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Paper by invitation

Shocks, Financial Constraints and Households' Consumption amid the Great Recession

Summary: Overall, there is now considerable evidence that financial constraints are at the root of the lack of consumption smoothing during the Great Recession. We push this evidence forward and show that in the presence of credit constraints, a job loss leads to larger drops in households' consumption. We build a set of testable hypotheses from our theoretical model and employ microdata taken from the second round of the Life in Transition Survey (LiTS II) (European Bank for Reconstruction and Development 2010). We specifically assess the role of financial constraints in explaining households' consumption coping strategies after the crisis shocks. Economic hardship is more likely to be observed if households experience difficulties in meeting outstanding debt obligations or in obtaining new credit lines because of financial constraints. The impact of job and wage shocks on households' consumption is much attenuated, by around a half, when we control for sample selection bias in accessing the formal credit markets. In the context of increasing impoverishment across Europe, the paper shows that a careful analysis of the main determinants of households' economic and financial hardship is crucial to formulate targeted measures at the regional and local level.

Key words: Households' consumption, Economic and financial hardship, Financial constraints, Wage and job shocks, Heckman probit model.

JEL: D14, D19, G21, G29.

The global financial crisis and the subsequent great recession caused substantial economic and financial harm among European households, but the effects are not uniform across individuals and across regions and localities. Young, less-educated and low-income families have been among the most vulnerable groups although differences in households' financial behaviour were not sufficiently investigated in the relevant literature. In particular, the connection between households' consumption decisions and the presence of financial constraints is crucial to evaluate how people respond to unanticipated shocks. Moreover, determining the nature of shocks, whether they are linked to a job loss or wage reduction, is fundamental to assess how they may affect households' consumption response, and the role of the credit markets in smoothing consumption fluctuations (Dimitris Christelis, Dimitris Georgarakos, and Tullio Jappelli 2015).

If we consider the main shocks through which the global crisis impacted households in Europe (Dimitris Kenourgios and Dimitrios Dimitriou 2014), we observe that the most common adverse events were, by far, a wage reduction/suspension or a reduction in remittances (which we call a *wage shock*) followed by a job loss of a household member or a family business closure (which we call a *job shock*) with the Eastern European households hit harder by crisis shocks than their Western European counterparts (European Bank for Reconstruction and Development 2010).

William R. Emmons and Bryan J. Noeth (2013) found that in the wake of the recession the most vulnerable households were those with lower levels of emergency savings and with relatively higher levels of leverage (Carmen M. Reinhart and Kenneth S. Rogoff 2009). Overall, there is now considerable evidence that financial constraints are at the root for the lack of consumption smoothing; so we expect financially constrained households to be hit harder by the crisis in terms of their consumption response (see, among others, Jappelli and Luigi Pistaferri 2010; Greg Kaplan and Giovanni L. Violante 2010; Atif Mian, Kamalesh Rao, and Amir Su 2013; Petra Gerlach-Kristen and Rossana Merola 2019). In this paper, we push this evidence forward and show that unanticipated negative wage shocks cause large drops in consumption among borrowing constrained households (Scott R. Baker 2018). Hence, we add to the existing literature on consumption smoothing of financially constrained households by addressing the following points:

- How do households' consumption and financial plans respond to unexpected wage or job shocks?
- Do wage shocks have a lower impact than job shocks on households' consumption decisions?
- How do financially constrained households adjust their consumption in response to the above shocks?
- Do the social factors and the geographic context matter in shaping households' vulnerability?

There are two dimensions of the households' vulnerability to the crisis we consider in this paper. One dimension is *economic hardship* defined as the difficulties encountered by families in shopping for food or paying other expenditures such as utility bills, insurance, medical care services etc. The other dimension is *financial hardship*, which we define as a condition where households face one or more of the following problems: (i) are in arrears on mortgages; (ii) have delayed or defaulted on loan instalments; (iii) have had a bank loan refused; (iv) have no personal savings or other assets. Financial hardship makes households more likely to face severe debt problems when they suffer adverse unanticipated wage or job shocks. We construct a measure of households' hardship by computing the level of economic and financial difficulties experienced by each household with respect to its neighbours. We, therefore, build an index that compares economic and financial hardship at the household-level to the community-level. Our analysis aims at identifying the main determinants of households' vulnerability which might be associated with a decline in

wages or loss of jobs leading to an inability to pay for food, rents and essential services (utilities), access to credit, or indeed repay outstanding debt.

Evaluating households' response to crisis shocks requires the availability of detailed information on households' finances and socio-economic and demographic characteristics (John Y. Campbell 2006). We employ the second round of the Life in Transition Survey (LiTS II) undertaken in late 2010 to analyse the geographical distribution of households' economic and financial hardship across Europe in the aftermath of the global crisis and its impact on households. This survey, conducted jointly by the European Bank for Reconstruction and Development (EBRD) and the World Bank, involves households living in eighteen countries in Central-Eastern Europe, the Baltic region, South-Eastern Europe plus five Western European comparator countries (France, Germany, Italy, Sweden and the UK). The survey includes several questions on households' financial balance-sheet and collects microdata at the local and regional levels. The survey collects households' socio-economic and demographic data on expenses, education level, age, religion, gender and marital status, labour market status, interpersonal networks and use of financial services. Given these data, we try to identify the main determinants of households' hardship and whether it depends on demographic, social and geographic factors. In a nonlinear setting, individuals are then sorted across localities and regions on the basis of the residing area characteristics, which we assume to have an impact on the likelihood of experiencing both consumption cutbacks and financial difficulties (Ron Martin 2011). We perform a bivariate analysis where economic and financial hardships are related to household-level demographic and social factors as well as to differences in households' characteristics (size, composition, area of residence etc.).

This LiTS survey offers detailed information on the impact of the crisis on households that is comparable across European regions and countries. In particular, we employ data from the "LiTS II Crisis Impact Module" to detect the economic impact of the crisis on the respondents: whether it resulted in a job shock (defined as a job loss or a family business foreclosure) or a wage shock (defined as a wage reduction, a wage suspension/delay or a reduction in remittances). We show that poorer, not well educated and larger size households headed by young adults are more vulnerable to the crisis shocks. Also, the employment status seems to matter: if household members work for a salary wage or are self-employed, their vulnerability to shocks decreases; while for poorer households whose main sources of income are pensions or social allowance benefits may experience financial hardships since they more likely to be financially constrained (i.e., they cannot access credit markets). So when they are hit by a negative wage or job shock they are more likely to react with sharp reductions in consumption.

An additional contribution of the paper is to assess the role of financial constraints in households' consumption decisions during the crisis. In this sense, consumption coping strategies are more likely to be observed if households experience difficulties in meeting outstanding debt obligations or in accessing new credit lines because of the presence of financial constraints, so that they cannot borrow to smooth consumption. After controlling for sample selection bias with a standard Heckman's two-stage approach, we find that the impact of both wage and job crisis shocks on

households' consumption is much attenuated, in particular across the European transition regions, although it remains significantly severe.

The paper's structure is as follows. Section 1 provides a review of the literature. Sections 2, 3 and 4 present the theoretical model, the methodology and the empirical framework respectively. Section 5 describes the data. Section 6 discusses the results. Section 7 outlines the econometric framework to control for sample selection bias, the Heckman probit model. Section 8 concludes and offers some policy advice.

1. Literature Review

Several studies define fragile households in terms of exposure to adverse shocks and their consumption response, rather than in terms of exposure to poverty (see, among others, Thorsten Beck and Martin Brown 2011; Brown 2013). This allows us to link our study to the life cycle and permanent income models, which suggest that households aim to smooth consumption in response to income fluctuations (Franco Modigliani and Richard Brumberg 1954; Milton Friedman 1957). Improved access to credit is key to stabilise consumption choices over the lifetime (Jappelli and Pistaferri 2010); however, this is true if the shocks are fully anticipated. Little exploration has been done with respect to unanticipated income shocks, which may be either temporary or permanent (Agnes Kovacs, Concetta Rondinelli, and Serena Trucchi 2019; Orazio Attanasio, Kovacs, and Krisztina Molnar 2020) and to study how they affect consumption in a lifecycle framework when households have no precautionary savings. In this case, we expect that even potentially temporary wage shocks might translate into a consumption cutback strategy if households' credit constraints are in place because of difficulties in accessing local financial markets (Susan Christopherson, Ron Martin, and Jane Pollard 2013; Philip Arestis, Giuseppe Fontana, and Peter Phelps 2016).

Some studies explore issues concerning households' financial fragility[1], defined as a situation to the exposure of financial risk and shock; hence they conceptualize financial vulnerability as an inability to repay financial debt (Jappelli, Marco Pagano, and Marco Di Maggio 2013; May P. Lee and Mohamad F. Sabri 2017). Other authors such as Ana Del Rio and Garry Young (2008) employ a self-reported indicator of households' financial fragility and analyse the probability of reporting problems with debt repayment. Christelis et al. (2009) analyse financial fragility of elderly Europeans and describe how this fragility varies across countries, age groups, health status and other socio-economic and demographic variables. Other authors, analyse the empirical determinants of debt burden, default and bankruptcy using household-level data (Miguel Ampudia, Has van Vlokhoven, and Dawid Zochowski 2016). Following Sarah Bridges and Richard Disney (2004), the study of Luisa Anderloni, Emanuele Bacchiocchi, and Daniela Vandone (2012) uses a definition of household financial fragility which considers not only over-commitment due to excess indebtedness, but also other conditions of financial fragility, such as: (i) households' inability to face the

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[1] The term "financial fragility" is used interchangeably with financial vulnerability and financial distress (Anderloni, Bacchiocchi, and Vandone 2012; Ampudia, Van Vlokhoven, and Zochowski 2016; Mindaugas Leika and Daniela Marchettini 2017).

monthly outlay and to balance the family budget; (ii) households' arrears on loan commitments; (iii) households' difficulties in shopping for food or paying the rent. The authors define these households as financially vulnerable since they are particularly exposed to adverse shock that can eliminate or reduce an income source and/or determine unexpected liabilities that negatively impact their financial situation. Financial fragility may also be driven by factors other than debt, such as: low income and wealth levels; life-style behaviors that may be induced by short-sightedness in money management and unsustainable expenditure; adverse shocks that may negatively impact their financial situation; the absence of financial instruments or personal savings which enable households to manage risk more effectively (Sarah Brown and Karl K. Taylor 2008; Christelis et al. 2009; Annamaria Lusardi, Peter Tufano, and Daniel Schneider 2011; Yvonne McCarthy 2011; Anderloni, Bacchiocchi, and Vandone 2012; Brown 2013; Sri Noerhidajati et al. 2020).

Our work contributes to the existing literature along two main directions: first, we employ a more comprehensive definition of financial fragility: households in *financial hardship* are those who have no assets or savings and, following Burcu Duygan-Bump and Charles Grant (2009), those who have a propensity to fall into arrears or default on mortgages and unsecured loans. When using this measure of financial hardship we also control for non-random sorting by averaging the social and demographic characteristics of the area where the household lives. Secondly, when analysing households' consumption response to shocks we account for the fact that cutbacks in consumption, what we call *economic hardship,* may either reflect precautionary attitudes of the households, who cut spending voluntarily or may be a coping strategy induced by the presence of financial barriers, i.e. binding financial constraints, that might not enable them to borrow in the formal financial markets therefore inducing sample selection bias (Grant 2007; Mian, Rao, and Su 2013; Gerlach-Kristen and Merola 2019).

2. Modeling Consumption Response to Shocks and the Role of Financial Constraints

In this section we present a stylised model along the lines of Luca Guerrieri and Matteo Iacoviello (2015) to explain households' consumption response to wage and job shocks when some financial constraints are in place, leading to consumption adjustment that depends on how much these constraints are binding.

We assume that the representative household in the model maximises her/his lifetime utility:

$$U(c_{it}) = \max E_0 \sum_{t=0}^{\infty} \beta^t \log c_{it}, \qquad (1)$$

subject to:

$$c_{it} + R b_{it-1} = w_{it} + b_{it}. \qquad (2)$$

Households spend their income, w_{it}, on consumption goods, c_{it}. They can borrow, b_{it}, to smooth their consumption intertemporally, which they repay at an

interest rate, R, in the next period. We also assume a financial constraint, i.e. the debt that households hold in each period does not exceed a proportion, γ, of their income:

$$b_{it} \leq \gamma w_{it}. \tag{3}$$

The constraint is endogenous to income, which means that where a negative shock is sufficiently large, a household that began the period borrowing unconstrained can find herself constrained because of the crisis shock. We assume that income is subject either to a job shock, a_{it}, or to a wage reduction shock, v_{it}:

$$\begin{aligned} w_{it} &= \Delta a_{it} + v_{it}; \\ a_{it} &= a_{it-1} + e_{it}, \end{aligned} \tag{4}$$

where $\Delta a_{it} = a_{it} - a_{it-1}$, $v_{it} \sim i.i.d$ and $e_{it} \sim i.i.d.$ Following Itay Saporta-Eksten (2016) we assume that individuals who lose their jobs experience a long-term decline in income which often never recover to pre-job loss levels.

Maximisation of (1) subject to (2) and (3) yields the intertemporal Euler condition:

$$\frac{c_{it+1}}{c_{it}} = \Delta c_{it+1} = \beta R + \lambda_{it}(b_{it}), \tag{5}$$

where $\lambda_{it}(b_{it})$ is the Lagrange multiplier. When the borrowing constraint is binding, $b_{it} = \gamma w_{it}$, it implies $\lambda_{it}(b_{it}) > 0$, hence households are forced to consume relatively less in the current period w.r.t. the future; thus, wage or job loss income fluctuations affect the time path of consumption.

And the Kuhn-Tucker condition:

$$\lambda_{it}(b_{it})(b_{it} - \gamma w_{it}) = 0; \tag{6}$$

$$\lambda_{it}(b_{it})\big(b_{it} - \gamma(\Delta a_{it} + v_{it})\big) = 0. \tag{7}$$

With large negative shocks the borrowing constraint binds, $\lambda_{it}(b_{it}) > 0$, hence:

$$b_{it} = \gamma(\Delta a_{it} + v_{it}). \tag{8}$$

In this case, households borrow as much as they can and the current period consumption is determined by the financial constraint. We expect, therefore, that when households face a job loss, they will cut their spending back sharply, as they find that the financial constraint limits the amount that they are able to consume. Also, transitory wage reduction shocks will affect consumption, although with a different magnitude. In fact, in the absence of credit constraints, households who face a negative wage shock can freely borrow and smooth their consumption to a large extent. But, when financial constraints exist and get closer to binding, households would need to drop their consumption in response even to wage shocks (Jappelli and Pistaferri 2010).

We assume that our reduced form model mapping relationships (5) for Δc_i and (8) for b_i (in log-linear form) is approximated by the following equations (we omit the time subscript for convenience):

$$\begin{aligned} \Delta c_i &= y_{1i}^* = c_1 + \varphi(\Delta a_i + v_i) + z_i \varphi_1 + \varepsilon_{1i}; \\ b_i &= y_{2i}^* = c_2 + \gamma(\Delta a_i + v_i) + z_i \gamma_2 + \varepsilon_{2i}, \end{aligned} \tag{9}$$

where, given (8), in the equation for Δc_i we assume that $\lambda_{it}(b_{it})$ is a linear function of the job and wage shocks, $\lambda_{it}(b_{it}) = \varphi(\Delta a_i + v_i)$, and z_i is a set of demographic, economic and social controls which affect both consumption and financial decisions.

We also extend model (9) by assuming imperfect access to credit markets:

$$y_{1i} = y_{1i}^* \cdot \ y_{2i}(y_{2i}^* > 0) = \begin{cases} 0 & \text{if} \quad y_{2i}^* \leq 0 \\ y_{1i}^* & \text{if} \quad y_{2i}^* > 0 \end{cases}, \tag{10}$$

that is, potential consumption decision and actual consumption decision are equal only if the propensity to select into the sample (e.g. to experience credit constraints in the formal credit market) is positive ($y_{2i}^* > 0$). For households not selecting into the sample ($y_{2i}^* \leq 0$), y_{1i}^* is not observed: this outcome could relate to voluntary financial exclusion from the official credit markets induced by the presence of alternative informal credit lines.

2.1 Testable Hypotheses

Based on the model (9), we test the following hypotheses:

Hypothesis 1: Households cut their consumption, y_{1i}^*, only in response to job shocks, Δa_i, but not in response to wage shocks, v_i.

In line with the life-cycle and permanent income models (Modigliani and Brumberg 1954; Friedman 1957) the main distinction is between transitory shocks, which according to the theory should have a small impact on consumption, and permanent shocks, which should lead to major revisions and fluctuations in consumption. These models are based on the assumption that consumers operate in perfect credit markets: they can freely borrow as long as they do not violate the intertemporal budget constraint and satisfy the terminal condition on wealth.

Hypothesis 2: Households cut their consumption, y_{1i}^*, even in presence of wage shocks, v_i, when there are imperfect credit markets where they cannot freely borrow and can access alternative forms of informal credit.

When individuals face a selection into the financial markets their ability to smooth unexpected negative wage shocks through borrowing can be seriously affected and this should have a larger impact on consumption (Jappelli and Pistaferri 2010).

Hypothesis 3: Socio-demographic and economic factors, z_i, affect both households' consumption cutback decisions, y_{1i}^*, and their financial condition, y_{2i}^*.

We test whether demographic and economic factors along with informal social ties impact on households' economic and financial situation. Demographic and economic factors include age, gender, highest attained education qualification; place of residence; employment status, whether a single-parent household and the number of members in the household. In addition, the interpersonal linkages and informal social ties (with friends/relatives) are taken into account as they may favour

households' resilience to crisis shocks, especially of low-income households (Arestis and Ana Rosa Gonzalez-Martinez 2016).

Hypothesis 4: The local context impacts on the individual propensity to face both economic, y_{1i}^*, and financial hardship, y_{2i}^*, and on households' response to the crisis shocks.

To control for non-random sorting we assume that individuals decide where to live on the basis of certain characteristics of the area represented by its average economic and demographic characteristics (Georgarakos, Michael Haliassos, and Giacomo Pasini 2014). Therefore, the individual propensity to face economic and financial hardship and the ability to cope with crisis shocks may depend also on the characteristics of the area of residence chosen by the respondent.

3. Economic and Financial Hardship

As a measure of financial hardship we use a number of households' balance-sheet problems which they experienced during the crisis, i.e. if they reported inability to meet mortgage payments, have defaulted/delayed on loan commitments, have a potentially risky financial product in their portfolio, such as a foreign currency mortgage loan, or a bank loan has been refused or they have no savings/assets. Financial hardship, therefore, accounts also for households' holdings of assets since they may allow individuals to access new lines of credit and potentially overcome financial problems. Using this metric of financial hardship a clear picture of financial weakness arises across Europe, especially across European transition countries (Table 2, Appendix).

To measure the level of economic hardship we evaluate whether a household has adopted some coping strategies as a response to the crisis, such as cutting food consumption and other expenditures (on vacations, health, education, job training, insurance, car, smoking), or cutting/delaying payments on utilities or services (TV, phone, internet services). These coping practices allow to deeply understand the impact of the crisis on European households' daily life. For example, the data from LiTS II indicate that the most frequent coping mechanism adopted by households hit by the crisis shocks was reducing the consumption of "staple foods" such as milk, fruit, vegetables or bread, closely followed by cutting the consumption of luxury goods and utility expenditures. In particular, middle-income households have had to reduce mainly their staple food and health expenditures, whilst households with assets are better able to maintain their expenditures on staple foods and health and can respond to a fall in income by reducing non-essential expenses. This variety of responses can give us a measure of the level of consumption cutback to identify the more vulnerable households; namely, those who have had to cut consumption expenditure more (on average) than their counterparts. This suggests a "natural pecking order" where households are likely to choose certain coping strategies that are less harmful (i.e. cutting back on luxury goods and other nonessential goods and services) that are therefore prioritized over the more harmful ones (i.e. cutting back on food consumption). Since poor households do not have all the options available to wealthier

households, for the presence of credit constraints, the actions chosen by poor households (cutting expenses even in the consumption of food and primary services) are evidently the most harmful options; therefore consumption cutbacks may be used, in combination with financial weakness, as a measure of vulnerability.

In line with this approach, we use a bivariate probit regression model to capture the likelihood of households' vulnerability to unexpected (wage and job) shocks that we measure as the joint probability of facing both economic and financial difficulties. This analysis allows us to capture both forms of hardship – financial and economic – that are strictly interrelated and reinforce each during the crisis.

4. The Empirical Framework

Households face different degrees of consumption and financial hardships: in order to have a clear policy target, we measure both intensities with respect to the average levels experienced by families residing in the same area. Let y_{1i}^* and y_{2i}^* represent the *i-th* household's latent propensity to experience a consumption cutback and financial difficulties above the local household average, respectively. This latent propensity depends on a set of economic and demographic characteristics of the households. In reality, we do not observe these propensities, hence the dependent variables y_{1i}^* and y_{2i}^* are unobservable. We only observe the outcomes, i.e. whether households actually experience consumption falls and/or financial difficulties. Hence, we define the variables y_{1i} and y_{2i} as follows:

$$y_{1i} = 1 \quad \text{if} \quad I_{1i} > I_{1,l}, \qquad y_{1i} = 0 \text{ otherwise}$$
$$y_{2i} = 1 \quad \text{if} \quad I_{2i} > I_{2,l}, \qquad y_{2i} = 0 \text{ otherwise}$$

i.e., we consider as dependent variables two dummies, which equal to one if the level of the household's economic and financial hardship indices, I_{1i} and I_{2i} respectively, are above the local average indices, $I_{1,l}$ and $I_{2,l}$.

Similarly to William H. Greene (2012) and Germana Corrado and Luisa Corrado (2015), we assess more formally the respondents' level of vulnerability and use a bivariate probit model[2] for the reduced form system (9):

$$y_{1i}^* = x_i\beta_1 + D_c\beta_{1c} + \varepsilon_{1i} \qquad\qquad y_{1i} = \begin{cases} 1 & \text{if} \quad y_{1i}^* > 0 \\ 0 & \text{if} \quad y_{1i}^* \leq 0 \end{cases}$$

$$y_{2i}^* = x_i\beta_2 + D_c\beta_{2c} + \varepsilon_{2i} \qquad\qquad y_{2i} = \begin{cases} 1 & \text{if} \quad y_{2i}^* > 0 \\ 0 & \text{if} \quad y_{2i}^* \leq 0 \end{cases}$$

$$i = 1,2,\dots,I \qquad\qquad c = 1,2,\dots,C \tag{11}$$

$$E(\varepsilon_{1i}) = E(\varepsilon_{2i}) = 0;$$
$$Var(\varepsilon_{1i}) = Var(\varepsilon_{2i}) = \sigma_\varepsilon^2;$$
$$Cov(\varepsilon_{1i}, \varepsilon_{2i}) = \rho,$$

y_{1i}^* is the latent variable, that is the latent propensity to face economic hardship for the *i-th* individual; y_{1i} is the observed response for those who face economic hardship.

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[2] One limitation of this modeling approach is that it cannot address endogeneity concerns in the form of correlations of household unobserved characteristics with the controls due to the cross-sectional nature of the data.

Whereas y_{2i}^* is the latent propensity of the *i-th* individual to experience financial difficulties and y_{2i} is the observed response for those who experience financial difficulties; x_i is a $(1 \times M)$ vector of explanatory variables for the socio-demographic controls and both wage and job shocks with β_1 and β_2 being the associated $(M \times 1)$ vectors of parameters in the two equations. We also consider a $(1 \times C)$ vector of country dummies, D_c, where β_{1c} and β_{2c} are the $(C \times 1)$ associated parameter vectors. Finally, ε_{1i} and ε_{2i} are error terms with a jointly bivariate normal distribution with correlation equal to ρ. The errors in the two equations are highly correlated as we expect that households who experience economic hardship are more likely to face financial difficulties.

In a bivariate probit model, the correlation coefficient between the error disturbances in the latent regression equations gives a measure of how the unobservables interact in the underlying system equations (Songnian Chen and Yahong Zhou 2007). From the bivariate probit estimation, we derive the probability of experiencing cutbacks in consumption and other coping strategies, what we have called "economic hardship", $p(y_1 = 1)$, and of facing financial difficulties, what we have called "financial hardship", $p(y_2 = 1)$. Since during the global crisis those who faced economic hardship also experienced severe financial difficulties (see Emmons and Noeth 2013), the bivariate probit analysis allows us to model the common latent factors that explain both economic and financial hardship.

We also define households' vulnerability as the *joint* probability of facing both economic and financial hardship, $p(y_1 = 1 \cup y_2 = 1)$. We cluster the error terms at the PSU-level to account for possible correlation of the unobservable effects across households located in the same area of residence.

4.1 Exposure to Crisis Shocks: The Local Context

According to Hypothesis 4, the individual propensity to face economic and financial hardship and to cope with crisis shocks depends crucially on the characteristics of the area of residence chosen by the respondent. This correlation if not accounted for generates endogeneity between the individual regressors and the unobserved effects at the local level (Steven N. Durlauf and Yannis M. Ioannides 2010). To control for non-random sorting we assume that individuals decide where to live on the basis of certain characteristics of the area represented by its average economic and demographic characteristics (Georgarakos, Haliassos, and Pasini 2014).

Following Corrado and Corrado (2015) we take into account this aspect and extend in model (1) the latent equations for economic and financial hardship, $y_{ki,lr}^*$ with $k = 1,2$, by introducing an unobservable standard of living effect, $\eta_{k,lr}$,[3] of locality l within region r. Such standard of living effect depends on the locality specific attributes, $\overline{x}_l$, which includes both the incidence of wage and job shocks, and on the

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[3] In linear models $\eta_{k,lr}$ could be eliminated through first difference estimation or via a within-transformation. The non-linear form used does not allow us to follow this route. A dummy variable approach cannot be implemented either for two reasons: the potential loss of too many degrees of freedom and the incidental parameters problem, which generates inconsistent estimates (Corrado, Corrado, Emiliano Santoro 2013).

observable attributes of all the other localities within the same region, $\bar{x}_r$, as well as on an unobservable component, $u_{k,lr}$. To control for the correlation between $x_{i,lr}$ and $\eta_{k,lr}$, we follow Yair Mundlak (1978) and assume that the unobservable effects, $\eta_{k,lr}$, are normally distributed, conditional on averaging individual attributes over the locality where each individual lives, $\bar{x}_l$, and over all the other surrounding localities within the same region, $\bar{x}_r$:

$$y_{ki,lr}^* = x_{i,lr}\beta_k + D_c\beta_{kc} + \varepsilon_{ki,lr} + \eta_{k,lr} \quad k = 1,2 \quad l = 1,2,\dots,L \quad r = 1,2,\dots,R$$
$$\eta_{k,lr} = \bar{x}_l\alpha_{kl} + \bar{x}_r\alpha_{kr} + u_{k,lr}$$
$$E(u_{k,lr}) = 0 \quad Var(u_{k,lr}) = \sigma_u^2 \tag{12}$$

▪ $\bar{x}_l = \frac{\sum_{i=1}^{I_l} x_i}{I_l}$ denotes the average value of the economic and demographic characteristics, x, over the *l-th* locality where I_l is the number of individuals living in each area. We include in $\bar{x}_l$ the average incidence of the crisis shocks at the local level. The set of variables $\bar{x}_l$ enters model (2) with coefficients α_{kl}.

▪ $\bar{x}_r = \sum_{j \neq l}^{L_r} \frac{\sum_{i=1}^{I_j} x_{ij}}{I_j}$ is the average of x over all the other localities within region r with $j \neq l, \dots, L_r$, where L_r denotes the number of localities in the *r-th* region. We include in $\bar{x}_r$ the average incidence of the crisis shocks at the regional level. The way $\bar{x}_r$ is built, by excluding the *l-th* locality from the average, ensures that $\bar{x}_r$ and $\bar{x}_l$ are not correlated. The set of variables $\bar{x}_r$ enters model (2) with coefficients α_{kr}.

Non-random sorting generally induces correlation between observed individual characteristics and unobserved characteristics at the group level. Hence, by introducing group averages and averages across the other groups in the choice set, we account for sorting of individuals into groups associated with groups' unobserved characteristics.

5. Data

In our analysis, we use the second round of the LiTS II, conducted jointly by the European Bank for Reconstruction and Development and the World Bank. It covers 35 countries in Central-Eastern Europe and the Baltic region, South-Eastern Europe plus Turkey, the Commonwealth of Independent States and Mongolia. The survey coverage allows us to benchmark the European transition countries against five Western European countries, defined as the "comparators", represented by France, Germany, Italy, Sweden and the UK.

In our analysis, beyond the five comparator countries, we consider 18 transition Eastern European countries: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, Slovenia, Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo, Macedonia, Montenegro, Romania, Serbia and Turkey. In total, in our sample we have around 15,000 households. Using pan-European microdata allows us to gain a better view of how people's lives were shaped during the global crisis. In fact, by benchmarking the transition region against some advanced market economies, we get a clearer perspective of the main challenges facing transition countries in the aftermath of the crisis and how the crisis has hit households across European regions. In LiTS II the "Crisis Impact Module" is able to provide good insights into the various

transmission channels through which the households were affected by the crisis and also the coping mechanisms that they adopted during the crisis both in terms of consumption plans and emergency lending.

The first part of the LiTS II questionnaire collects data on the composition and type of the selected family, housing conditions and spending. Whilst the second part provides a range of personal information on respondents' socio-economic and demographic characteristics, attitudes and values, current and past professional activity, level of education, religion and nationality of respondents are also taken on board (for more details see EBRD 2010).

This survey is conducted in stages. During the first stage, a sample of Primary Sampling Units (PSUs) was selected: local electoral territorial units were used as PSUs ordered by regions and settlement type (urban or rural) to ensure the even distribution of responses[4]. In the second stage, households were randomly sampled within each PSU. Given that in all countries, except France, Poland and Sweden, there is a majority of female and older respondents, LiTS II provides a weighting scheme, which first identifies the target population in each country disaggregated by age and gender and then assigns design weights in order to reproduce in the sample the gender and age distribution of the population. Table 1 (Appendix) lists the variables used in the analysis and Table 2 (Appendix) reports the summary statistics, which use this design weighting scheme to compute the variables means. The design weight used in LiTS II is labelled "XCweight". The unweighted samples in some countries over- or under-represent people by age and gender. The design weight corrects for these different probabilities of selection making the sample representative of the "true" population in each country.

We employ two indicators of household vulnerability:

▪ The first variable, I_{1i}, is an economic hardship index and measures whether the household has adopted some coping strategies, such as reducing expenditure on staple foods (such as milk, fruit, vegetables or bread), health expenditure, and reducing other expenditures (insurance, education, job training, car, smoking) and also cutting or delaying payments on utilities (TV/phone/internet services), or stopping/reducing help to friends/relatives. We define for each household the number of coping strategies adopted in terms of consumption $I_{1i} = \sum_{e=1}^{E} i_{1i,e}$ where $e = 1, \ldots, E$ indicates the type of consumption coping strategy. Denoting with $I_1^{\max}$ and $I_1^{\min}$ the maximum and the minimum number of consumption coping strategies adopted by households in the sample, the economic hardship indicator is defined as $\frac{(100-0)}{(I_1^{\max}-I_1^{\min})}\left(I_{1i} - I_1^{\min}\right)$ and it ranges from 0 to 100.

▪ The second variable, I_{2i}, is a financial hardship index and measures whether the respondent: is in arrears on mortgage, has to make repayments on mortgage loans denominated in a currency other than that in which she/he receives the income, has delayed or defaulted on loan instalments, has a bank loan refused, and has no savings or assets. We define for each household the number of financial difficulties faced with $I_{2i} = \sum_{f=1}^{F} i_{2i,f}$ where $f = 1, \ldots, F$ indicates the type of financial difficulty. Denoting

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[4] During this stage 50 PSUs have been selected with a selection probability proportional to the number of household living in the PSU. In Poland, Serbia and the UK the selected PSUs are 75.

with $I_2^{\max}$ and $I_2^{\min}$ the maximum and the minimum number of financial difficulties faced with by households in the sample, the financial hardship indicator is defined as $\frac{(100-0)}{(I_2^{\max}-I_2^{\min})}\left(I_{2i}-I_2^{\min}\right)$ and it ranges from 0 to 100.

As Table 2 (Appendix) shows the economic and financial hardship indices are around 55% and 21% higher in Eastern Europe than in Western Europe. We then build two dummies, which equal to one if a household's economic or financial hardship indices, I_{1i} and I_{2i}, are above the local average indices defined as $I_{1,l}$ and $I_{2,l}$, respectively. The averages by locality of the economic and financial fragility indices are derived using the LiTS II design weighting scheme. We, therefore, identify the more fragile households as those who have had to cut more on consumption expenditures or face more financial problems with respect to their counterparts living in the same area. We use these two binary measures of local economic and financial hardship as the dependent variables in the bivariate probit model. Figures 1 and 2 in the Appendix map economic and financial hardship across European regions while Figure 3 (Appendix) shows the relationship between economic and financial hardship across European countries. Both the regional and the country analysis indicate a clear divide between the benchmark Western countries and the transition European economies.

As reported in Table 2 (Appendix), among the controls, we insert a range of *crisis shocks* that may affect the level of households' vulnerability during the crisis. We define as a job shock the event where a member of the household lost her/his job, or a family business closed during the crisis. Whilst a wage shock is the event where a member of the household experienced either a reduction in wages (i.e. wage reduced or wage suspended/delayed) or a reduction in the flow of remittances during the crisis. Also, we note that households in Eastern Europe suffered more crisis-related shocks. For example, the proportion of households reporting a job loss or a family business closure was around two times (29.5%) higher than in Western Europe (16%). Also those who experienced a wage shock have been around two times higher in Eastern Europe (69.2%) than in Western Europe (35.3%).

The *Economic and Demographic Factors* comprise household's expenses, which are the sum of total household's equivalent consumption expenses[5] over the previous 12 months[6] (excluding durable goods)[7] all expressed in Euros. Many households have consumption commitments such as utilities, education or health expenses that are costly to adjust in response to fluctuations in income. In particular, commitments can explain the key facts often attributed to habit formation that consumption exhibits excess smoothness in presence, mainly, of moderate and anticipated shocks. But the commitments model also explains empirical regularities

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[5] The main items included among expenses are: (i) Food, beverages and tobacco; (ii) Utilities (electricity, water, gas, heating, fixed line phone); (iii) transportation; (iv) education (including tuition, books and other kindergarten expenses); (v) health; (vi) clothing and footwear.

[6] Concerning the timing of the variables households' consumption expenditure refers to the previous 12 months, while the variables income and job shocks refer to the previous two years.

[7] By excluding expenses on durable goods (such as furniture, appliances, TV, car, home etc.) we mitigate potential endogeneity issues with the dependent variable "Credit", which in some countries may also include loans to purchase durable goods.

that are not consistent with standard habit formation models. For instance, it predicts that excess sensitivity and smoothness vanish for large and unanticipated shocks (Jappelli and Pistaferri 2010). Hence, our results suggest that some of the behaviour previously attributed to habit formation may be due to adjustment costs in consumption. We use the following dummy variables for the main source of household's income: wage or self-employment income, state benefits, and pensions[8]. Among other explanatory variables, we also use gender, age, marital status, education attainment and household's place of residence – whether the household lives in an urban or metropolitan area.

Finally, we consider a set of *Formal and Informal Social Factors* which allow us to control for sample selection of financially constrained households. These factors might be assumed to be a proxy for informal social connections (David O'Brien, John Phillips, and Valeri Patsiorkovsky 2005; John Western et al. 2005): (i) having friends or family members who are geographically close and willing to help; (ii) membership to voluntary associations and community-based relationships, which influence social interaction and cooperation between agents (Robert D. Putnam 1993). These connections reflect the density of interpersonal linkages and social ties which, in turn, may favour the resilience to the crisis of those who are suffering financial hardships and access to alternative forms of financial support. Family and friendship relationships may be considered as a proxy for informal borrowing which is linked to credit rationing or, in a broader sense, to credit constraints phenomena. In this respect, informal credit market mostly serves a marginal class of borrowers, who are not eligible for formal financial services, and for this reason, several studies define this source of informal borrowing as a form of "last resort" lending to credit-constrained individuals.

In addition, we consider the following household head's social characteristics: (i) whether she/he speaks at least one official language, this is considered as in indicator of social integration; (ii) whether she/he is a Muslim. As highlighted in the literature (Martin Čihák and Heiko H. Hesse 2010; Pejman Abedifar, Iftekhar Hasan, and Amine Tarazi 2016), Islamic banks differ notably from conventional western banks offering products that are more "attractive" for people that demand financial services consistent with their religious beliefs.

6. Results

Tables 3 and 4 report the marginal effects of the bivariate probit estimation[9]. The average marginal probability effects in Table 4 (Appendix) are computed as the partial derivatives of each explanatory variable on the probability that each observed dependent variable equals one, $\frac{\partial p(y_1=1)}{\partial x}$ and $\frac{\partial p(y_2=1)}{\partial x}$. The marginal probability effects in Tables 3 and 4 are computed as the partial derivatives of each explanatory variable

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[8] Since the information on household's income level is not available from the survey we use as a proxy the employment status which refers to the current period main sources of livelihood.

[9] The bivariate probit model is estimated in Stata/MP 11.2 using maximum-likelihood estimation with the standard errors clustered at the PSU level. The results of the coefficient estimates are available from the authors upon request.

on the probabilities that the two observed dependent variables are jointly equal to one, $\frac{\partial p(y_1=1 \cup y_2=1)}{\partial x}$, where the joint probabilities are defined by a bivariate normal distribution (Greene 2012). The $\chi^2(1)$ Wald test on the statistical significance of the correlated effects ($H_0: \rho = 0$ vs $H_1: \rho \neq 0$) suggests that economic and financial hardship displays some correlation that cannot be entirely accounted for by the inclusion of our controls. From a purely statistical viewpoint, a positive and statistically significant ρ indicates a positive and interactive correlation between the two dependent variables, economic and financial hardship, suggesting that it is potentially harmful to explore them in a separate fashion. An alternative way to interpret a statistically significant correlation between the error terms is to think about the impact of other determinants of the propensity to experience cutbacks in consumption and financial difficulties that are not fully accounted for by observable effects in the model; although they also influence the dependent variables. Therefore, ruling out the assumption of correlated disturbances may potentially bias the estimates.

As Table 3 (Appendix) shows, there are several groups of households that seem to be more vulnerable than their counterparts living in the same area: (i) households whose members experience a job or wage shock during the crisis; (ii) people with low education level; (iii) households with lower consumption expenses in the previous year (i.e. what we term consumption commitment) and households receiving social aid and allowance/benefits; (iv) households belonging to ethnic minorities; (v) younger or divorced people. The following sections analyse in detail these findings.

6.1 Job and Wage Shocks

The likelihood of experiencing more consumption cutbacks and financial problems than co-residents depends on who you are and how the economic crisis shocks have affected your household life. For example, Eastern transition countries were severely affected by the economic downturn in 2008-2010: the global crisis affected household on multiple fronts as workers lost their job, wages were either suspended or reduced, remittances fell.

As Table 2 (Appendix) shows European households have been mainly affected by the crisis through the labour market especially through the loss of their job or a family business closure. Other transmission channels have been the reduction or suspension of wages and the reduction in remittances from family members living abroad. In particular, as Table 2 (Appendix) shows, the number of Eastern European households hit by a wage shock is almost double that of Western Europe's households. Wage shocks are considered as important crisis transmission channels, particularly as Eastern European countries have a large number of migrant workers abroad. These shocks have produced large cutbacks in the level of consumption of the European households and higher levels of financial hardship due to the individuals' increasing difficulties in accessing the financial market and the lower level of precautionary savings people hold to cope with unexpected events.

Our aim is to assess the impact of negative job and wage shocks on households' consumption decisions and financial hardship during the global crisis. To answer this question we use a bivariate probit estimation, which assumes correlated disturbances

between the two equations for economic and financial hardship to account for common unobservable individual effects. For example, households with a high-risk profile that are experiencing financial problems are also more prone to face economic hardship.

Table 3 (Appendix) shows that in Western Europe job and wage shocks positively and significantly affect the likelihood of experiencing consumption cutbacks and financial weakness by households. A negative wage shock increases the probability of economic hardship by 12.4% and of financial hardship by 5.3%; whilst a job shock doubles these values: the probability of facing economic hardship raises by 22.4% and that of facing financial hardship increases by 10.2%. So we reject Hypothesis 1.

Likewise in Eastern Europe the impact of these shocks on households' consumption coping strategies and financial hardship is always significant and positive: individuals hit by a job shock face a rise in the probability of financial hardship by 11%, and also an increase in the probability of economic hardship by 17.1%. Whilst those hit by a negative wage shock face an increase in the probability of experiencing cutbacks in consumption and financial difficulties by 3.9% and 10.3%, respectively. The severity by which the crisis shocks hit households across European regions might be explained by the lower availability, coverage and efficiency of public safety nets in protecting more vulnerable households.

6.2 Economic and Demographic Factors

As reported in Table 3 (Appendix), the traditional demographic factors are, of course, relevant determinants of both households' consumption response and financial balance sheet problems. So we accept Hypothesis 3. Concerning *age*, our results show that in Western European countries people aged over 65 experience a reduction in the likelihood of economic and financial hardship by 11.4% and 16.1%, respectively. Elderly people living in European transition economies face a reduction in the likelihood of experiencing economic and financial hardship by 9.5% and 12.6%, respectively. Also, middle-aged people face a reduction in the probability of facing financial difficulties with respect to their younger counterparts: in Western Europe, this probability decreases by 10.3% for people in the age class 55-64 whilst in Eastern Europe this probability is reduced by 6.8% for people in the same age class, and by 6.4% for those aged 45-54. We can explain these results by arguing that the role of age is among the most important determinants of households' vulnerability. In fact, younger individuals (age group 25-34) generally have less job experience, which is fundamental to build up human capital. Therefore, a lower level of human capital might explain why younger workers might be less suitable for the job market. It is not surprising that in Europe during the crisis the level of unemployment of younger workers was more than double the overall rate. On the other hand, age also influences households' financial decisions. Generally, young people have not adequate financial knowledge and therefore more exposed to the risks of financial hardship. Whilst those who are middle-aged have higher levels of human capital and are also more likely to have high earnings so that they have more incentive to acquire the financial knowledge necessary to engage in sound financial decisions (for example, in terms of savings, assets, emergency funds, pension/investment schemes, insurance arrangements etc.).

Also. the results indicate that the elderly by drawing from personal precautionary savings, wealth (e.g. liquidating retirement assets) and pension income, are more able to cope with unexpected shocks than younger people.

In Western Europe *separated/divorced* people are more likely to experience both economic hardship (9.4%) and financial problems (10.6%) with respect to their unmarried counterparts. Whereas in Eastern Europe separated/divorced people are more likely to face financial hardship (6.9%). It is known that divorce has significant negative economic and financial consequences for families as it leads to a decrease in household income and a higher risk of poverty. In fact, and as highlighted by Hayley Fisher and Hamish Low (2016), typically after a marital separation the financial resources that supported one family become insufficient to meet the expenses and costs of two newly formed households, one of which often includes children. Likewise sole-parent families, especially those headed by mothers, typically experience a drastic fall in financial living standards that also makes it harder to access credit from formal financial markets. In Eastern Europe being single reduces by 3.1% the probability of financial hardship while in Western Europe this probability is more than twice higher (7.5%).

As Table 3 (Appendix) shows, in Western and Eastern Europe the likelihood of experiencing reductions in consumption and financial problems is heavily affected by the level of educational attainment. Higher-educated people have a lower probability of experiencing falls in consumption by around 6% both in Western and transition European countries. Whilst there is a reduction in the probability of suffering financial hardship by 9.8% in Western Europe and by 6.2% in Eastern Europe. Education can be considered as a proxy of permanent income so we can argue that better-educated people are more resilient to shocks since they are better equipped to face an income decline: they are less likely to suffer economic and financial hardship as they usually are higher-income people. There is some positive association between educational attainment and selecting savings as a coping strategy in case of shocks as found by Lusardi, Tufano, and Schneider (2011). These precautionary savings may allow households to smooth consumption spending without undertaking larger reductions in their consumption plans (i.e. without adopting "passive" coping strategies). These results also confirm findings by Maarten van Rooij, Lusardi, and Rob Alessie (2011) where education is interrelated with financial market participation that may represent a way to address the lack of precautionary savings to cope with shocks. Accessing the mainstream credit (credit cards, home equity lines of credit, mortgages and unsecured loans) helps individuals to smooth consumption, thereby alleviating the impact of unexpected wage and job shocks, and consequently lowering reductions in consumption expenditures; and, as a result, less financial hardship should be expected.

Employment status is another important determinant of households' vulnerability. We find that when the main sources of livelihood are *salary/wages* and *self-employment* incomes, households experience lower levels of economic and financial hardship. In particular, Western European households, whose main source of livelihood is a salary wage, experience a decrease in the probability of facing financial problems by 13.8%. For self-employed people, the probabilities of reporting economic and financial difficulties drop by 6.9% and 9.5%, respectively. In Eastern Europe, only

self-employed people are less likely to face financial hardship: their probability of experiencing financial problems and difficulties declines by 9.7%. We also expect that households that rely on transfer income have to reduce consumption more due to the inherent uncertainty related to these income sources. In fact, when the main source of livelihood are *state benefits*, the probability of facing economic hardship increases by 11.7% for Western European households and by 7.1% for their Eastern European counterparts. When we look at financial hardship the results are even more pronounced, especially in Western Europe where the probability of experiencing financial problems for households receiving state benefits is three times higher than in Eastern Europe (12.5% against 4.5%). This result might be explained by the fact that people that are the recipients of state benefits are typically lower-income individuals and therefore less likely to access credit facilities. They cannot borrow since their income is low, irregular and uncertain, so they do not have secure income streams of which banks can keep track. Since in Western Europe there are more stringent income requirements to access bank credit, households on state benefit might then be more likely to experience financial hardship than their counterparts living in transition economies.

The number of members living in a household also seems to affect the exposure to economic and financial hardship, especially in Western Europe where an increase in the *household size* increases the probability of financial hardship by 4.8% and the probability of economic hardship by 2.4%. In the relevant literature it has been clearly assessed that for households experiencing crisis shocks, family size and vulnerability to poverty are positively related (Joshua Angrist and William Evans 1998). It is hypothesized that the main mechanisms operating between family size and vulnerability to poverty are savings, the labor supply and earnings of parents. Analyses have shown (see among others Angrist and Evans 1998; Christelis et al. 2009) that additional children, on average, cause a substantial decline in household's savings levels, especially among lower-income households, reducing the work participation and the wage income, especially of mothers. Consequently, family size increases households' vulnerability to shocks: hence, larger households, containing more children, might experience higher reduction in their consumption and greater financial hardship.

In Eastern Europe an increase of 1% in (log) household-level expenses in the previous year lowers by 4% the probability of experiencing financial difficulties; this effect is almost two times higher, 7%, in Western Europe. Why does the ability to cope with shocks seem to increase with past consumption expenditure levels of the households? Because high-income high-consumption families have built up more savings before the crisis (Brown 2013); or because their income allows them to repay existing debts and to get credit from the financial markets to overcome negative unanticipated shocks in order to maintain a given consumption stance from the previous year.

6.3 Social Factors

In Western Europe speaking the official language is an indicator of social integration and it is negatively correlated with financial hardship; households speaking an official

language face a reduction in the likelihood of experiencing financial difficulties by around 20%. This result may indicate that in Western European countries ethnic fractionalization limits the access to and the use of financial services, such as credit, so that the ethnic minorities are more likely to face exclusion from the mainstream financial markets (Corrado and Corrado 2015).

Membership to voluntary organisations (informal lending), here used as a proxy of social capital, might mitigate the financial difficulties faced by certain disadvantaged low-income groups of people. Membership to a voluntary organisation decreases the probability of financial hardship by 4.7% and 2.2% in Western and Eastern Europe, respectively. This result highlights that, especially in transition economies, an increasing number of financial institutions provide credit to the poor on the basis of a form of social collateral, through which borrowers' reputation, or the social networks to which they belong, take the place of traditional physical or financial collateral. Since these arrangements are based, to various degrees, on the extent and strength of personal relationships, they provide a fertile ground for social capital in the provision of informal credit (Corrado and Corrado 2015). Especially in Western Europe where the access to formal borrowing (banks) to obtain credit during the crisis was more difficult for many households, and interpersonal relationships seem to be even more important to make people less vulnerable to financial hardships. Also, family and friendship relationships may be assumed to be a proxy for informal finance: individuals who are excluded from the mainstream financial sector, i.e. a credit-constrained borrower might borrow from family/friends. These private safety nets can provide credit of last resort to those who are not eligible for formal financial services and are excluded from formal credit. The results seem to confirm this evidence, especially in the Eastern European regions, where stronger family ties and private networks may reveal the presence of more binding financial constraints that put individuals at the margins of the financial sector. For those who have stronger ties with family or friends the probability of experiencing financial difficulties increases by around 3%. So we accept Hypothesis 3.

6.4 Households' Vulnerability

Table 4 (Appendix) reports the likelihood of households' vulnerability, which is defined as the joint probability of facing both economic and financial hardship. Overall, Western European households appear to be particularly vulnerable during the 2008 financial crises. In Western Europe households' vulnerability increases by 16.7% after a permanent job shock and by 8.7% after a wage shock. Whereas in Eastern Europe the same shocks raise the likelihood of vulnerability by 14.4% and 7.4%, respectively.

In Europe, demographic groups that are less likely to be vulnerable are unmarried people, the elderly and workers with either a salary wage or a self-employment income. Specifically, we find that in transition countries the probability of reporting both economic and financial problems drops dramatically for elderly people: respondents aged 65 or over are three and half times (10.5%) less likely to be vulnerable than those aged 55-64 (3.4%) and aged 45-54 (3.2%). As noted in the previous section the elderly have been found to be less vulnerable than their younger

counterparts during the 2008-2010 economic downturn, which heavily affected households mostly through the labour market, particularly by reductions in wage earnings and job losses. Therefore, elderly and retired people are among the age groups less affected by the labour market shocks; they also are those, among the population, that have higher levels of savings (liquid assets or retirement accounts) to use as a buffer against unexpected events to smooth consumption. Education reduces vulnerability by 7.8% in Western Europe and by 5.9% in Eastern Europe. There are several reasons to explain the resilience of highly educated households to shocks. First, a higher educational level is associated with higher income earnings and savings, which are used as a buffer against negative labour market shocks. Secondly, having a higher education level means having more human capital to offer an employer and therefore households with a higher level of education (i.e., a BA degree or higher) are less likely to suffer economic hardship since they are less vulnerable to being laid off. In addition, because of their good career earning prospects, they have an incentive to acquire the financial knowledge that may help them to reduce their financial vulnerability (Lusardi, Tufano, and Schneider 2011; Emmons and Noeth 2013). The source of income is important in reducing vulnerability; having a salary decreases vulnerability by 8.7% in Western Europe, probably because households can count on a stream of earnings that allow them both to cushion their consumption and to secure access to financial markets.

7. Financial Constraints

In this section, we test Hypothesis 2 by explicitly modeling households' imperfect access to financial markets (Ognjen Radonjić and Miodrag Zec 2010; Yulu Chen et al. 2017). We observe that cutting on consumption may either reflect (*ex-ante*) self-insurance *via* precautionary savings in anticipation of worse future financial conditions (i.e., households can insure themselves by building up assets and savings in "good times", and drain these resources in "bad times"), or (*ex-post*) coping strategies induced by the presence of financial constraints. These are the so-called balance sheet hypotheses (Asger Lau Andersen, Charlotte Duus, and Thais Lærkholm Jensen 2016; Gerlach-Kristen and Merola 2019) which generate non-random sample selection bias. Non-random sample selection arises whenever observations are selected so that they are not independent of the outcome variables: endogeneity arising from sample selection should then be accounted for (James Heckman 1979). In this instance, consumption coping strategies induced by financial constraints are observed if households experience difficulties in meeting outstanding debt obligations or in accessing the official credit markets. Neglecting sample selection may lead us to overstate the effects of other controls in the outcome, the equation of consumption. So, we expect that the impact of both negative job and wage shocks into households' consumption decisions will be inflated. To allow for a correlation between factors influencing the occurrence of financial constraints and the subsequent decision to reduce consumption we specify a set of two equations in which unobserved factors are accounted for in the error term. The selection equation considers additional variables, as required by the exclusion restriction, that are the causes of financial constraints, while the outcome equation analyses the determinants of economic hardship in the

presence of financial constraints. Thus we only select cases that experienced such constraints, i.e. the "marginal class" of borrowers, who have more difficulties in accessing formal financial markets. We adopt a bivariate probit model with sample selection, which is also known as the Heckman (1979) probit model:

$$
\begin{aligned}
y_{1i}^* &= z_i\beta_{1z} + D_c\beta_{1c} + \varepsilon_{1i}; \\
y_{2i}^* &= z_i\beta_{2z} + w_i\beta_{2w} + D_c\beta_{2c} + \varepsilon_{2i}, \\
i &= 1,2,\ldots,I \qquad c = 1,2,\ldots,C
\end{aligned}
\tag{13}
$$

where the selection equation, y_{2i}^*, depends both on (i) economic and demographic households' characteristics, z_i and on (ii) a set of variables, w_i, that are expected to affect the selection process, but not the consumption process, except through selection. The set of independent variables, w_i, used in the selection equation are: religion, official language, membership to voluntary organizations and family or friendship relationships. These variables are used as instrumental variable (exclusion restrictions) which determine the selection process but not the outcome equation. We have formally tested that they are not correlated with the outcome equation; hence they can be used as valid instruments in the selection equation. Such variables mainly reflect voluntary exclusion of people who can access alternative informal credit lines.

The outcome equation for consumption, y_{1i}^*, is therefore observed only for credit-constrained households and it depends on the set of economic and demographic factors, z_i. In other terms, we have imposed a set of exclusion restrictions in the selection equation to identify financially constrained households in the outcome equation for consumption. Formally we have:

$$
y_{1i} = y_{1i}^* \cdot \; y_{2i}(y_{2i}^* > 0) = \begin{cases} 0 & \text{if } \; y_{2i}^* \le 0 \\ y_{1i}^* & \text{if } \; y_{2i}^* > 0 \end{cases},
\tag{14}
$$

that is, potential consumption decision and actual consumption decision are equal only if the propensity to select into the sample (e.g. to experience credit constraints in the formal credit market) is positive ($y_{2i}^* > 0$). For households not selecting into the sample ($y_{2i}^* \le 0$), y_{1i}^* is not observed: this outcome could relate to voluntary financial exclusion from the official credit markets induced by the presence of alternative informal borrowing.

When we estimate the consumption equation, y_{1i}^*, by using the Heckman two-step correction approach, we find that the impact of both job and wage negative shocks on households' consumption is reduced but still high, in particular across Eastern Europe, therefore we can also validate Hypothesis 2. Table 5 (Appendix) shows that in the European transition economies a wage shock increases the probability of experiencing falls in consumption by 6%, whilst a job shock doubles this figure up to 13.5%. Whilst, without accounting for sample selection correction, the same probabilities were significantly higher: 11% and 17.1%, respectively (as reported in Table 3, Appendix).

8. Conclusions

The global financial crisis spread unevenly across households and localities in Europe. We find that poorer, less educated, larger size and young adult-headed households

without supportive social ties are more exposed to the crisis shocks. The second contribution of the paper is to show that unanticipated wage and job shocks have a large impact on households' consumption and financial decisions, with the bad news of a job loss hitting harder than a wage reduction. Specifically, households hit by a negative job shock are twice more likely to be exposed both to consumption and financial hardship. Indeed, the results confirm that crisis shocks have significantly reduced the levels of consumption of European households and increased the risk of financial hardship since people encountered difficulties in accessing credit lines from the financial sector.

Since a cutback on consumption may be a mere precautionary measure, a third contribution of the paper is to assess the role of financial constraints in households' consumption response to the shocks. In this sense, consumption coping strategies (economic hardship) are observed if households experience difficulties in meeting outstanding debt obligations or in obtaining loans because of financial constraints (financial hardship). When we account for non-random sample selection bias by the means of a two-stage process to correct sample-induced endogeneity, we find that the impact of the shocks on households' consumption is attenuated, especially across the Eastern European regions, but still remarkable.

Finally, we show that, at least locally, difficulties in financial market access and credit constraints are mainly responsible for the consumption response to unanticipated wage and job shocks. Our results, however, go further in that they offer useful information to identify the areas where households' consumption has been affected mostly as a result of financial constraints. In the context of increasing impoverishment across Europe, the paper shows that a careful analysis of the main determinants of households' hardship – economic and financial – is crucial to formulate policy measures at the local level that can help people to access credit and smooth their consumption in response to unexpected negative shocks.

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Appendix

Table 1 List of Variables

Variables	Categories	Description
Economic hardship index	Continuous	Measure of the number of consumption coping strategies adopted by the household: cutting food consumption and other expenditures (in vacations, health, education, job training, insurance, car, smoking), cutting/delaying payments on utilities (TV/phone/internet), stopping/reducing help to friends/relatives.
Financial hardship index	Continuous	Measure of the number of financial difficulties experienced by the household: mortgage arrears, mortgage in foreign currency, delayed/defaulted on unsecured loan instalments, bank loan refused, she/he has no savings or assets (assets comprise a primary residence, a secondary residence or a car).
Economic hardship	Binary	Dummy equal to one if a household's economic hardship index is above the average index by locality.
Financial hardship	Binary	Dummy equal to one if a household's financial hardship index is above the average index by locality.
Crisis shocks		
Job shock	Binary	Dummy if during the crisis any household member lost his job or the family business closed, 1=Yes 0=No.
Wage shock	Binary	Dummy if during the crisis any household member experienced either a reduction in income (wage reduced or wage suspended/delayed) or a reduction in the flow of remittances, 1=Yes 0=No.
Economic and demographic factors		
Gender	Binary	Respondent gender 1=Female; 0=Male.
Age	Binary	Dummies for "Age 25-34", "Age 35-44", "Age 45-54", "Age 55-65", "Age over 65". Ref. cat. "Age 18-24".
Marital status	Binary	Dummy variables for: "Single", "Widowed", "Separated/Divorced". Ref. cat.: "Married". 1=Yes 0=No.
Educational level	Binary	Dummy if the respondent's highest level of education is Bachelor's degree, Master's degree or PhD. 1=Yes 0=No.
Main sources of livelihood	Binary	Dummy variables for "Salary wages", "Self-employment income", "Pensions", "State benefits". 1=Yes 0=No.
Household expenses	Continuous	(Log) Household equivalised expenses (excluding housing expenses and durable goods) in the previous year (Euros).
Household size	Continuous	Number of people living in the household.
Place of residence	Binary	Dummies if household lives in an "Urban or Metropolitan area". Ref. cat.: "Rural area". 1=Yes 0=No.
Formal and informal social factors		
Official language	Binary	Dummy if the respondent speaks any of the official languages of the country. 1=Yes 0=No.
Muslim	Binary	Dummy variable for "Muslim". 1=Yes 0=No.
Member of organizations	Binary	Dummies if respondent is member (active/passive) of a voluntary organization (religious, sport, art/music/educational, labor union, environmental, professional, humanitarian/charitable organizations, youth associations). 1=Yes 0=No.
Meeting friends/relatives	Binary	Dummies if respondent meets on most days, once or twice a week relatives or friends. 1=Yes 0=No.
Geographic contextual effects		
Country dummies	Binary	Dummy variables for Italy, France, Germany, Sweden, United Kingdom, Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo, Macedonia, Montenegro, Serbia, Romania, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, Slovenia, Turkey.

Source: EBRD (2010).

Table 2 Summary Statistics

	Western Europe				Eastern Europe			
	Mean (% if counts)	SD	Min	Max	Mean (% if counts)	SD	Min	Max
Economic hardship index	12.013	12.467	0	92.857	18.700	14.201	0	100
Financial hardship index	12.058	13.134	0	66.667	14.657	12.043	0	100
Economic hardship	0.484	0.500	0	1	0.507	0.50	0	1
Financial hardship	0.467	0.499	0	1	0.495	0.50	0	1
Job shock	0.160	0.367	0	1	0.295	0.456	0	1
Wage shock	0.353	0.478	0	1	0.692	0.462	0	1
Female	0.576	0.494	0	1	0.625	0.484	0	1
Age 25-34	0.118	0.323	0	1	0.218	0.413	0	1
Age 35-44	0.216	0.412	0	1	0.190	0.392	0	1
Age 45-54	0.201	0.401	0	1	0.178	0.383	0	1
Age 55-64	0.157	0.364	0	1	0.129	0.335	0	1
Age over 65	0.273	0.446	0	1	0.187	0.390	0	1
Single	0.551	0.497	0	1	0.580	0.494	0	1
Separated/divorced	0.139	0.346	0	1	0.088	0.283	0	1
Widowed	0.094	0.292	0	1	0.122	0.327	0	1
Higher education	0.252	0.434	0	1	0.156	0.363	0	1
Salary wages	0.598	0.490	0	1	0.622	0.485	0	1
Self-employment	0.127	0.333	0	1	0.172	0.378	0	1
Pensions	0.385	0.487	0	1	0.398	0.490	0	1
State benefits	0.171	0.377	0	1	0.122	0.327	0	1
Household expenses (previous year)	9.795	1.055	3.296	13.754	8.686	0.722	1.571	11.401
Household size	2.402	1.284	1	9	2.950	1.586	1	10
Urban/metropolitan	0.684	0.465	0	1	0.636	0.481	0	1
Official language	0.993	0.086	0	1	0.930	0.255	0	1
Muslim	0.016	0.127	0	1	0.217	0.412	0	1
Member of organizations	0.599	0.49	0	1	0.328	0.47	0	1
Meeting friends/relatives	0.955	0.208	0	1	0.925	0.263	0	1
Number of observations	3275				12170			

Notes: Means are defined as average of the variables using LiTSII design weights. Western Europe: Italy, France, Germany, Sweden, United Kingdom. Eastern Europe: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo, Macedonia, Montenegro, Serbia, Romania, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, Slovenia, Turkey.

Source: Authors' compilation.

Table 3 Households' Economic and Financial Hardship (Average Marginal Effects)

Variables	Western Europe		Eastern Europe	
	Econ. hardship $p(y_1 = 1)$	Fin. hardship $p(y_2 = 1)$	Econ. hardship $p(y_1 = 1)$	Fin. hardship $p(y_2 = 1)$
Job shock	0.224***	0.102***	0.171***	0.103***
Wage shock	0.124***	0.053***	0.110***	0.039***
Female	0.002	0.023	-0.005	0.008
Age 25-34	0.093**	0.032	0.006	0.009
Age 35-44	0.054	0.047	0.025	-0.007
Age 45-54	0.053	0.015	0.002	-0.064***
Age 55-64	-0.038	-0.103**	0.002	-0.068***
Age over 65	-0.114*	-0.161***	-0.095***	-0.126***
Single	-0.023	-0.075***	-0.019	-0.031**
Separated/divorced	0.094**	0.106***	0.018	0.069***
Widowed	0.029	0.008	-0.079***	0.011
Higher education	-0.067***	-0.098***	-0.058***	-0.062***
Salary wages	-0.036	-0.138***	-0.008	-0.019
Self-employment	-0.069**	-0.095***	-0.027*	-0.097***
Pensions	-0.042	-0.044	-0.014	-0.032***
State benefits	0.117***	0.125***	0.071***	0.045***
Household expenses (previous year)	0.005	-0.070***	0.009	-0.040***
Household size	0.024**	0.048***	0.012***	0.008*
Urban/metropolitan	-0.011	0.011	-0.020	0.097*
Local and regional averages ($\overline{x}_l, \overline{x}_r$)	√	√	√	√
Country dummies	√	√	√	√
Marginal probability	0.494	0.471	0.51	0.50
ρ	0.251**		0.172***	
$\chi^2(1)$ (Prob>$\chi^2(1)$)	74.25 (0)		123.10 (0)	
Log-likelihood	-4150		-16368	
Observations (clusters PSU)	3275 (223)		12170 (193)	
No. countries	5		18	
No. regions	33		157	
No. localities	316		937	

Notes: Significance level at *** 1%, **5%, *10%. y_1 = economic hardship and y_2 = financial hardship. Standard errors clustered at the PSU level. Constants are not reported but are available from authors upon request. Group averages ($\overline{x}_l, \overline{x}_r$) are defined over locality l and over the other localities within region r.

Source: Authors' compilation.

Table 4 Households' Vulnerability (Average Marginal Effects)

Variables	Western Europe $p(y_1 = 1 \cup y_2 = 1)$	Eastern Europe $p(y_1 = 1 \cup y_2 = 1)$
Crisis shocks		
Job shock	0.167***	0.144***
Wage shock	0.087***	0.074***
Economic and demographic factors		
Female	0.013	0.002
Age 25-34	0.061*	0.008
Age 35-44	0.050	0.009
Age 45-54	0.033	-0.032**
Age 55-64	-0.068**	-0.034**
Age over 65	-0.126***	-0.105***
Single	-0.048**	-0.025**
Separated/divorced	0.103***	0.045***
Widowed	0.018	-0.035**
Higher education	-0.078***	-0.059***
Salary wages	-0.087***	-0.014
Self-employment	-0.076***	-0.062***
Pensions	-0.041*	-0.024**
State benefits	0.124***	0.060***
Household expenses (previous year)	-0.033**	-0.016***
Household size	0.035***	0.010***
Urban/metropolitan	0.001	0.040
Geographic contextual effects		
Local and regional averages ($\overline{x}_l, \overline{x}_r$)	√	√
Country dummies	√	√
Joint probability	0.273	0.284

Notes: Significance level at *** 1%, **5%, *10%. y_1 = economic hardship and y_2 = financial hardship. Standard errors clustered at the PSU level. Constants are not reported but are available from authors upon request. Group averages ($\overline{x}_l, \overline{x}_r$) are defined over locality l and over the other localities within region r.

Source: Authors' compilation.

Table 5 The Heckman Probit Model (Average Marginal Effects)

Variables	Western Europe		Eastern Europe	
	Econ. hardship (outcome eq.) $p(y_1 = 1)$	Fin. hardship (selection eq.) $p(y_2 = 1)$	Econ. hardship (outcome eq.) $p(y_1 = 1)$	Fin. hardship (selection eq.) $p(y_2 = 1)$
Crisis shocks				
Job shock	0.231***	0.098***	0.135***	0.102***
Wage shock	0.106***	0.053***	0.060***	0.040***
Economic and demographic factors				
Female	-0.004	0.022	0.008	0.009
Age 25-34	0.109*	0.026	0.020	0.013
Age 35-44	0.024	0.051	0.026	-0.003
Age 45-54	0.071	0.020	-0.017	-0.056***
Age 55-64	-0.073	-0.100**	-0.019	-0.062***
Age over 65	-0.151*	-0.148**	-0.092***	-0.124***
Single	0.001	-0.076***	-0.045***	-0.035**
Separated/divorced	0.103*	0.108***	0.029	0.066***
Widowed	0.061	0.010	-0.061***	0.016
Higher education	-0.027	-0.090***	-0.050***	-0.059***
Salary wages	-0.058	-0.130***	-0.022*	-0.023*
Self-employment	-0.024	-0.085***	-0.050***	-0.097***
Pensions	-0.049	-0.045	-0.014	-0.032***
State benefits	0.117**	0.127***	0.049***	0.044***
Household expenses (previous year)	0.030	-0.065***	-0.014*	-0.034***
Household size	0.009	0.051***	0.014***	0.009**
Urban/metropolitan	-0.034	0.010	0.041	0.100*
Formal and informal social factors				
Official language	–	-0.196**	–	0.005
Muslim	–	0.058	–	-0.017
Member of organizations	–	-0.047**	–	-0.022**
Meeting friends/relatives	–	0.007	–	0.029**
Geographic contextual effects				
Local and regional averages $(\overline{x}_l, \overline{x}_r)$	√	√	√	√
Country dummies	√	√	√	√
Marginal probability	0.499	0.469	0.276	0.502
ρ	0.248		0.993**	
$\chi^2(1)$ (Prob$>\chi^2(1)$)	0.15 (0.70)		3.31 (0.06)	
Log-likelihood	-2992		-11984	
Observations (clusters PSU)	3275 (223)		12170 (193)	
No. countries	5		18	
No. regions	33		157	
No. localities	316		937	

Notes: Significance level at *** 1%, **5%, *10%. y_1 = economic hardship and y_2 = financial hardship. Standard errors clustered at the PSU level. Constants are not reported but are available from authors upon request. Group averages $(\overline{x}_l, \overline{x}_r)$ are defined over locality l and over the other localities within region r.

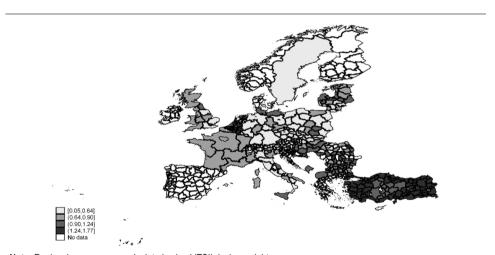**Source:** Authors' compilation.

[0.00,1.37]
(1.37,2.03]
(2.03,2.26]
(2.26,4.89]
No data

Notes: Regional averages are calculated using LiTSII design weights.

Source: EBRD (2010).

Figure 1 Households' Economic Hardship across European Regions

[0.05,0.64]
(0.64,0.90]
(0.90,1.24]
(1.24,1.77]
No data

Note: Regional averages are calculated using LiTSII design weights.

Source: EBRD (2010).

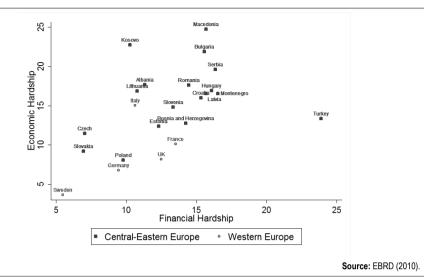**Figure 2** Households' Financial Hardship across European Regions

Figure 3 Relationship between Households' Economic and Financial Hardship across Europe

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