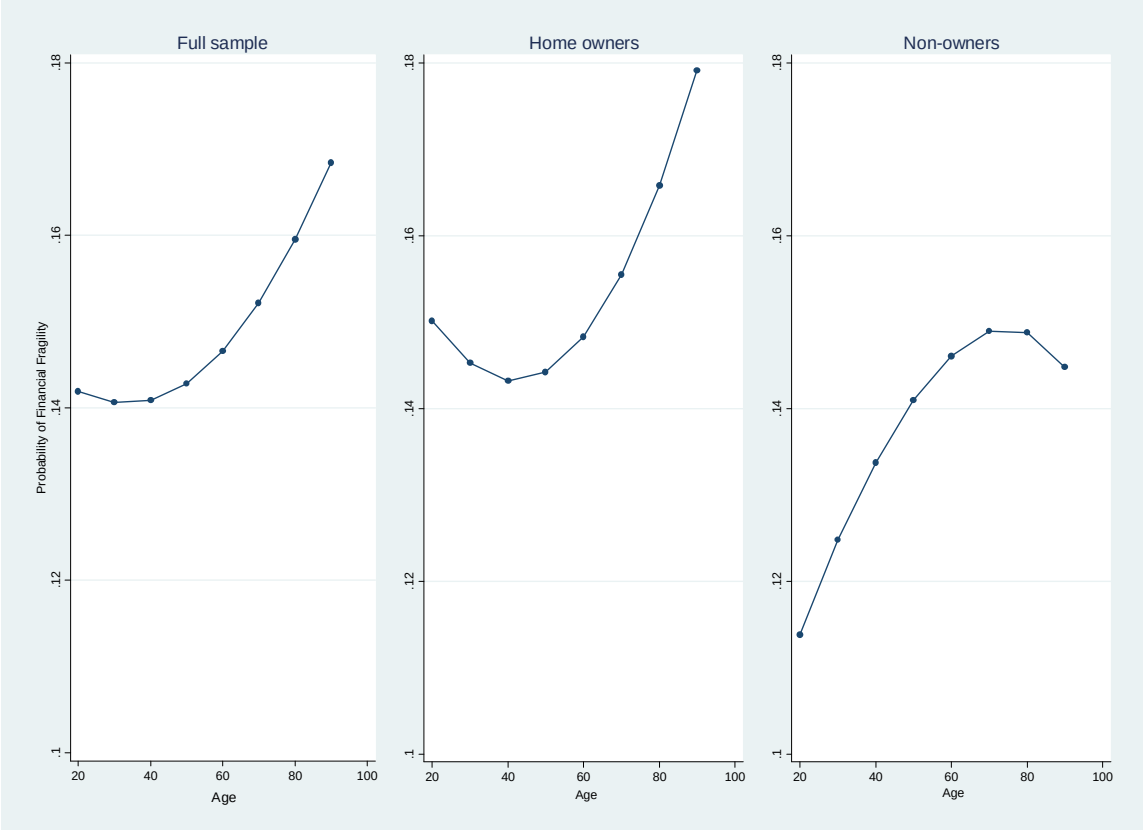
Figure1: Probability of Financial Fragility, by age of the household head



Since homeownership might actually be one of the main factors associated with financial fragility, this aspect is further investigated. To this end, the interaction between widowhood and ownership is firstly explored, finding that financial fragility of widows actually appears only in the presence of housing (see Column 2, Table 2). The interaction with age is also explored, by re-estimating the multinomial logit over the two subsamples of homeowners and non-owners and then by looking at the life-cycle profile of the model's predicted probabilities. Figure 2 shows that, not only homeownership makes financial fragility on average much more likely, but also the two life-cycle profiles of homeowners and non-owners are remarkably different: while the likelihood of financial fragility is increasing for young and elderly homeowners, the probability of experiencing liquidity shortage shows a humped-shaped pattern for non-owners.

Thus, our definition allows to highlight that homeownership bringing along a substantial lack of liquidity is especially significant for the young and the elderly.

Figure2: Probability of Financial Fragility, by age and homeownership



4.2 A finer look at the results

In Table 3, we compare the marginal effects reported in our preferred model specification (Table 2, column 2) with the full set of odds ratios estimated in the multinomial logit model. Thus, Columns 2, 3 and 4 report the odds ratios obtained comparing Financially Fragile households with respect to Unconstrained, Over-consuming and Constrained households respectively, while Colum 1 reports the overall marginal effects. The marginal effect of a control essentially summarizes the average change in the probability of observing the outcome of financial fragility for each (continuous or discrete) variation in the control variable. The overall effect results from the coefficients of three comparison groups and, since the Unconstrained group is the most numerous, in most cases it determines the prevailing effect.

In general, a control unquestionably increases (reduces) the probability of financial fragility whenever all the corresponding odds ratios are statistically significant and higher (lower) than one. In the present study, the characteristics that reduce the likelihood of experiencing financial fragility are: being male, highly-educated and wealthy. By contrast, other features increase the likelihood of potential difficulty, specifically homeownership and its interaction with widowhood.

Conversely, the effect of a few other characteristics depend on the alternative status with which financial fragility is compared. For instance, the negative effect of higher income quintiles on the probability of experiencing financial fragility results from two opposite effects. On the one hand, the odds in Column 2 are lower than one, showing that the higher the income, the lower the probability that a household is Financially Fragile with respect to Unconstrained households. On the other, the odds in Columns 3 and 4, being higher than one, show that a higher income increases the probability of financial fragility for Over-consuming and Constrained households respectively. The overall negative effect is thus the result of the former effect prevailing on the latter due to the bigger dimension of the Unconstrained group. The same holds for household size, whereby the small overall marginal effect in Column 1 results from the combination of a positive effect (each additional member increases by 19% the likelihood for the household to be Financial Fragile rather than Unconstrained, Column 2), and two smaller negative effects (Columns 3 and 4, where each additional member reduces the likelihood of financial fragility by increasing by 5.75% and 15.49% the probability of belonging to the Over-consuming or Constrained categories respectively).

Also debts towards family imply different effects depending on the comparison group: their presence increases the probability of being Financially Fragile rather than Unconstrained or Over-consuming, while it decreases it if compared to Constrained. On the whole we can conclude that having such an informal type of debt increases the probability of falling in the Financially Fragile group.

Finally, some characteristics seem to be relevant only for some comparison groups. This happens for age, marital status and employment status. For instance, households with a regular income stream, such as the employee and the retired, are more likely to be Financially Fragile rather than Constrained, while the unemployed (and more weakly the self-employed) are more likely to be Financially Fragile rather than Unconstrained. Additionally, this analysis confirms the role for homeownership in increasing the likelihood of financial fragility for widows. Interestingly, the presence of a mortgage is not relevant *per se* as a determinant of financial fragility with respect to Unconstrained households, while it strongly reduces the probability of financial fragility for both Over-consuming and Constrained households. It follows that in this case the overall effect turns out to be negative.

Table 3. Multinomial logit: marginal effects compared with odds ratios

	(1)	*(2)*	*(3)*	*(4)*
Variables	Marginal Effects	Fin. Fragile / Unconstrained	Fin. Fragile / Over-consuming	Fin. Fragile / Constrained
Male	-0.0198 ***	0.8614 ***	0.7712 ***	0.7732 ***
Age	-0.0004	1.0068	0.9741 **	0.9719 **
Age squared	0.0007	0.9955	1.03 ***	1.034 ***
Single	0.0109	1.0751	1.2903 ***	1.0639
Divorced	0.0409 ***	1.5554 ***	1.317 **	0.9853
Widow	-0.0151	0.7826 **	1.186	1.0072
Edu 2	-0.0450 ***	0.7755 ***	0.4097 ***	0.794 **
Edu 3	-0.0894 ***	0.5479 ***	0.2162 ***	0.61 ***
Edu 4	-0.1155 ***	0.4375 ***	0.1377 ***	0.4634 ***
Edu 5	-0.1069 ***	0.4996 ***	0.1251 ***	0.5806 **
Edu 6	-0.1693 ***	0.2216 ***	0.0458 ***	0.1661 ***
Household size	0.0098 ***	1.1913 ***	0.9475 *	0.8451 ***
Income quintile 2	0.0108 *	0.4292 ***	2.1733 ***	6.0331 ***
Income quintile 3	-0.0061	0.2655 ***	4.8421 ***	16.0414 ***
Income quintile 4	-0.0276 ***	0.1855 ***	11.5912 ***	34.8609 ***
Income quintile 5	-0.0506 ***	0.133 ***	44.2121 ***	137.9545 ***
Wealth quintile 2	-0.1893 ***	0.2407 ***	0.2831 ***	1.0981
Wealth quintile 3	-0.2214 ***	0.1739 ***	0.2186 ***	0.9116
Wealth quintile 4	-0.2434 ***	0.1443 ***	0.1318 ***	0.6155 ***
Wealth quintile 5	-0.2697 ***	0.1219 ***	0.0529 ***	0.2528 ***
Employee	0.0063	0.9689	1.2135 *	1.4549 ***
Self-employed	0.0089	1.1999 *	0.8108	0.9339
Retired	0.0141	0.9182	1.589 ***	2.2374 ***
Unemployed	0.0580 ***	1.9735 ***	1.0877	0.9669
Having Mortgage	-0.0665 ***	1.1503	0.1105 ***	0.1108 ***
Having debt towards family	0.0821 ***	2.5594 ***	1.5341 ***	0.6792 **
Homeowner	0.1318 ***	2.4461 ***	11.8969 ***	5.4388 ***
Widow*Homeowner	0.0458 ***	1.432 ***	1.577 ***	1.6134 ***

Notes: Column (1) reports the overall average marginal effects. Columns (2) to (4) report odds ratios of the multinomial logit with Financial Fragility as base category. In order to make results more easily interpretable in terms of financial fragility, the reciprocal of odds ratios is reported. Each regression includes time and regional dummies (not shown) and is estimated with robust standard errors clustered at the regional level. *significant at 10%; ** significant at 5%; *** significant at 1%.

The analysis based on the odds ratios allows for further considerations, which might be useful to find markers or early warning indicators of financial fragility. If we want to understand which factors increase the probability of having insufficient liquidity w.r.t. being in good economic

and financial health, we can look at the ratios in Column (2), which are based on the comparison between Financially Fragile and Unconstrained households. Since the former differ from the latter only for the lack of enough liquidity to cope with unexpected expenses, ratios in Column 2 can signal those factors affecting the probability of a "downgrade". For instance, an odds ratio of 0.8614 for males means that being males reduces by around 15% (1-0.8614) the probability of being Financially Fragile rather than Unconstrained. Beside usual markers (e.g. gender, income, wealth, employment status), a few interesting indications arise. Specifically, the odds for being Financially Fragile relative to Unconstrained are 2.4 times greater for homeowners than for non-owners. Additionally the odds ratio (1.4320) of the interaction between widowhood and ownership confirms that widowhood is associated with insufficient liquidity only in the presence of housing: the probability of being Financially Fragile rather than Unconstrained is 43% higher for widows owning their home than for widows non-owners. The presence of a mortgage does not matter (the odds ratio is not significant), while having debts towards the family more than doubles (odds ratio equal to 2.5594) the likelihood of financial distress.

4.3 Robustness

A set of (not presented) additional regressions has been run to check the robustness of the results to a series of alternative specifications of the control variables, of the dependent variable and hence of the statistical model actually estimated.

As for the control variables, we first observe that the total disposable income provided in the SHIW historical archive conventionally includes, when applicable, the (imputed) rents from housing. This means that, all else equal, homeowners have a higher income with respect to non-owners and hence a higher probability of meeting the first condition. While this does not affect the probability of being financially fragile for those households without liquidity problems, it might actually increase such probability for homeowners if their liquid assets are lower than the 1500€ threshold. We thus cleaned the total yearly disposable income from the imputed rents and repeat the analyses. We also try a model specification in which income and wealth entered in linear and quadratic terms are replaced by income and wealth quintile dummies. To test the role played by the degree of liquidity or illiquidity of the households' portfolios we use two additional variables: the share of liquid assets over total financial assets and the share of the home value over total assets.

As for the dependent variable, which represents the categorization of households according to their ability to meet expected expenses and potentially unexpected expenses, whereby the latter

are here set equal to 1500 € (in real terms). We thus re-estimate the main model specification using different liquidity thresholds, from 1200 to 2000€.

As for the methodology, we try an alternative way of modelling the dependent variable: more specifically, we use a binomial rather than a multinomial specification, so that the dependent variable now assumes value 1 when the household is financially fragile (category 2 of the original multinomial model) and 0 otherwise (former categories 1, 3 and 4, therefore collapsing the three household types Unconstrained, Over-consuming and Constrained into a single one). We are aware that this specification would be less appropriate economically, since financially fragile households would be compared to a variety of non-homogeneous households. Yet, estimating a binary choice model allows us to relax the IIA hypothesis, for which we do not find completely supporting evidence.

Results, available upon request, show that our main conclusions hold under each of the mentioned robustness checks. In particular, the results on portfolio controls remain unchanged, with homeownership and debts towards relatives strongly increasing the likelihood of financial fragility and debts towards bank reducing it.

5. Conclusions

With this study we propose a novel definition of household financial fragility that means to capture households who are not currently financially vulnerable but might be in such a condition in the near future. The definition thus aims to exclude households whose financial fragilities are totally explained by income (e.g. over-indebted) and to separate the role played by expected and unexpected expenses. In particular, we define as financially fragile those households who are able to afford expected expenses, but do not have liquidity enough to face unexpected ones.

The empirical analysis is performed for Italy where homeownership is high, but indebtedness low and usual measures of financial fragility based on it fail to capture fragilities of the households. The results highlight that our definition confirms the role played by most of the usual markers (income, wealth, education, gender, etc.), but emphasizes new dimensions of households' financial fragility. In particular, contrary to common credence, we show that the fragility is negatively associated with mortgages while positively associated with informal debts. As for marital status, divorced are more financially fragile, while widows turn up to be more likely financially fragile only in the presence of homeownership. We also find evidence of a life-cycle effect, which is remarkably different depending again on homeownership: the probability of experiencing financial fragility is minimum for middle-aged (around their 40s) and peaks for older

owners, while non-owners seem to be more able to avoid situations of potential difficulty especially during typically "cash-poor" periods such as youth and retirement.

The multinomial approach allowed us to highlight some interesting results. Some controls unquestionably increase (reduce) the probability of financial fragility. For instance financial fragility is less likely for males, the highly-educated and the wealthy, while more likely for homeowners. By contrast other controls seem to be relevant depending on the alternative status with which financial fragility is compared. An example is employment status: households with a regular income stream, such as the employee and the retired, are more likely to be Financially Fragile rather than Constrained, while the unemployed (and more weakly the self-employed) are more likely to be Financially Fragile rather than Unconstrained.

Our approach is to some extent comparable with Lusardi et al. (2011), although they use answers to specific survey questions, while here we use an objective measure based on the amount held by households into fully liquid assets such as bank and postal accounts. While Lusardi et al. (2011) report that fragility is a condition mainly experience for US "middle class" (although they stress that the period the survey was run (June-Sept. 2009) might have exacerbated anxiety/pessimism), our investigation shows that financially fragility is not typically middle class, rather it seems more related to the fact that there is too much housing in Italian household portfolios. In particular old people find themselves with an excessive (compared also with their needs) amount of wealth immobilized in houses and young ones (with uncertain labour income perspectives) are locked in too early in housing, an important engagement which, as stressed by Donovan and Schnure (2011), also implies a reduction in labour mobility.

Our analysis is first of all relevant for households, since it highlights the need to take into account, at the portfolio level, the risk of incurring unexpected expenses, regarding e.g. the restoration of household capital stocks including cars, housing and other household durables, or even income instability, resulting e.g. from changing jobs, reduction of wages and employment layoffs or temporary cessation. Such a need becomes more and more imperative in the light of the economic downturns and of the move toward a weaker social safety net, which should make households increasingly more responsible for the "unexpected". Yet, the reported evidence has also implications for financial intermediaries and advisors, who might need to revisit standard rules for household portfolios that tend to display too much housing in their composition and some procyclicality in the holding of risky and illiquid assets (e.g. stocks and real estate). These considerations highlight the need for normative models for household portfolio selection to drive realistic choices in consideration of the housing decisions (e.g. Kraft and Munk, 2011) and the need to hedge its riskiness (e.g. Voicu and Seiler, 2011). Our results bring along suggestions for the

markets, as they call for innovative products and foster research on the optimal design of reverse mortgages loans (e.g. Nakajima and Telyukova, 2011).

The analyses presented in the present paper open to further investigations, which include a deeper understanding the consequences of financial fragility, with particular attention to the ability of the proposed definition of financial fragility to act as an early warning indicator for some (negative) households' economic outcomes.

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APPENDIX

Table A.1 – Variable description

VARIABLE	Description
SHIW DATA Source: http://www.bancaditalia.it/statistiche/indcamp/bilfait	
HOUSEHOLD TYPE	Dependent variable assuming 4 values: 1 for being Unconstrained, 2 for being Financially Fragile, 3 for being Over-consuming, 4 for being Constrained.
FRAGILE	Binary variable assuming value 1 for those satisfying our financial fragility definition, 0 otherwise.
MALE	Binary variable assuming value 1 for male, 0 for female.
AGE/ AGE^2	Integer variables representing the age of household head (values between 20 and 90) and its squared term.
MARRIED/SINGLE/ DIVORCED/WIDOW	Binary variable assuming value 1 for the corresponding marital status, 0 otherwise.
EDU	Categorical variable representing the highest education level achieved: 1 = no education 2 = primary school 3 = secondary school 4 = college 5= graduate level 6 = post-graduate level.
HOUSEHOLD SIZE	Number of household components ranging between 1 and 9.
INCOME	Continuous variable representing household total yearly disposable income (including potential children maintenance provided by ex-partners) at 2010 value expressed in €.
WEALTH	Continuous variable representing household wealth at 2010 value expressed in €.
EMPLOYEE/ SELF-EMPLOYED/ RETIRED/UNEMPLOYED	Binary variable assuming value 1 for household heads being in the corresponding occupational status, 0 otherwise.
HOMEOWNER	Binary variable assuming value 1 for owner of residential house.
HAVING MORTGAGE/ HAVING DEBT TOWARDS FAMILY	Binary variable assuming value 1 for household having a mortgage or debt vs. relatives/friends, 0 otherwise.

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