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Past Income Scarcity and Current Perception of Financial Fragility[§]

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Abstract

The aim of this paper is to test whether a temporary experience of income scarcity in the recent past affects the individual's assessment of financial fragility over time. Using EU-SILC (European Union Statistics on Income and Living Condition) longitudinal data in 2010-2013 period, our results highlight that individuals who transited out of a short spell of scarcity tend to record a lower subjective ability to make ends meet than those who never experienced it during the reference period, even after two years and controlling for the current level of household income. When a more objective measure of household financial health is taken, the effect is weaker and disappears when current income is accounted for. Our results, which are robust to various robustness checks, have implications for public policies since they question the idea that helping people to leave an objective condition of income scarcity is enough to address poverty and social exclusion.

Keywords: Scarcity; Financial fragility; Perception; Coarsened Exact Matching.

JEL Classification: C25, D60, I32.

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1. Introduction and literature review

A common implicit assumption in public policies against poverty and social exclusion is that helping people with financial difficulties to transit out of poverty is enough to solve the problem. However, transition out of poverty generally happens when a poverty line is crossed over, whereby the latter is defined by social convention or experts (Atkinson, 1969). But leaving a condition of poverty or income scarcity may not be accompanied by a change in the perception that the individual has concerning the financial-economic health of his/her household. If a person still feels to be poor, the implication is a lower effectiveness of the policies, which helped the household to transit out of a distressed condition.

The literature on poverty and financial health traditionally measures these phenomena on the basis of (objective) income indicators, although, more recently, consideration of multidimensional and non-monetary (subjective) indicators such as happiness or well-being has been proposed (e.g. Guio et al., 2009; Alkire and Santos, 2010; Di Tella et al., 2010; McCarthy, 2011). Under a subjective approach, the individual's assessment replaces the objective and expert-determined threshold in determining the household economic conditions (Paglin, 1980). Difference between the two measures depends on additional factors that may be either observable (e.g. household spending, assets accumulation) or unobservable (e.g. personal traits, aspirations).

Some authors find that, once basic needs are satisfied, higher income levels do not have a long-lasting impact on happiness (see, among others: Easterlin, 1974; Brickman et al., 1978; Blanchflower and Oswald, 2004; Di Tella and MacCulloch, 2010; Di Tella et al., 2010). For instance, Di Tella and MacCulloch (2010), using individual panel data from the German Socioeconomic panel and a life satisfaction ladder question to estimate one's happiness, find that home-owners (i.e. wealthier households) highlight a happiness adaptation to income (after around seven years), while renters (i.e. poorer households) do not. Moreover, some studies show that increases of the income level may not determine any effect on happiness or well-being (Brickman et al., 1978, and Knight and Gunatilaka, 2012). Psychologists explain this phenomenon through the so-called 'hedonic treadmill' model, according which people's happiness reacts to good and bad events only temporarily.[1]

Other empirical studies have explored well-being adaptation to income decrease or poverty entry (Ayllón and Fusco, 2017; Clark et al., 2016). Using the SOEP data from 1985 to 2012, Clark et al. (2016) try to figure out the well-being time profile of income poor individuals, finding that poverty is associated with lower life satisfaction and there is a lack of happiness adaptation regardless the poverty duration and its intensity. Ayllón and Fusco (2017), using the 2003-2011 Luxembourg Socio-Economic Panel data, show similar results with regard to subjective poverty, pointing out a strong relationship between past (perceived) financial difficulties and current (objective) poverty.

Subjective measures are subject of a long-standing skepticism amongst economists, especially when these data are used as dependent variables (Bertrand and Mullainathan, 2001; Ravallion, 2012). Nevertheless, the self-assessment of economic conditions remains a good and broadly adopted measure in new empirical researches based on the so-called 'scarcity approach' (Mullainathan and Shafir, 2013). According to this new approach, living a condition of scarcity (e.g. poverty, lack of time, starvation), defined as *"having less than what you feel you need"*, alters how people look at things, and thus influences their decisions. Mullainathan and Shafir (2013) state that scarcity determines a 'tunneling tax' (i.e. the narrowing of the visual field on the need leads to neglect valuable

[1] For more details on the hedonic treadmill and its effects on well-being adaptation, see Diener et al. (2006).

aspects) and a 'bandwidth tax' (i.e. the scarcity condition reduces individuals' computational capacity and the ability to make good decisions). The authors show also that individuals living a scarcity condition have a higher probability to fall into a 'scarcity trap' (i.e. a long-term status of bias) for two different reasons: I) tunneling leads individuals to use the same resources less effectively, and II) a lack of bandwidth decreases the ability to take advantage of temporary opportunities in order to plan a way out of scarcity. Indeed, some empirical researches highlight a strong relationship between income poverty and the perception of financial difficulties or well-being (Ayllón and Fusco, 2017; Clark et al., 2016), but no evidence is available on how individual perception reacts when people transit out of the scarcity condition.

Against this background, the aim of this paper is to test whether and to what extent even a temporary experience of income scarcity[2] in the recent past affects the individual's assessment of current financial-economic health. Given the lack of consensus on the most appropriate indicator of financial health (for a discussion see Brunetti et al., 2016), we perform our analyses on different indicators of financial fragility (ability to make ends meet and financial burden of the total housing cost) and we test robustness of our results across different degrees of scarcity (income below the standard poverty threshold, defined as 40/60 percent of the yearly national median equivalised income) and length of its experience.

Our analyses are based on EU-SILC (European Union Statistics on Income and Living Condition) longitudinal data over the period 2010-2013 so as to assess not only the heterogeneity of this effect across socio-demographic characteristics, but also across different welfare systems and family structures in Europe. In fact, EU-SILC data not only allow measuring poverty, but they also provide information on non-monetary aspects of household's living condition, such as material deprivation and well-being and produce comparable datasets among almost all European countries.

We focus on the non-poor in order to look at the short-mid term effects of scarcity on a subjective measure of economic-financial health once the former has completely disappeared.[3] We are interested in this potential relationship, because the risk to remain mentally stuck in a prolonged status of financial fragility may have important implications for future levels of poverty and inequality. In fact, this condition determines a lower willingness to adopt new technologies, a higher social exclusion, and low investments in long-term both monetary and non-monetary outcomes such as education and health (Farkas et al., 2000; Haushofer and Fehr, 2014; Carvalho et al., 2016). In addition, a lower subjective socio-economic status leads to lower levels of life satisfaction and personal control (e.g. lower personal mastery and higher perceived constraints), to endorse more likely contextual explanations, and to be more dependent on others (Krauss et al., 2009; Poluektova et al., 2015).

The remainder of the paper is organized as follows. Section 2 describes the empirical strategy and the EU-SILC panel data. Section 3 presents the results, and last Section concludes.

2. Aim, empirical strategy and data

The aim of our analysis is to test whether and to what extent a temporary income scarcity experienced in the recent past affects the individual's assessment of current financial-economic health,

[2] Income scarcity is in this paper used as synonymous of poverty, as illustrated in the next Section.

[3] A number of studies highlights that income scarcity significantly affects individual cognitive resources, because it imposes load and impedes cognitive capacity (Blank and Barr, 2009; Mani et al., 2013; Haushofer and Fehr, 2014). However, they explore the effects of scarcity among the very same poor.

i.e. borrowing from Mullainathan and Shafir (2013), whether the 'tunneling effect' persists after income scarcity itself disappeared.

To this end, we define two main hypotheses to be tested:

- Hypothesis 1: A past one-off experience of scarcity affects perception of financial fragility over time.
- Hypothesis 2: The scarcity effect differs according to the welfare system.

In order to test them, we observe two groups of households over time: those who suffered a scarcity experience at the start of the reference period and those never hit by scarcity in the whole period. For the former, when scarcity ends, the perceived financial fragility should - *ceteris paribus* - decrease converging to the levels reported by the latter group. If over time there is full convergence between the two groups, it means that the scarcity effect has no duration on the perception of financial fragility; otherwise, there is a substantial risk that people remain mentally stuck in a persistent status of financial fragility.

Among the possible definitions of income scarcity, we take the European Commission's definition of severe at-risk-of poverty: people experience an income scarcity if they live in a household whose total equivalised disposable income is below the standard poverty threshold, defined as 40 percent of the yearly national median equivalised income.[4] We take this definition for three main reasons: it is objective (household income below a specific threshold), relative (country based), and time-varying (poverty threshold annually calculated). However, in consideration of other measures proposed in the literature, we provide robustness checks in Section 3.

As for the household perception of financial fragility, similarly to Christelis et al. (2009) and McCarthy (2011), we proxy it through a six-level Likert item question to estimate the ability to make ends meet. Specifically, in our dataset, the question to the household respondent is:

"*Thinking of your household's total income, is your household able to make ends meet, namely, to pay for its usual necessary expenses?"* '1 – With great difficulty', '2 – With difficulty', '3 – With some difficulty', '4 – Fairly easily', '5 – Easily', or '6 – Very easily'.

In our econometric specification, we consider as financially fragile people living in a household whose reported ability to make ends meet is equal to 1 or 2; 'non-fragile' otherwise. Since the ability to make ends meet is defined at the household level only, our unit of analysis is the household and individual characteristics refer to the household head, i.e. the individual, aged 16 and over, responsible for the accommodation. We use household sample weights in all estimates.

Our analysis relies on the EU-SILC (European Union Statistics on Income and Living Condition) data. The dataset provides detailed micro-data on income and living conditions, labor supply, and numerous demographic and socioeconomic characteristics (e.g. education, health, and home ownership) at both individual and household level. We use the EU-SILC data because they allow measuring income scarcity and capturing further non-monetary aspects of household's living condition, such as the ones for material deprivation and well-being. Moreover, this survey aims to annually produce comparable datasets among almost all European countries, adopting the same

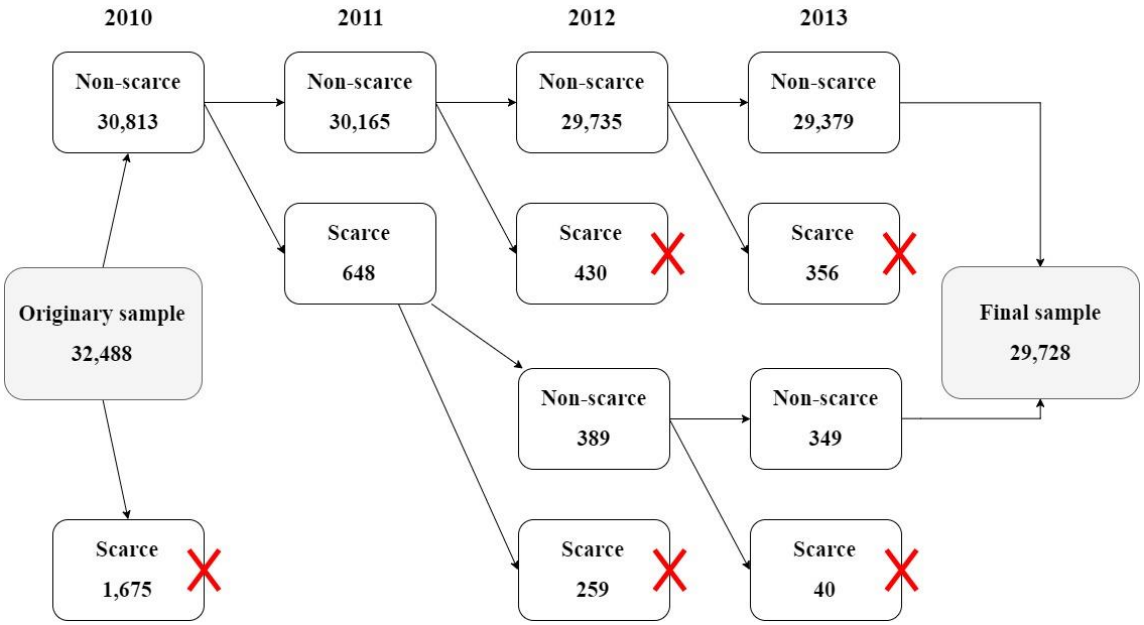
[4] The standard poverty threshold is obtained, for each country in each year, correcting total disposable household income for the modified OECD equivalence scale, which gives a value of 1 to the household head, 0.5 and 0.3 to each additional adult and child, respectively. We will perform robustness on the threshold.

questionnaire, definitions, and methodology. Therefore, we can also develop a comparative analysis in order to get possible dissimilarities across countries.

In particular, we use the longitudinal EU-SILC UDB 2014, which refers to incomes received in the 2010-2013 period. The sample covers households living in 26 EU-Member countries (Germany and Romania are missing) and 2 EU Associate Members (Iceland and Norway). Since subjective data are used as to define the dependent variable, to avoid the risk of relevant unobserved time-invariant variables, we adopt the solution suggested by Ravallion (2012) deciding to use a panel dataset of countries and people, as well other studies in the well-being literature (Newman et al., 2008; Ayllón and Fusco, 2017; Clark et al., 2016).

We define a sub-sample consisting of households observed over a full four-year period, in which the head never changed, and which provided valid responses to all variables used in our analysis. The panel sample counts 32,488 households having experienced the above-defined income scarcity during the reference period as illustrated in Figure 1.

Figure 1 – Scarcity experience over time of households in the panel sample



From the panel sample, we observe that 1,675 households already experienced income scarcity in 2010, but we do not know from how long they were in that condition because of the temporal limitation of the panel (i.e. left-truncation bias). Since households experiencing different scarcity spans may be quite heterogeneous, and to avoid the left-truncation bias, we drop from the total sample all households that were already income scarce in 2010 and shift the analysis one year ahead. We thus focus only on households having lived a scarcity condition in 2011 but not in subsequent years (349 units) and those who never experienced scarcity in the reference period (29,379 units), for a total of 29,728 observations.

Table 1 shows descriptive statistics of the final sample and variable definitions. Most observations are female-headed households (56%), mean age is 54 years, nearly half of reference persons are married (46%), and high- or very high-educated (40% and 29% respectively). The average number of household members is 2.2; most households have at least one member employed (55%) or one retired

(39%), and are home owners (70%). Only a few households state not having a car or not being able to keep home adequately warm, and 38% of households have debts, loans or mortgages. Almost half of the households belong to the lower income class (i.e. having a household income between the above-defined poverty threshold and the national median), while only 22% belong to the upper class (i.e. having a household income above 150% of the national median).

Table 1 – Descriptive statistics and variable definitions

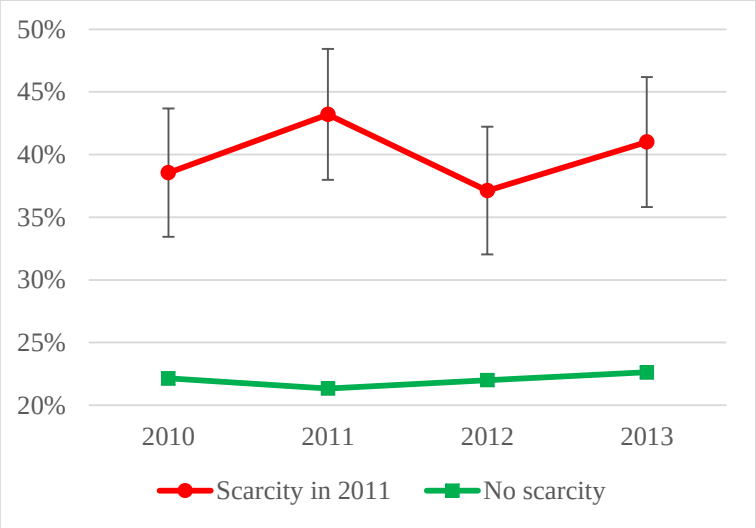
Variable	Definition	Total sample	
		Mean	Std. Dev.
Male	1 if male household (HH) head, 0 otherwise	0.440	0.496
Female	1 if female HH head, 0 otherwise	0.560	0.496
Age	Age of HH head (in years)	54.3	15.9
Primary school or lower	1 if HH head has primary or lower education, 0 otherwise	0.163	0.369
Lower secondary school	1 if HH head has lower secondary education, 0 otherwise	0.148	0.355
High school	1 if HH head has upper secondary education, 0 otherwise	0.396	0.489
University	1 if HH head has tertiary education, 0 otherwise	0.293	0.455
Single	1 if HH head is single, 0 otherwise	0.227	0.419
Married	1 if HH head is married, 0 otherwise	0.463	0.499
Separated/Divorced	1 if HH head is separated or divorced, 0 otherwise	0.140	0.347
Widowed	1 if HH head is widowed, 0 otherwise	0.170	0.375
Household size	Household size	2.23	1.28
At least one employed	1 if HH with at least one employed, 0 otherwise	0.553	0.497
At least one self-employed	1 if HH with at least one self-employed, 0 otherwise	0.101	0.302
At least one unemployed	1 if HH with at least one unemployed, 0 otherwise	0.087	0.282
At least one retired	1 if HH with at least one retired, 0 otherwise	0.393	0.488
At least one disabled	1 if HH with at least one disabled, 0 otherwise	0.053	0.224
Home ownership	1 if HH tenure status is ownership, 0 otherwise	0.701	0.458
No car	1 if HH does not have any car (cannot afford it), 0 otherwise	0.060	0.238
Home inadequately warm	1 if HH is not able to keep home adequately warm, 0 otherwise	0.084	0.278
Loans or mortgage	1 if HH must repay debts, loans or mortgages, 0 otherwise	0.378	0.485
Lower income class	1 if HH income is between the poverty threshold and the national median equivalised income, 0 otherwise	0.467	0.499
Middle income class	1 if HH income is between the national median equivalised income and 150% of the median, 0 otherwise	0.314	0.464
Upper income class	1 if HH income is above 150% of the national median equivalised income, 0 otherwise	0.215	0.411
Scarcity experience in 2011	1 if HH income is below the poverty threshold in 2011, 0 otherwise	0.012	0.108
Financial fragility	1 if HH ability to make ends meet ≤ 2, 0 otherwise	0.223	0.416
Financial burden of the total housing cost	1 if HH declares the total housing cost is a heavy burden, 0 otherwise	0.301	0.459
Number of observations		118,912	
Number of households		29,728	

As shown in Figure 1, Table 1 highlights that very few households (1.2%) over the whole sample report a one-year experience of income scarcity (i.e. severe at-risk-of poverty) in 2011. By contrast, several households (22%) consider themselves as financially fragile. It follows that most of financially fragile households never experienced income scarcity during the reference period, pointing to a

perception that is probably more related to psychological and environmental factors rather than to the actual or past income conditions.

Figure 2 illustrates how perceived financial fragility changed over time in the reference period, for the two groups. As expected, households which never experienced scarcity appear much less vulnerable than the others, even in 2010 (i.e. before the scarcity experience in 2011). Only 22% of observations in this group consider themselves as financially fragile, whereas 40% of those who are dealing with an income scarcity declare a perceived status of financial fragility. This is related to the fact that these two groups of households are likely to be different regardless the scarcity experience in 2011. We stress and deal with this potential issue of the analysis in Sections 3.2 and 3.3. When the "treated" group transits out of scarcity, in 2012, the share of households perceiving a situation of financial fragility decreases, but it remains quite far (about 15 percentage points) from the one presented by those who never experienced scarcity, and the gap remains substantial and even increases in 2013. It must be noted that, however, the majority of households which had a scarcity experience in 2011 always do not perceive themselves as financially fragile, despite in this group there are more households in financial fragility under a relative point of view.

Figure 2 – Percentage of households which feel financially fragile, by scarcity experience group



3. Results

In this section, we use an econometric analysis based on panel Probit models to test the two hypotheses stated in Section 2. First, to examine Hypothesis 1, we first regress the measure of perceived financial fragility defined in Table 1 on the main variable of interest (i.e. 'Scarcity experience in 2011') and several controls. Then, to check for the duration of the effect we use a difference-in-differences approach. Finally, to test the Hypothesis 2, we estimate interactions between the scarcity experience variable and welfare system dummies.

Table 2 reports results of the regression analysis on the probability of being financially fragile after the scarcity experience (i.e. in 2012 and 2013). Model in column 1 contains the variable of interest and a set of relevant covariates. Model in column 2 controls also for current income class defined in terms of income distance from the national median. Results confirm the first hypothesis showing that a past one-off experience of income scarcity determines a robust and significant effect on the current perception of financial fragility, even controlling for household characteristics related to its

composition, occupational status of the household head, and economic conditions. Female gender and age of the household head are positively associated with perceived financial fragility, whereas a highly educated or married household head leads to a negative effect on the dependent variable.

Table 2 – Effect of scarcity on perceived financial fragility (Marginal effects through Population-Averaged Probit Model)

VARIABLES	(1)	(2)
Scarcity experience in 2011	0.065***	0.035**
Female	0.039***	0.029***
Age	0.003***	0.006***
Age^2	-0.000***	-0.000***
Lower secondary school	-0.036***	-0.021***
High school	-0.086***	-0.054***
University	-0.166***	-0.103***
Married	-0.037***	-0.027***
Separated/Divorced	0.067***	0.057***
Widowed	0.038***	0.033***
Household size	0.016***	0.009***
At least one employed	-0.058***	-0.022***
At least one self-employed	-0.053***	-0.039***
At least one unemployed	0.088***	0.080***
At least one retired	-0.013**	-0.010*
At least one disabled	0.059***	0.052***
Home ownership	-0.079***	-0.064***
No car	0.129***	0.112***
Home inadequately warm	0.158***	0.146***
Loans or mortgage	0.092***	0.095***
Middle income class		-0.105***
Upper income class		-0.182***
Country fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Observations	59,456	59,456

*Notes: Cluster-robust standard errors are included; *** p<0.01, ** p<0.05, * p<0.1.*

In order to test the time dimension of our first hypothesis, despite the limited number of waves available, we check whether the effect of a temporary scarcity experience in the past changes over time, since in principle this effect should be null or at least decreasing.

Table 3 reports estimated effects of a one-off scarcity experience on the perceived financial fragility in a Difference-in-Differences framework. Specifically, excluding intermediate waves (i.e. 2011 in the comparison between 2010 and 2012, and 2011-2012 in the comparison between 2010 and 2013), in columns (1) of Table 3 we regress the dependent variable on the scarcity experience in 2011 (i.e. the treatment), a year dummy, and an interaction term (i.e. Scarcity experience X Year dummy). The year dummy captures perception change over time for everyone irrespective the treatment, while the interaction term captures any difference in the perception pattern after the treatment between

households who experienced an income scarcity (i.e. the treated group) and those who never did that during the reference period (i.e. the control group). Models in columns (2) present the same specification including also the same controls used in column (2) of Table 2. In this framework, the estimated constant of regression models is interpreted - *ceteris paribus* - as the perceived financial fragility for control group households.

Table 3 – Effect of scarcity by year (Marginal effects through Probit Model)

VARIABLES	2010-2012		2010-2013	
	(1)	(2)	(1)	(2)
Scarcity experience in 2011	0.142***	0.060**	0.143***	0.060**
Year	-0.001	0.032***	0.005	0.042***
Scarcity experience * Year	-0.010	-0.007	0.014	-0.013
Constant	0.223***	0.222***	0.226***	0.225***
Pseudo R-squared	0.002	0.267	0.002	0.269
Observations	59,456	59,456	59,456	59,456

*Notes: Cluster-robust standard errors are included; *** p<0.01, ** p<0.05, * p<0.1. Column (1) reports results of the models without controls. Models in columns (2) include also all other covariates showed in column (2) of Table 2.*

The first column of Table 3 shows that the treated group of households has a perceived financial fragility 0.142 percentage points greater than the control group in 2012. The scarcity effect decreases to 0.060 when controlling for characteristics of household heads and household economic conditions, remaining highly significant, and the year dummy coefficient signals an overall increase in the perception of financial fragility from 2010 to 2012, probably due to the economic crisis effects. Since the interaction term is always insignificant, the effect of a one-off scarcity experience does not seem to further affect the pattern of the dependent variable after the treatment and thus treated households do not appear to converge to the control group in terms of perceived financial fragility. The 2010-2013 comparison overall confirms the previous one revealing a duration of the scarcity effect of at least two years. The fact that the effect of past poverty/scarcity on the perception of current financial fragility remains essentially constant over time signals that even a single year spent in poverty may have a potentially long impact on subjective well-being.

As for the second hypothesis, we want to explore the role of welfare systems in the heterogeneity of the scarcity effect. Since the welfare system influences the perceptions of support and protection in the households' ability to make ends meet even if they have experienced income scarcity, it is likely that the scarcity effect varies according to the welfare system characterizing their country of residence.

Following theoretical and empirical studies on welfare systems (Esping-Andersen, 1990; Ferrera, 1996; Whelan and Maître, 2010; Urbé, 2012), in this analysis we define the following six welfare systems in Europe:

1. Scandinavian (Denmark, Finland, Iceland, Norway, Sweden);
2. Anglo-Saxon (Ireland, Malta, United Kingdom);
3. Continental (Austria, Belgium, France, Luxembourg, Netherlands);
4. Mediterranean (Cyprus, Greece, Spain, Italy, Portugal);
5. Central-Eastern European (Bulgaria, Czech Republic, Croatia, Hungary, Poland, Slovenia, Slovakia);
6. Baltic (Estonia, Lithuania, Latvia).

To account for this potential heterogeneity and to verify the Hypothesis 2, in Table 4 we show interactions between our variable of interest (i.e. Scarcity experience in 2011) and welfare system dummies.

Table 4 – Effect of scarcity by welfare system
(Marginal effects through Population-Averaged Probit Model)

INTERACTIONS	(1)	(2)
Scandinavian & No scarcity	base	base
Anglo-Saxon & No scarcity	0.167***	0.171***
Continental & No scarcity	0.144***	0.156***
Mediterranean & No scarcity	0.336***	0.361***
Central-Eastern European & No scarcity	0.344***	0.342***
Baltic & No scarcity	0.418***	0.424***
Scandinavian & Scarcity	0.109*	0.092*
Anglo-Saxon & Scarcity	0.148**	0.130*
Continental & Scarcity	0.224***	0.207***
Mediterranean & Scarcity	0.402***	0.398***
Central-Eastern European & Scarcity	0.423***	0.391***
Baltic & Scarcity	0.464***	0.425***

*Notes: Cluster-robust standard errors are included; *** p<0.01, ** p<0.05, * p<0.1. Models include also all other covariates showed in Table 2.*

Table 4 underscores that households supported by a Scandinavian welfare system declare themselves as financially fragile much less frequently than those residing in other systems, independently of the scarcity experience. By contrast, households living in Mediterranean, Central-Eastern European, or Baltic systems appear both more financially fragile in general and more sensitive to one-year experience of income scarcity. We can thus state that also the second hypothesis is confirmed since some welfare systems (e.g. Scandinavian and Anglo-Saxon ones) seem to avoid that households experiencing a period of income scarcity remain mentally stuck in a permanent status of (perceived) financial fragility.

3.1. Alternative specifications

As stressed by Brunetti et al. (2016), financial fragility measures can be classified in two broad categories: objective and subjective indicators. The ability to make ends meet is taken in the present study as a more subjective indicator of financial health. In order to asses the effect of an income scarcity episode on a more objective measure, we take the financial burden of the total housing cost. In our dataset, it can be quantified from the following question:

"*Please consider your total housing costs including mortgage repayment (instalment and interest) or rent, insurance and service charges (sewage removal, refuse removal, regular maintenance, repairs and other charges). To what extent are these costs a financial burden to you?"* '1 – A heavy burden', '2 – A slight burden', '3 – Not a burden at all'.

The dependent variable 'Financial burden' is equal to 1 if the household declares the total housing cost is a heavy burden, and 0 otherwise. Table 5 shows that the effect of a past experience of income scarcity is positive and significant on the financial burden perception.

Table 5 – Scarcity effect on perceived financial burden of the total housing cost (Marginal effects through Population-Averaged Probit Model)

VARIABLES	(1)	(2)
Scarcity experience in 2011	0.050***	0.026
Female	0.046***	0.038***
Age	0.001	0.003***
Age^2	-0.000**	-0.000***
Lower secondary school	-0.029***	-0.017**
High school	-0.062***	-0.036***
University	-0.129***	-0.074***
Married	-0.013**	-0.004
Separated/Divorced	0.084***	0.076***
Widowed	0.066***	0.062***
Household size	0.023***	0.017***
At least one employed	-0.054***	-0.024***
At least one self-employed	-0.057***	-0.044***
At least one unemployed	0.069***	0.060***
At least one retired	-0.004	0.000
At least one disabled	0.063***	0.057***
Home ownership	-0.044***	-0.030***
No car	0.127***	0.114***
Home inadequately warm	0.155***	0.143***
Loans or mortgage	0.094***	0.097***
Middle income class		-0.083***
Upper income class		-0.156***
Country fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Observations	59,456	59,456

*Notes: Cluster-robust standard errors are included; *** p<0.01, ** p<0.05, * p<0.1.*

By comparative inspection of Table 2 and Table 5, two main comments are in order. First, when comparing the first columns of the two tables, the magnitude of the scarcity effect is lower on financial burden than on the ability to make ends meet. Second, when the income class is accounted for as a control, it is not significant at all. This result shows that the effect of a temporary income scarcity experience is stronger on the perception of financial health than on a more objective measure of the same.

3.2. Estimation of scarcity effects through the Coarsened Exact Matching

Another way to stress the existence of a scarcity effect on perceived financial fragility over time consists of preprocessing our sample through the "Coarsened Exact Matching" (CEM) proposed by Iacus et al. (2011). The CEM is a new matching approach involving three steps: I) temporarily coarsen

each control variable as much as is reasonable; II) sort all units into strata, each of which has the same values of the coarsened covariate; III) prune from the sample strata without at least one treated and one control unit (Iacus et al., 2009; Iacus et al., 2011). Therefore, the CEM allows for an improvement in the estimation of the treatment effect because it narrows the sample analysis to treated units and their (very similar) matches only. We decide to adopt this approach since Iacus et al. (2011) and King et al. (2011) show that CEM-based results are typically less imbalanced, model-dependent, biased, and inefficient than other commonly used matching methods.

Considering the scarcity experience in 2011 as our treatment, 349 households represent the so called "treated" group and the remaining 29,379 households compose the "control" group (Figure 1). We focus on the treatment effect on the perceived financial fragility after 2011 and we assume no omitted variables. First row of Table 6 illustrates results of a Probit regression of perceived financial fragility on scarcity experience in 2011. One year after the treatment (i.e. 2012), our estimate of the scarcity effect on the outcome is equal to a significant 0.195. The estimated scarcity effect decreases to 0.180 in 2013, but it remains significant thus denoting somehow a treatment effect persistence and further confirming the Hypothesis 1.

Table 6 – Scarcity effect on perceived financial fragility by year and matching strategy (Marginal effects through Probit Model)

Model	**Effect on perceived financial fragility**	
	2012	**2013**
No matching (Base)	0.195***	0.180***
	(0.022)	(0.022)
CEM	0.166***	0.127***
	(0.030)	(0.031)
CEM and covariates	0.095***	0.060**
	(0.026)	(0.028)

*Notes: Cluster-robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1. 'CEM and covariates' model includes all the covariates showed in column (2) of Table 2.*

However, these results are likely biased because the treatment was not (in our case by definition) randomly assigned among the two groups. As shown clearly in Figure 2, the two groups of households were probably quite different already before the treatment. To make better estimations, we match units in the treated and the control groups by the following 2010 covariates: gender, age, education level, and marital status of the household head, household size, tenure status, household income, and country of residence. The coarsening of control variables leads to 260 matched strata for a total number of matched units equals to 2,940: 287 treated and 2,653 control units. So, 62 treated households are excluded in the following analyses, together with 26,726 units in the control group, since according to the CEM they do not match with any control unit and vice versa. Second row of Table 6 reports the marginal effects of the same Probit regression than before, but including the matched units only. CEM-based estimates of the treatment effect are lower than those without matching, although conclusions overall hold. Indeed, the scarcity effect on the financial fragility perception is equal to 0.166 in 2012 when accounting for the matched units only, while the treatment effect still declines from 2012 to 2013.

Occasionally some imbalance among units remains despite the CEM. An alternative approach in this common situation is suggested by Iacus et al. (2009) and consists of adding variables to the

regression to adjust for the residual imbalance via a statistical model. Third row of Table 6 presents the marginal effects according to a Probit model which relies on the matched data only, as well as the previous one, and also includes all the covariates showed in column 2 of Table 2. Even considering for covariates in the current year, estimated scarcity effects remain strongly significant but lower to those in the second model (i.e. without additional covariates). Nonetheless, these treatment effects should be more reliable and precise than the previous ones.

3.3. Robustness checks

In this Section we summarize a set of robustness check related to the definition of scarcity and perceived financial distress. More details about described robustness checks are available upon request

An important check we do is about the poverty threshold. In fact, to define scarcity we adopt a poverty threshold equals to 40 percent of the national median. To test the robustness of our results we replicate the analysis with two other thresholds very common in the literature (e.g. Ayllón and Fusco, 2017; Iacovou, 2017): 50 and 60 percent of the national median. Results of the robustness check show that the scarcity effect on financial fragility perception always remains positive and significant. The magnitude of scarcity coefficients reported in Table 2 grows when the poverty threshold is higher.

We also check the specification of the dependent variable, trying alternative definitions of financial fragility with respect to the one we use in the analysis (i.e. reported ability to make ends meet equals to 2 or lower). In particular, we try here both a stricter definition (i.e. reported ability to make ends meet equals to 1) and a less severe one (i.e. reported ability to make ends meet equals to 3 or lower). Check outcomes overall confirm our results and so a significant and positive effect of income scarcity on perception of financial fragility.

Furthermore, we test our results for a longer scarcity experience (e.g. two-years scarcity experience) rather than a one-year one. As expected since the longer scarcity span, results of this robustness check overall confirms the statistically significance of the scarcity effect on the dependent variable and report higher marginal effects.

Finally, we address the issue of difference in the financial fragility perception between the analyzed groups of households before the scarcity experience in 2011. Indeed, households who have experienced scarcity already considered themselves more financially fragile than the others in 2010 (see Figure 2). To deal with this potential issue, we replicate here the same analysis in Table 2 but excluding those households who perceived themselves as affected by financial fragility from the panel sample. Thus there are no differences in the perceived financial fragility among households in 2010, but now households living an income scarcity in 2011 are only 187 in the sample, while households who never experienced scarcity in the reference period are 22,888.

Table 7 overall confirms the results reported in Table 2: a past experience of income scarcity significantly affects the perceived financial fragility over time. Also considering for the current income class, the scarcity effect remains statistically significant and positive.

Table 7 – Effect of scarcity in a sample without households who perceived themselves as financially fragile in 2010 (Marginal effects through Population-Averaged Probit Model)

VARIABLES	(1)	(2)
Scarcity experience in 2011	0.059***	0.040**
Female	0.019***	0.014***
Age	0.001	0.002***
Age^2	-0.000	-0.000***
Lower secondary school	-0.033***	-0.022***
High school	-0.055***	-0.032***
University	-0.103***	-0.061***
Married	-0.018***	-0.013**
Separated/Divorced	0.042***	0.036***
Widowed	0.022***	0.020***
Household size	0.008***	0.003*
At least one employed	-0.031***	-0.007
At least one self-employed	-0.025***	-0.017***
At least one unemployed	0.072***	0.065***
At least one retired	-0.008	-0.005
At least one disabled	0.037***	0.033***
Home ownership	-0.043***	-0.034***
No car	0.080***	0.069***
Home inadequately warm	0.117***	0.109***
Loans or mortgage	0.064***	0.067***
Middle income class		-0.069***
Upper income class		-0.113***
Country fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Observations	45,084	45,084

*Notes: Cluster-robust standard errors are included; *** p<0.01, ** p<0.05, * p<0.1.*

4. Conclusions

We have used EU-SILC longitudinal data over the period 2010-2013 to test two main hypotheses: whether a past one-off experience of scarcity affects perception of financial fragility over time (Hypothesis 1), and whether this effect differs according to the welfare system characterizing the country of residence (Hypothesis 2).

Results confirm the first hypothesis showing that a past temporary experience of income scarcity determines a robust and significant effect on the current perception of financial fragility, even controlling for household characteristics related to its composition, occupational status of the household head, and economic conditions. The effect persists over time as further confirmed by implementing the "Coarsened Exact Matching" (CEM). As for the second hypothesis, our results allow to conclude that also this hypothesis is confirmed since some welfare systems (e.g. Scandinavian and Anglo-Saxon ones) seem to avoid that households experiencing a period of income scarcity remain mentally stuck in a permanent status of (perceived) financial fragility. The evidence provided is robust to several alternative specifications of both the dependent variable and the variable of interest. Specifically, the empirical analysis with a different indicators shows that the effect of a

temporary income scarcity experience is stronger on the perception of financial health than on a more objective measure of the same, specifically the financial burden of the total housing cost.

We think our results have also relevant policy implications, because they question the idea, implicit in public policies, that helping people with financial difficulties to leave objective conditions of scarcity is sufficient to solve phenomena such as poverty and social exclusion. Therefore, a discussion on the relevance of complementary services, beyond the usual cash transfer or help in the job placement, more oriented to the psychological support and social inclusion of households with financial difficulties appears here necessary.

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