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**Working Paper**

## Unemployment risk and over-indebtedness: A micro-econometric perspective

NBB Working Paper, No. 294

**Provided in Cooperation with:**

National Bank of Belgium, Brussels

*Suggested Citation:* Du Caju, Philip; Rycx, François; Tojerow, Ilan (2016) : Unemployment risk and over-indebtedness: A micro-econometric perspective, NBB Working Paper, No. 294, National Bank of Belgium, Brussels

This Version is available at:

<https://hdl.handle.net/10419/144506>

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# Unemployment risk and over-indebtedness: A micro-econometric perspective



Philip Du Caju, François Rycx and Ilan Tojerow

February 2016    **No 294**

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ISSN: 1375-680X (print)

ISSN: 1784-2476 (online)

## Abstract

We study how unemployment effects the over-indebtedness of households using the new European Household Finance and Consumption Survey (HFCS). First, we assess the role of different labor market statuses (i.e. employed, unemployed, disabled, retired, etc.) and other household characteristics (i.e. demographics, housing status, household wealth and income, etc.) to determine the likelihood of over-indebtedness. We explore these relationships both at the Euro area level and through country-specific regressions. This approach captures country-specific institutional effects concerning all the different factors which can explain household indebtedness in its most severe form. We also examine the role that each country's legal and economic institutions play in explaining these differences. The results of the regressions across all countries show that the odds of being over-indebted are much higher in households where the reference person is unemployed. These odds ratios remain fairly stable across different over-indebtedness indicators and specifications. Interestingly, we find similar results for secured debt only. Turning to country specific results, the role of unemployment varies widely across countries. In Spain, France or Portugal, for example, the odds ratio for the unemployed group is just below 2, whereas in Austria, Belgium, or Italy the odds ratio is higher than 4. Secondly, we situate the analysis in a macro-micro frame to identify households and countries that are especially vulnerable to adverse macroeconomic shocks in the labor market. For the Euro area, we find that the percentage of households plagued by over-indebtedness increased by more than 10%, suggesting that another unemployment shock could have a major impact on the financial solvency of Euro area households. Finally, the impact of this shock on single-headed households is much higher than on couple-headed ones.

JEL classification: D14, D91, J12.

Keywords: Household finance, Over-indebtedness, Financial Fragility, Unemployment, Labor market status, HFCS.

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We are grateful to Marianna Brunetti, Hans Dewachter and Eva Sierminska as well as the participants at the 2<sup>nd</sup> Luxembourg Workshop on Household Finance and Consumption (CBL, June, 2014), the HFCN research seminar (ECB, November, 2014) and the Modena-Netspar Conference on Advances in Household Finance (U. of Modena, April, 2015). This work was supported by the National Bank of Belgium. Any remaining errors are those of the authors alone.

The views expressed in this paper are those of the authors and do not necessarily reflect the views of the National Bank of Belgium or any other institution to which the authors are affiliated.

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## 1. Introduction

Over the past several decades, levels of household credit and indebtedness have increased across OECD countries (Crook and Hochguertel, 2007; Du Caju et al., 2014). In the Eurozone for example, these levels increased from around 10,000€ per capita in the early 2000s to almost 20,000€ fifteen years later (Du Caju et al., 2014). Consequently, questions related to over-indebtedness and its determinants have attracted more attention. Interest in these topics became even more acute after the beginning of the 2008 Great Recession.

Indeed, after starting in the US housing credit market, the crisis quickly extended to the rest of the economy and then to Europe thereby sharply harming the finances in households all over the world. Among other repercussions, the effects on unemployment levels proved particularly dramatic and, hence, re-emphasized how exceptionally interconnected labor and the financial markets are. In essence, a housing bubble in the US could affect the labor market in Europe and could simultaneously impact the indebtedness of individual households.

To illustrate this perspective, Figure 1 highlights the dramatic changes in unemployment rates that took place in the Euro area after the beginning of the Great Recession. Specifically, it shows an increase of more than 30% in the unemployment rate, from 7.5% in 2007-08 to 10% in 2010-11. Figure 1 also reveals that not all countries experienced the financial crisis in similar ways. While in countries like Austria, Germany or Luxembourg the changes were almost non-existent, in other countries like Spain, Portugal or Greece, the increase in unemployment levels was substantial. These huge differences could in turn prefigure disparate movements in levels of households' credit and indebtedness. Despite this obvious tendency, the empirical literature on over-indebtedness and its labor market determinants is relatively rare, especially regarding European countries.

[Figure 1]

Conceptually, uncertainty in the labor market can explain an increase in a household's demand for debt through different channels like the employment situation (e.g. unemployment), the type of contract (part-time, short term, etc.) and/or the wage structure (variable pay plan) of the household members. Besides these labor market channels, several other demand-side factors can play a similar role in a household's demand for debt (Bertola et al., 2006; Campbell, 2006). Changes in the household structure can, for example, influence overall income and, hence, its

level of debt. On the supply-side, any sign of (household) stability could increase the access to loans and favorable credit conditions.

The current empirical literature on all these determinants rests on two distinct definitions of over-indebtedness. The first strand of literature relies on self-assessment. In this case, statements on account overdrafts (Keese, 2009) or difficulties in repaying debt (Betti et al., 2007) define over-indebtedness. Kempson (2002) shows, for example, that self-assessed British overborrowers are more likely to be young, single householders, low-income, employed and/or part-time workers. Bridges and Disney (2004) use a tobit model to show that in the UK overdue debt is more likely incurred by young, less-educated and/or low-income households. Finally, Betti et al. (2007) have found using the European Household Budget Survey that “difficulty in making debt payment” remains more common amongst young individuals and lone parents.

The second strand of literature relies on a more objective/relative measure of over-indebtedness. The definition accounts for, in other words, household income and expenditures (Keese, 2009). It often references a situation when the disposable income after debt payment hovers below subsistence level. Keese (2009) explores the panel structure of the German Socio-Economic Panel (SOEP) to measure relative indebtedness and reveals that it is driven by, most notably, unemployment, marital status, home loan and/or the number of children. Focusing on Germany, Great Britain and the US, Brown and Taylor (2008) find that negative household wealth correlates with the number of children. They also find a negative link with the level of education and household income. Similar results exist in the US but within a different consumer bankruptcy regime (e.g. Fay et al., 2002; Gross and Souleles, 2002). Finally, Rio and Young (2005) show that UK household debt is negatively correlated to age and positively associated to income.

Interestingly, research interests linking over-indebtedness and its (labor market) determinants at the household level figure prominently in each national central bank’s agenda, especially with regards to their potential impact on overall financial stability at the country level (Ampudia et al., 2014). Indeed, a better understanding of a households’ vulnerability to over- indebtedness could also help ascertain the threat this factor poses to the banking sector and, thus, to the entire economic stability of a country. In direct relation to this perspective, several recent papers have focused on different stress tests on households and on the associated risks for financial institutions (Ampudia et al. 2014; Albaceta and Lindner, 2013; Persson, 2005). Generally, these

studies highlight a specific country and/or test different types of shocks to evaluate households in specific financially vulnerable situations.

This paper draws on the above literature concerning factors which explain the over-indebtedness of households. More specifically, we study the importance of the labor market status of individual household members to explain over-indebtedness in the Euro area and across its member countries by using the new European survey of household finances, the Household Finance and Consumption Survey (HFCS).

First, we assess the role of the labor market status (employed, unemployed, disabled, retired, etc.) and other household characteristics (demographics, housing status, household wealth & income, etc.) to determine the likelihood of over-indebtedness according to varying indicators which capture some distinctive dimensions of over-indebtedness (Debt service-to income-ratio above 30%, Debt-to-income ratio above 100%, etc.). We explore these relationships both at the Euro area level and through country-specific regressions. This approach captures country-specific institutional effects concerning the different factors explaining household over-indebtedness. We therefore also examine the role that each country's legal and economic institutions contribute to these differences. Secondly, we move the analysis to a macro-micro frame to identify households and countries that are especially vulnerable to adverse macroeconomic shocks in the labor market. At this juncture, we look at the impact of unemployment shocks on the percentage of over-indebted households by country and across different groups of demographics (age, couple vs. non-couple, education level or income category). Once we obtain these results we will proceed to our last step and run logit regressions to isolate the households' characteristics that increase the likelihood of toppling into over-indebted after macro-unemployment shocks.

To summarize, our main objective is to examine the following questions:

- What is the proportion of households affected by over-indebtedness throughout the Euro Area and across individual member countries? Does it vary across indicators?
- How is over-indebtedness influenced by labor market status, household and demographic characteristics? In other words, controlling for household and demographic characteristics, do precarious labor market situations induce a higher likelihood to accumulate household (over)debt?



- What are the characteristics of households with the highest risk of toppling into over-indebtedness after adverse macroeconomic shocks in the labor markets?

Our paper significantly contributes to the existing literature as we: i) use detailed household and budget surveys to investigate the link between household characteristics and over-indebtedness; ii) rely on an extremely detailed and accurate measure of debt at the household level (even including home loan and consumer credit); iii) provide an overall picture of the relative contribution of a household's labor market characteristics and demographics to explain household over-indebtedness, and investigate these different factors in the case of the Euro Area and its member countries.

Thus, we organize the remainder of this paper as follows. We begin with a review of the literature regarding the relationships between over-indebtedness, the labor market status and demographics. We also discuss in that section the different measures of over-indebtedness. The following sections, respectively, describe the dataset and discuss the descriptive statistics. We then analyze and discuss a cross-country comparison of the impact of household's characteristics on the likelihood of being over-indebted. Finally, in the last section, we look at the impact of unemployment shocks impacting households across multiple countries and the characteristics of those households toppling into over-indebtedness after these shocks.

## **2. Literature Background**

### **2.1. Defining and Measuring Over-Indebtedness**

Before we present the theoretical background explaining consumer over-indebtedness and the main empirical findings on these issues, we must first focus on how others have defined and measured over-indebtedness.

Indeed, there is no consensus in the literature regarding how to define and measure over-indebtedness (Bridges and Disney, 2004; D'Alessio and Iezzi, 2013). In this spirit, two recent studies (European Commission, 2008 & 2014) highlighted the lack of a common definition of over-indebtedness across EU Member States and within country-specific legislative environments. For instance, the European Commission (2014) notes that diverging interpretations of borrowing and the meeting (or failure to meet) repayment commitments have severely inhibited the emergence of a unified definition of over-indebtedness. For example, D'Allesio and Iezzi (2013) illustrate these differences by comparing the French and German

cases. While a French citizen is considered over-indebted when he/she can't meet his/her debt obligation in good faith, a German citizen is labeled over-indebted when his/her basic income does not cover debt repayments in the long-run. Despite these variations, the 2008 European Commission study pinpointed common dimensions of various country-specific definitions. For instance, this study identified a common economic dimension, related to the number of commitments, and a common temporal dimension which defined the relevant horizon under consideration. Moreover, this specific study argues for a common social dimension to capture the risks of exclusion and an overarching psychological context highlighting potential stress damages.

Taking into account these different dimensions, the European Commission developed a tentative operational definition incrementally over the last few years (2008, 2010, and 2014). First, the EC set the unit of measurement at the household level. Second, the Commission assessed that the indicators should include all financial commitments (mortgage, consumer credit, utility bills etc.) to be accurate and relevant. The next criteria introduced by the EC referred to the payment capacity of individual households and implied that over-indebtedness stems primarily from the inability to meet recurrent expenses. Finally, this operational definition addressed the time dimension by including persistency as a defining element and accounted for specific social circumstances. Namely, the ability of over-indebted households to meet their contractual repayment commitments without a reduction in their overall standard of living. Summing up these criteria, D'Alesio and Iezzi (2013) consider a household over-indebted "when its existing and expected resources are insufficient to meet its financial commitments without lowering its standard of living, which might mean reducing it below what is regarded as the minimum acceptable in the country concerned, which in turn might have both social and policy implications." They are, however, also quick to point out that an accepted definition does not always translate into an easy and practical way to measure over-indebtedness. Similarly after interviewing stakeholders across Europe, the European Commission (2014) concluded that finding better quantitative indicators to measure over-indebtedness trumps the need for a better definition.

All in all, it seems that the preferred trend in both conceptual and in empirical studies focuses on crafting a more practical and easy-to-apply definition (European Commission, 2008, 2014; D'Alessio and Iezzi, 2013; Fondeville et al., 2010). Accordingly, a range of indicators has been developed to capture the different dimensions generally associated with over-indebtedness. Across this range of indicators, one shared feature remains constant: namely, the on-going

struggles related to the fulfillment of any type of financial commitment (BIS, 2010; D'Alessio and Iezzi, 2013; European Commission, 2014; Keese, 2009). These indicators generally provide information on the origin of the financial commitment, the type of problem or both. Following the topology introduced by D'Alessio and Iezzi (2013), the indicators in question can reflect over-indebtedness through (1) the subjective burden it could represent, (2) the number of arrears, (3) the amount of household spending dedicated to borrowing repayments relative to income and (4) the extent of credit use.

The first type of indicators tackles over-indebtedness through self-assessment. In this instance, self-reported difficulties concerning the repayment of debt (Betti et al., 2007), statements on account overdraft (Keese, 2009) or available income at the end of month (D'Alessio and Iezzi, 2013) define severe debt difficulties. Based solely on individuals' perception, these subjective measures could, nevertheless, be considered as less reliable. Indeed, they not only directly depend on people's understanding of the concept but also on their own self-assessment of their repayment difficulties. These two elements could potentially vary substantially across households' characteristics and countries and, therefore, are highly susceptible to bias. Interestingly, even if prone to error, Betti et al. (2007) do not indicate striking differences across European countries regarding the gap between perceived and real "heavy burden". In a different vein, D'Alessio and Iezzi (2013) find a relatively small correlation between self-reported indicators and "objective" measures of over-indebtedness.

Contrary to the first indicators discussed above, a second set of indices which are not subject to self-interpretation arguably constitute more objective measures of over-indebtedness. Arrears, for example, directly capture difficulties in repaying any type of debt or bill in the short term. The standard threshold signaling over-indebtedness varies between two to four months of overdue payments (D'Alessia and Iezzi, 2013; Oxera, 2004). These indicators effectively account for the "falling behind" dimension but they are not without their own flaws. Consider that efforts to look at households with arrears do not necessarily include discussions regarding the precise amounts due. Moreover, the legal consequences like late-payment penalties or the number of months the account is past due may also vary across countries. Finally, the short-term dimension may lead to an overestimation of the real difficulties by overrating temporary setbacks. Despite these problems, D'Alessia and Iezzi (2013) still consider measures based on arrears amongst the most precise indicators in capturing over-indebtedness.

Besides arrears, the number of loans represents another objective indicator used to identify over-indebtedness at the household level. Indeed, the existence of four or more credit commitments potentially categorizes a household as one that exceeded its borrowing capacity by hiding its true solvency in several divided risk evaluations. Here, the limited effectiveness of the indicators stems from the lack of information concerning the severity of the situation.

Finally, the last type of indicators directly focuses on the burden of the debt. They try to capture over-indebtedness by measuring the importance of the payments due relative to income. In this case, high burden ensues when debt repayment over income is above a certain threshold. These indicators particularly underline the short-term dimension of the commitments. They also have the advantage of allowing for reliable country comparison as they effectively internalize country-specific mortgage types and interest rates (HFCN, 2013b).

Several papers try to discern the limit that best reflects the drain that debt commitments inflict on income (BIS, 2010; Bryan et al., 2010; D'Alessio and Iezzi, 2013; DeVaney and Lytton, 1995; HFCN, 2013b; Keese, 2009; Oxera, 2004). For example, BIS (2010) sets the limit at 50% of gross monthly income for payments of both unsecured and secured debt. Notably, they also utilize an indicator focusing only on unsecured debt with a (lower) limit at 25%. The “exclusion” of collateralized debt from the indicator relies on the lower risk associated by construction with them. On the other hand, D’Alessio and Iezzi (2013) pinpoint the “cut point” at 30%. They consider that limit as the most accurate after trying to maximize the statistical association between the debt-service-to-income ratio at different threshold values and an “imperfect gold standard” (i.e. a subjective measure of economic distress). Other papers circumvent the challenges associated with this particular threshold question by invoking more commonly accepted references like the poverty line, basic living costs or non-sizable income (Ampudia et al., 2014; Keese, 2009). In these cases, households are considered over-indebted when they cannot cover their basic needs after the repayment of their debt servicing costs.

Like all the other indicators trying to capture over-indebtedness, those based on debt-to-income ratios also have their limitations. The first limitation concerns potential misinterpretations regarding changes in the indicators. A similar increase in the ratio could have totally different consequences on debt repayments for low- or high-income households thus rendering the terms of over-indebtedness in a confusing manner. Another issue with debt-service-to-income indicators relates to the omission of assets in a proper assessment of the debt burden gravity of a household (Ampudia et al., 2014). A household that is technically over-indebted with

payments above the threshold could in fact be decidedly healthy thanks to its assets and its ability to sell them. Moreover, a household with financial assets could see its overall debt burden adjusted due to a change in asset valuation or as a result of easier access to new credit they provide even as the household's debt-to-income ratio remains constant.

Overall, ignoring assets and the capabilities they offer to reduce debt servicing costs could eventually lead to over-estimations of debt-burden. Interestingly, two recent papers offer upgraded versions of traditional debt-income indicators to include assets in over-indebtedness indicators based on debt servicing costs (Amudia et al., 2014; D'Allesio and Iezzi, 2013). The latter study, for example, reduces the debt servicing costs by an amount equivalent to the assets divided by the outstanding debt. To conclude this discussion on assets and over-indebtedness, we should also mention the possibility of constructing an indicator solely based on the ratio of debt to assets thereby erasing any reference to the service of the debt (Amudia et al., 2014; HFCN, 2013b). Here, over-indebted households are rendered as a ratio above one; a case whereby the selling of assets wouldn't completely cover the de-leveraging of the debt.

To sum up this overall discussion, even if a consensus defining over-indebtedness coalesced, not a single measure manages to address all its aspects simultaneously. Each indicator highlights certain aspects of the problem. In other words, the different indicators of over-indebtedness do not overlap but rather complement each other to capture the multidimensional and complex structure of over-indebtedness (D'Alessio and Iezzi, 2013). Thus the challenge lies in creating a set of measures that covers the entire over-indebted population while also being quantifiable within the HFCN dataset. Bearing these caveats in mind, we can now move on to next the section and attempt to understand why people accumulate debt, how debts switch to sever debts propelling households into the condition of over-indebtedness and what factors best explain this shift.

## **2.2. Theoretical Background**

Explanations of over-indebtedness and consumption behavior related to it have been framed in different theoretical structures over time.<sup>2</sup> The life-cycle-permanent-income model (hereafter LC-PI) and its different versions have dominated the modelling background since the 1960s (Friedman, 1957; Hall, 1978; Modigliani, 1966). The simplest version derives optimal

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<sup>2</sup> See Betti and al. (2007) for a detailed discussion on the different conceptual theoretical frameworks for analyzing over-indebtedness.

consumption from a constant fraction of overall income and assets (Betti et al., 2007; Deaton, 1992). Accounting for uncertainty with regards to future income, optimal consumption in each period becomes dependent only on new and unexpected information related to present or future income. Hence, changes in consumption only occur with the introduction of unexpected and new information (Hall, 1978). Another more recent version of the LC-PI model included risk attitude as a factor explaining optimal consumption growth (Betti et al., 2007; Hayashi, 1997). Also, these more recent manifestations inject precautionary saving into the model as one direct consequence of income uncertainty.

These different elements measuring optimal consumption within the LC-PI framework help to understate indebtedness in general and above all enable us to differentiate indebtedness from over-indebtedness. In this conceptual framework, current assets value will always equal the present value of all future debts, hence making over-indebtedness impossible. Consumers could still be indebted at some point during their life cycle and have a higher proclivity to fall into debt near the beginning of adulthood, but this inter-temporal budget constraint as well as precautionary saving would always prevent them from falling into over-indebtedness.

In this context, only unexpected adverse shocks to household expenditures or/and resources could lead to over-indebtedness within the LC-PI framework. On the resource side, these shocks directly result from uncertainty in the projected value of revenues from employment income as well as from financial and fixed assets. All in all, adverse shocks could express themselves through unexpected changes in employment, family structure, health or interest rates that situate the household in a circumstance when income/assets no longer balance debts (Betti et al., 2007). Accordingly, the only way to meet debt repayment commitments in this particular case entails a substantial lowering of consumption levels in order to absorb the shocks and consequences pertaining to over-indebtedness. Interestingly, these shocks could manifest in positive ways. Economies of scale for newlywed couples constitutes a viable example of positive shocks that could, in this particular case, lower the potential inter-temporal budget constraint.

Obviously, over-indebtedness could also be explained through other models besides LC-PI and the “rational consumption behavior channel” it emphasizes. Indeed, other drivers might include myopic behavior, debt literacy (Lusardi and Tufano, 2009), moral hazard mechanisms deriving from potential insolvency, and market failures related to asymmetric information or liquidity constraint. In sum, they all harness, to a certain extent, irrational consumer behavior to explain over-indebtedness. For example, the prospect theory (Kahneman and Tversky, 1979) links

over-indebtedness to people's "irrational" optimistic inclination in the presence of uncertainty concerning future resource outcomes. Market failures in the credit realm could highlight another channel. Here, notably, "liquidity constraint" helps deviate from optimal "smooth path" behavior and explicates over-indebtedness utilizing borrowing blockages which ensue in the wake of adverse negative shocks (Betti et al., 2007). As a final example of alternative factors, we can consider the consequences of myopia related to over-indebtedness. In this example, households do not properly manage their resources and are not accurately aware of potentially adverse shocks. The ongoing impact of new information and social interactions concerning a household's consumption behavior usually contributes to this circumstance (Ekelund et al., 1995; Hodgson, 2003). Others have argued that individuals' habits and preferences are constantly evolving and that social institutions and informational provisions directly inform this process (Betti et al., 2007; Ekelund et al., 1995; Hodgson, 2003).

Before eventually moving to our empirical analysis, we will consider how the existing quantitative literature interlocks with the divergent conceptual elements considered thus far in the next section.

### **2.3. Empirical Background**

The empirical literature focusing directly on "labor market" determinants of over-indebtedness remains relatively scarce (Bryan et al., 2010; Keese, 2009; Keese, 2012). Existing research mirrors the same demarcations of the conceptual debates discussed above regarding measurement issues (concerning, for example, subjective vs. objective indicators) and charts the differences between "controlled"/"rational" borrowing behavior and over-indebtedness. Besides the papers focusing directly on the labor market, a sizeable number of other studies, in one way or another, take into account labor market determinants but envision them more as controlled variables or as existing solely at the margins (Albacete and Lindner, 2013; Ambudia et al., 2013; Aristei and Gallo, 2012; Bover et al., 2014). In the following paragraphs, we will discuss both types of studies.

#### *Subjective Measures of Over-indebtedness:*

Rather limited by data constraints, older papers relied on subjective measures of household over-indebtedness in their analysis (Betti et al., 2007; Bryan et al., 2010; Disney et al., 2008; Gathergood, 2012). This first generation of studies seems more descriptive than more recent work and questions several determinants in parallel. Bearing these limitations in mind, the

findings embedded within these papers offer mixed results vis-à-vis the LC-PI model hypothesis. For example, using the ECHP, Betti et al. (2007) concluded that in certain EU countries during the mid-1990s instances of self-reported over-indebtedness occurred most often amongst high-income and young-age groups. Moreover, this same study indicated that low income was not a good predictor of over-indebtedness. These findings may result from imperfections in the credit market and/or from higher-than-expected repayment capacities within young and high-income groups. Focusing on the UK, Disney et al. (2008) draws from interviews with stakeholders in the credit market (i.e. financial providers and debt/money advice agencies) to present qualitative evidence on the importance of the loss of a job in explaining over-indebtedness. This same study also presents quantitative evidence on the determinants of over-indebtedness using the Families and Children Survey (FACS). Two different measures of self-reported over-indebtedness – “debt problems” and “financial stress” - are used in their regressions analysis. Their logit models demonstrate, among other conclusions, that individuals working or with a spouse working are less likely to report self-assessed over-indebtedness.<sup>3</sup> Also focused on the UK, Gathergood (2012) conversely finds no impact on self-reported over-indebtedness rendered as “having real financial problems” from his dataset constructed using internet household’s survey, DebtTrack survey. On the contrary, Bryan et al. (2010) finds that unemployed-heads of households have a higher probability to be over-indebted.

All in all, no clear conclusions have emerged from existing findings concerning the role of employment status on self-reported over-indebtedness. This could be partly due to the fact that unemployment increases one’s self-reported debt burden when controlled for the “real” level of over-indebtedness (Keese, 2012). Hence, using subjective measures of over-indebtedness when trying to better understand the link with the labor market could lead to biased results.

#### *Objective Measures of Over-indebtedness:*

Moving on to papers relying on objective measures of over-indebtedness, the number of studies is more prominent. These contributions, however, are split across different categories of indicators (i.e. arrears, cost of servicing debt, number of credit, etc.) and only highlight specific dimensions of over-indebtedness.

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<sup>3</sup> Disney et al. (2008) also present results based on arrears. We discuss them in the following section.



### *Arrears:*

Despite the complexities outlined in the prior section which inhibit the coalescence of a viable definition for over-indebtedness, several recent papers have relied on arrears as an “objective” measure of this phenomenon (Aristei and Gallo, 2012; Bridges and Disney, 2004; Bryan et al., 2010; Disney et al., 2008; Gathergood, 2012; Kempson, 2002). Notably, for Italy, Aristei and Gallo (2012) utilized a sample-selection ordered probit model to demonstrate that households with an employed or retired head are less likely to incur arrears connected to the repayment of mortgages. Additionally, the likelihood of accruing arrears proves higher for households with lower disposable incomes or those which have experienced a severe drop in income. Interestingly, this particular study reveals that both unemployed and employed heads of households share a higher propensity to accumulate high levels of arrears despite drastic variations in the process by which they accumulate arrears. For the former, arrear accumulation stems from lower-than-average disposable income. In the latter case, however, an increase in arrears may derive from higher mortgage expenses that employed-heads of households could obtain as a result of higher and more stable incomes. Notably, Kempson (2002) found slightly different results for British households. They exhibit in their descriptive analysis that the percentage of households in arrears across the past 12 months proves very high among those experiencing a drop in income as well as among the households headed by unemployed and/or single mothers. Bryan et al. (2010) find a similar result but with a probit model with a positive marginal effect. This result for British households is challenged, however, by Bridges and Disney (2004) who demonstrate the positive impact of employment on arrear accumulation using a Tobit model on the 1999 Families and Children Survey on low income families. Disney et al. (2008) add the 2001 wave of that survey to their analysis and arrive at the same result, namely that work status is not significant. Interestingly, thanks to the newly merged panel structure of the dataset, they also examine how changes affect the likelihood of being in arrears. Here, they find a positive impact on being in arrears from both the recent loss of a job or surprisingly from finding one. Finally, Hsu et al. (2014) show that in the U.S. context generosity in unemployment benefits could decrease mortgage delinquency.

### *The Cost of Servicing Debt:*

Empirical contributions using this specific type of objective indicator directly focus on debt burden (Albacete and Lindner, 2013; Ampudia et al., 2014; European Commission, 2010; Floro and Messier, 2015; Kees, 2009; Kempson, 2002). Over-indebtedness ensues when debt

repayment over income is above a certain threshold. As a starting point, we might remember that even without any econometric analysis Kempson (2002) finds that UK households with a repayment rate above 25% of income are characterized by a recent income drop indicative of the LC-PI model. Bryan et al. (2010) find a similar result with a probit model that shows a 9% increase in the likelihood of over-indebtedness for unemployed-headed household. Interestingly, Keese (2009) observes similar results in Germany by utilizing a more sophisticated econometric analysis. Using the German Socio-Economic Panel (SOEP), this study first identifies over-indebted households as those with an income below the non-sizable income threshold or those under the potential social-assistance level after the repayment debt. Secondly, Keese (2009) attempts to measure how income shocks like job loss and/or rise in the debt burden could explain over-indebtedness using fixed-effects and random-effects panel regressions. The main findings concerning the role of the labor market reveal that unemployment certainly triggers over-indebtedness. More precisely, this particular paper shows that over-indebtedness is a direct consequence of the income shock that follows job loss rather than stemming from a change in the debt itself. Using data reported by debt counsels, Knobloch et al. (2008) show that the likelihood of being over-indebted in Germany proves higher for unemployed people and lower for older ones.

For Euro Area households, Ampudia et al. (2014) recently developed a new methodology to identify the most financially vulnerable households relative to different macroeconomic shocks including employment income shocks. Compared to the cost-of-serving-the-debt indicators used by Keese (2009), their measure of financial distress also takes into account a household's liquid assets in order to properly identify over-indebtedness within household units. Hence, their measure mixes information not only on debt repayment, household income and basic living costs but also on liquid assets that cover flows of negative financial margin in the short term. Using the Household Finance and Consumption Survey (HFCS), Ampudia et al. (2014) look first at the effect which income shocks stemming from job losses has on the percentage of indebted households in a distressed state across the entire Euro area and also by country.<sup>4</sup> Their results indicate heterogeneity across countries. While the increase in the percentage of over-indebted households is around 4% in total, this figure ranges from 0.9% in Cyprus and France to more than 7% in Germany. Ampudia et al. (2014) go one step beyond this descriptive analysis

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<sup>4</sup> They also consider interest rate shocks and combined shocks. The employment shocks are either 1) a 5% income drop for public sector and a 3% probability of losing a job or 2) a 10% income drop for public sector and a 5% probability of losing a job (Ampudia et al., 2014).

and run a probit regression on the whole Euro area to ascertain the determinants of becoming over-indebted after the shocks. They only run their regression, however, on the households that become distressed after the combined shocks and thusly do not isolate employment shock alone. They find that even if the head of the household is unemployed, the probability of over-indebtedness does not increase. Moreover, Ampudia et al. (2014) show through country-fixed effects that households in Belgium, Cyprus, Spain, Greece and Italy have a higher probability to be over-indebted after combined shocks than households in Germany. Using the same setup, Fasiano et al. (2014) also find no employment effect but they do so by running country-specific regressions

Albacete and Lindner (2013) show with the same dataset (HFCS) a more nuanced result concerning the “unemployed” impact. They, however, focus only on Austria, which was excluded from Ampudia et al.’s (2014) analysis, and use different indicators of over-indebtedness in their logit regressions i.e. the debt-to-asset  $\geq 75\%$ , the expenses-above-income and debt service-to-income  $\geq 40\%$ . Their findings show that an unemployed-head of household increases the probability of over-indebtedness by around 10% with the debt-to-asset and expenses-above-income measures but is not significant with the debt service-to-income indicator. Ehermann and Ziegelmeyer (2014) also utilize the HFCS to examine another issue with respect to over-indebtedness. They, instead, look at the impact on households with a strong debt burden (debt-service-to-income ratio above 30%) stemming from the monetary easing policy that was introduced in the Eurozone after the 2008 crisis. Notably, their probit model shows that the easing policy had a particularly important (positive) impact for low income households. The labor status, however, did not seem to characterize these households in any way. Instead of looking at unemployed/employed impact, Floro and Messier (2015) supplement previous studies by analyzing the impact of job quality on the household debt service ratio in Ecuador. They find that the quality of employment has a positive impact on over-indebtedness for single-parent households and a negative one for households consisting of couples.

Also using the HFCS dataset, Bover et al. (2014) extend the analysis to debt-holding in general as well as to the severe cases of over-indebtedness. They look at the determinant of holding (secure and unsecure) debt across Euro area countries. They also use OLS and quantile techniques to explain the amount of debt held (conditional on holding debt). Moving to their results for the labor market status variables, they show that the probability of holding secure debt remains lower for the inactive/unemployed-headed households relative to the employed ones. As for the amount of debt, they posit that the same group of inactive/unemployed-headed

households is also characterized by a lower level relative to the employed group. In both cases, they highlight a heterogeneity across countries concerning the magnitude of these effects. Similar results have been found for the US, showing that households with an employed-head and/or a employed-spouse are more likely to hold debt (Brown et al., 2013) or that being unemployed has no effect on the desired household level of debt (Crook and Hochguertel, 2007). Compared to the above findings on over-indebtedness, these results clearly emphasize the different mechanisms at work when trying to understand consumer debt behaviors and its link to the labor market status of consumers.

Finally, some papers take into account the level of outstanding debt instead of the cost of servicing the debt in their analysis (European Commission, 2010). For example, the European Commission (2010) presents a descriptive analysis of over-indebtedness in Europe based on the 2008 EU-SILC survey. Among a variety of variables, this study looks at the effect of unemployment on over-indebtedness across member countries. To do so, the report compares the proportion of households with income below 60% of the median with debt over 100% of disposable income across different level of work intensity - i.e. the percentage of employed working-age people living in the household. At the EU level, the proportions seem relatively similar across work intensity groups. Indeed, over-indebtedness is present in 9.4% of households with a 0.75-1.0 work intensity and in 8.2% in the units with zero workers or those working only a few hours per year (0-0.19). There are, however, a few countries like Belgium, Denmark, Greece, the Netherlands and Finland where the percentage of over-indebted households was higher in low work intensity compared to the other groups. In summation, these results should be considered prudently since they do not take into account heterogeneity across households and countries.

Our paper draws on the above literature exploring the determinants of over-indebtedness, especially writing that focuses on “objective” measures. This study contributes to existing research by providing an exhaustive cross-country analysis both at the micro- and macro-level on how labor market characteristics of households can explain over-indebtedness. Hence, our approach combines logit regressions’ analysis for being over-indebted as a function of the labor market status at the household level with an evaluation of the impact from macroeconomic shocks in the labor market on the percentage of over-indebted households. We apply this approach to the entire Euro area and to each individual country separately. We are also the first to complete this entire exercise for three different measures of over-indebtedness (i.e. Debt-

Service-Income Ratio, Debt-Income Ratio and Debt-Assets Ratio) thereby capturing a distinctive aspect of this phenomena.

### **3. Dataset: European Household Finance and Consumption Survey (HFCS)**

Our empirical analysis will be based on a unique household budget survey covering the whole Euro area, as represented in the Household Finance and Consumption Survey (HFCS). This survey is a Eurosystem initiative that aims at collecting comparable micro-level information on household balance sheets across Euro area countries. It is the first extended harmonized survey of the financial behavior of households in all these countries. Altogether, more than 62 000 households were polled in the Euro area for 2009 and 2010.

The main aim of the HFCS is to gather comparable structural microeconomic information on the assets, liabilities and consumption of Euro area households. It contains detailed information on demographic characteristics (e.g. age, sex, nationality, marital status, level of education) and home characteristics (e.g. size, ownership, today and original value, mortgage situation and type of interest rate). It also provides household-level information on financial assets and debt and credit constraint variables (e.g. leasing contract, number of overdrawn accounts in the household, credit cards, consumption credits, savings, equity, etc.). Finally, the data set includes different variables describing the employment status, income situation (e.g. type of employment, occupation, industry, type of contract, number of working hours, experience, overall income, social transfers, investment income, etc.) and consumption behavior (consumption basket, consumption trends by type of product, price forecasts, etc.) of households. Finally, a key characteristic of the HFCS is that missing observations (i.e., questions without answers from the respondents) are multiply imputed (Ehermann and Ziegelmeier, 2014; HFCN, 2013a). Hence, all the findings presented in our study are based on all five imputates of the imputations.<sup>5</sup>

### **4. Over-indebtedness: Definitions and Descriptive Statistics**

As discussed in section 3, there is no consensus in the literature on how to measure over-indebtedness. Hence, we have adopted three “objective” indicators in our analysis to capture

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<sup>5</sup> See section 6 and 9 of HFCN (2013a) for more information on the sampling design and weighing of the survey.

different dimensions of over-indebtedness: 1) Debt Service-Income ratio over 30%, 2) Debt-Income ratio over 100%, and 3) Debt-Asset ratio over 75%.<sup>6</sup>

The first indicator is based on the ratio between total monthly debt payments and gross monthly household income. It captures short-term burdens imposed by debt repayments. Following D'Alessio and Iezzi (2013), the threshold is set at repayments equal to or above 30% of monthly income for indebted households. Household's total repayments are very exhaustive and comprise debt costs for both mortgages and other unsecured loans, such as car loans, consumer and installment loans and loans from relatives, friends, employers etc. (HFCN, 2013a). Household gross monthly income is measured as annual gross income divided by 12. Moreover, it is defined as the sum of labor and non-labor income for all household members. Labor income is collected for all household members aged 16 and older; other income sources are collected at the household level.<sup>7</sup>

[Table 1]

Table 1 displays the percentage of households with a ratio over 30% by country and for the whole Euro area. According to this indicator, 14.1% of the households in the Eurozone are over-indebted. Obviously, this figure varies across countries with Spain and Portugal having more than 20% of over-indebted households in contrast to less than 10% in Austria and Germany. The distribution of over-indebted units by labor market status as well as other individual and household characteristics is also presented in Table 1. It appears that over-indebtedness occurs most often amongst big households headed by a younger, less-educated person who possesses a mortgage and belongs at the bottom of income distribution.

Focusing on our main variable of interest, we can see that on the Euro area level the percentage of over-indebted households is higher amongst those with a self-employed or non-working person at their head. Indeed, it stands at 18% for the non-working group and around 22% for the self-employed one compared to only 12.7% for employed-heads of household. Interestingly, while the magnitude varies across countries, this result holds in all countries except Slovakia and Luxembourg where employed-headed households are more over-indebted. In the next

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<sup>6</sup> All three indicators are also used with different thresholds to test the robustness of our findings.

<sup>7</sup> See ECB Statistics Paper Series No. 2 (April 2013a) for details.

section, we will try to ascertain if these variations could be explained by characteristics of these different groups of households.

[Table 2]

According to the second indicator, a household is identified as over-indebted when household debt is equal to or above 100% of household overall income. It is based on the ratio of total debt<sup>8</sup> to gross annual household income and it is calculated for all indebted households. This indicator represents a households' potential need to de-leverage in the medium to long run (HFCN, 2013b). Table 2 presents the percentage of households with a debt-income ratio equal to or above 100% by country and for the whole Euro area. Like Table 1 for the previous indicator, it also shows the percentage of over-indebted households across demographics (age, education) and household characteristics (income, housing status, working status). Interestingly, at 40.8%, this indicator reveals a much higher overall percentage of over-indebted households in the Euro area than the debt service-income indicator mentioned in the previous paragraph. This difference also appears across labor market statuses. Consider: 37% for the non-working group compared to 18% and 48% for the self-employed group compared to 22.8%. Even if these differences do not alter the ranking by work status, they clearly suggest that varying indicators capture some distinctive dimensions of over-indebtedness.

Finally, the last indicator constitutes the ratio between total liabilities and total gross assets for indebted households. It captures long-term solvency of a household. Here, the threshold to be considered as over-indebted is set at 75% of the asset value.<sup>9</sup>

## **5. Over-indebtedness and Household Characteristics**

### **5.1. Empirical Strategy**

To identify the relationship between labor market characteristics and over-indebtedness, our empirical strategy relies on an estimation of the link between the role of the labor market status of household members and the likelihood of being over-indebted. We explore the contours of this linkage across the whole Euro area and by country. We employ three different

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<sup>8</sup> Total debt includes (1) outstanding amount of household main residence mortgages and other real estate property mortgages, (2) outstanding amount of debt on credit cards and credit lines/bank overdrafts, & (3) outstanding amounts of other, non-collateralized, loans (including loans from commercial providers and private loans). See HFCN (2013b) for details.

<sup>9</sup> Descriptive statistics related to this indicator are available upon request.

specifications whereas the dependent variable constitutes a different indicator of over-indebtedness in each specification: i.e. debt-income ratio over 100% of household income, debt service-income ratio over 30% of monthly household income or debt-Asset ratio over 75%. As a robustness test, we also use different thresholds, i.e. 300% for the debt-income indicator and 40% for the debt service-income one. In all cases, the dependent variable is equal to one if the household is above the respective threshold. Since the dependent variable is binary, we use discrete dependent variable techniques and employ a logit model of the following form:

$$Prob(over-indebtedness_i = y) = f(Labor_i, Housing_i, Household_i, C_i, Country_i) \quad (1)$$

where:

- $Labor_i$  is a vector of dummy variables capturing the labor market status of the household's reference person. We are using two different vectors (5 & 7 categories). The most disaggregated one includes the following 7 dummies: employee, self-employed, unemployed, retired, permanently disabled, fulfilling domestic tasks and other.

- $Housing_i$  is a vector controlling for the housing status of the household. We have defined three such dummies: owner-outright, owner-with mortgage and renter or other;

- $Household_i$  is a vector of variables capturing the household characteristics: the number of adult members, the number of children in the household, the total gross income and dummy if there is a couple in the household;

- $C_i$  is a vector of control variables controlling for the household reference person's demographics: specifically, age, gender and education;

- $Country_i$  is a fixed country effect.

## 5.2. Results

In comparing the results across specifications, we focus on the odds ratio for each variable of interest since, in the case of a logit, this parameter is invariant to different values of the covariates. Table 3 presents the results of the all-countries regressions for debt service to income ratio above 30 %, where the reference category is the group of reference persons who declared themselves to be employed.<sup>10</sup> Hence, the odds ratios should be interpreted relative to this omitted category. The table shows that the odds of being over-indebted are much higher in

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<sup>10</sup> See Annex 1 for the results with 5 categories and Annex 2 for the results for debt-service-to income ratio above 40%.



households where the reference person is self-employed or unemployed. For example, in the case of the model with country fixed effects (Model B), the odds ratio for the “unemployed” variable is about 1.43 times that of households where the reference person is employed.

[Table 3]

The odds ratios for the unemployed group remains fairly stable across models. Indeed, when demographic characteristics are controlled for the main results hold with an odds ratio of 1.36. Additionally, when household characteristics are controlled for the odds ratio remains consistent at 1.40. Finally, the result produced in the “full” specification (model G) that includes both household and demographic characteristics, equals 1.8, an estimate for the unemployed group that is slightly higher but still in line with previous ones.<sup>11</sup> Interestingly, Table 4 presents similar results for secured debt only, using the debt-income ratio indicator.

Although our main variable of interest is unemployment, it is also worth looking at the odds ratios of other labor market statuses before proceeding to the country-specific results. In the case of the self-employed group, results indicate an even higher likelihood of being over-indebted compared to the employed group with odds ratios standing around 2 depending on the model considered. This result should be read in light of the special status of self-employed workers who wear two hats simultaneously, a private one and one constituting the “firm”. As for the retired and disabled groups, their likelihood to be over-indebted when controlled for both household and demographic characteristics is not significantly different from the employed group.

[Table 4]

Turning to the country specific results in Table 5, there are obvious differences in the effects of the labor market status across countries. In the case of Belgium and Luxembourg, for example, a head of household who is self-employed has the same likelihood to be in an over-indebted household than an employed one (the omitted group); therefore, the odds ratio in these cases are not significant. In Austria or the Netherlands, however, the odds-ratios are high and significant. Indeed, the odds ratios in these two examples are higher than 3, suggesting that the odds of being over-indebted are much greater in households where the head is self-employed.

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<sup>11</sup> See Annex 3, 4, 5 for the results with Debt-Asset ratio over 75%, Debt-Income Ratio over 100% and over 300% as an indicator of over-indebtedness respectively.

Moving next to the “other non-working” group<sup>12</sup>, the likelihood of being over-indebted is in general higher for this group relative to the employed group. However, the extent of this reality varies widely across countries. In Spain, France or Portugal, the odds ratio for these groups is just below 2, whereas in Austria, Belgium, or Italy the odds ratio is higher than 4. Finally, only in France and Portugal does retirement matter. In all other countries being retired wields little influence.

[Table 5]

Yet, these results should be interpreted with care as our study is limited by the cross-sectional nature of our data. Indeed, our estimates capture both the impact of a negative income shock following a job loss and the effect of the status itself on access to credits. Hence, future research should rely on panel data in order to distinguish these different dimensions and properly identify, with fixed effects models, the responsiveness of a household’s debt to work status changes.

### **5.3. Country Institutions and the Effects of the Labor Status across the Euro Area**

The results above highlighted, amongst other observations, differences across countries with regards to the impact of the labor market status on the likelihood of being over-indebted. Before we move to the section on macroeconomic shocks, we try to examine how these country-specific results could be related to different institutions and indigenous credit conditions. Specifically, we look at the correlation between the odds ratios of being over-indebted across a particular labor market status and the quantitative indicators of different institutions like the legal foreclosure procedure, the taxation of mortgage payments, the regulatory loan-to-value (LTV) ratio, credit conditions, the accuracy of the information available to borrowers, overall economic literacy and the characteristics of the unemployment insurance system.<sup>13</sup>

[Table 6]

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<sup>12</sup> This group covers heads of households that are inactive or unemployed. At the country level, samples sizes are too small to distinguish between the two.

<sup>13</sup> See Bover et al. (2014) for an exhaustive discussion of the role of different institutions in driving households’ debt.

Table 6 reports the Pearson correlations' coefficients between the odds ratios<sup>14</sup> of different labor market statuses<sup>15</sup> – i.e. not working, retired, self-employed and reference group-- and the quantitative indicators describing the institutions listed above.<sup>16</sup> Starting with the duration of foreclosure, the results show that the most vulnerable households, such as those retired and not working, are more likely to be over-indebted (relative to the reference group) where foreclosure costs are higher. Indeed, the correlations coefficients are for both types of households significant and equal to .69 and .58 respectively. In line with previous findings (Bover et al., 2014; Livshits et al., 2007), these results suggests that any increase in the cost to foreclose on debt escalates the uncertainty for the lenders and from there pushes them to ask for higher interest rates from riskier groups like the unemployed or the retired. This transfer of the risk could in turn increase the probability to become over-indebted.

The next institution tackled captures the tax exemption system through two different indicators, i.e. the presence of a tax deduction system on mortgage interest payments and the existence or non-existence of a limit to the amount of interest payments deductible. Here, the institution suggests that the existence of the system and/or its generosity in terms of the amount deductible should increase housing consumption and/or the speed at which purchases take place (Bover et al., 2014; Gervais, 2002). Interestingly, there is no evidence of a labor market status effect in the results except for the self-employed. Hence, in countries with unlimited tax relief, their likelihood of being over-indebted is higher than for the reference households. This may be due to the fact that this group is particularly sensitive to any type of tax incentive and possess, on average, higher marginal taxes.

Surprisingly, when we move to examine the role of financial regulation and unemployment insurance systems, there seem to be little evidence of their impact in accounting for differences across labor market status. On the contrary, conditions that cut first-mortgage repayments seem to play an important role in increasing “the labor market” effect. The percentage of mortgages with interest-only arrangements is indeed positively correlated with likelihood of over-

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<sup>14</sup> The odds ratios presented in Table 5 for debt-service-to income ratio above 30%.

<sup>15</sup> Annex 6 presents the Spearman coefficients.

<sup>16</sup> As suggested by a referee, to further investigate the role of institutions, we also ran a set a logit regressions at the household level based on model G from Table 3 with quantitative indicators of institutions instead of country-fixed effects. Results are very stable across specifications (legal foreclosure procedure, the taxation of mortgage payments, the regulatory loan-to-value (LTV) ratio, credit conditions, the accuracy of the information available to borrowers, overall economic literacy and the characteristics of the unemployment insurance system). They systematically show that the likelihood of being over-indebted is higher for the unemployed group relative to the employed one.

indebtedness for the self-employed and the reference group. Hence, loosening credit constraints appears to enable these households to spend more on housing and from there increase their risk to become over-indebted. These results are at odds with the hypothesis submitted by Chambers et al. (2009) which suggests a positive impact for more constrained and risky groups like low income or younger ones. Finally, better information on borrowers appears to decrease the likelihood of being over-indebted for the retired group. By capturing the depth of information on a 0-to-6 scale, this result suggests that the accurate identification of a borrowers profile proves particularly relevant for retired parties.<sup>17</sup>

## **6. Unemployment Shocks and Over-Indebtedness**

### **6.1. Impact of Unemployment Shocks on Household Indebtedness**

Results in the previous section highlighted the characteristics that increase the likelihood of being severely indebted at the household level across the EU area and within individual countries. In this section, we go one step further by exploring how adverse shocks at the macroeconomic level could potentially impact the overall percentage of over-indebted households. Concomitant with our focus on the labor market, we investigate more precisely how employment shocks influence household over-indebtedness across many countries. We also try to detect which households are especially reactive to shocks in the labor market.

To do so, we analyze the impact that different types of increases in unemployment levels have on three distinct measures of over-indebtedness. The first type is defined as a 5% probability of an employee losing their job in the private or public sector in each country. The second one is defined as a 5% probability of an employee losing their job if they are 35 to 54 years old and as a 10% probability if they are 16 to 34 years old or above 55 in the private sector. Hence, the second shock emphasizes the particularly critical condition of young and older workers compared to those of prime working age in most EU countries.

In both cases, when the household's reference person is hit by a shock, he/she sees his/her labor income "replaced" by unemployment benefits. The replacement rates applied are estimated

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<sup>17</sup> We have also estimated the logit model with an interaction variable between the labor status and the different institutional variables. This specification also includes the institutional variables in the regressions (instead of the country FE). The only interaction coefficient that is significant (and negative) is the one between the state of unemployment and the unemployment replacement rate in each country. This negative coefficient seems to suggest that the likelihood of being over-indebted while unemployed decreases in those countries which have a higher replacement rate. All other interaction variables are not significant. This result reinforces our finding that the link between unemployment and over-indebtedness does not necessarily depend on institutional frameworks.

separately for each country based on the HFCS dataset and depend on household status (couple vs. no couple). Accordingly, their values are equal to the ratio of the average unemployment benefit and the average labor income in each country respectively.<sup>18</sup>

[Table 7]

Table 7 presents the impact of different employment shocks on those households with a debt-service-income ratio over 40% by individual country and for the whole Euro area.<sup>19</sup> It includes the different ratios while also accounting for changes in the percentage of over-indebted households compared to the “before shock” benchmark. This focus on the debt-service-to-income ratio allows us to directly capture the short-term dimension of over-indebtedness since asset selling is rarely involved in this case.<sup>20</sup>

For the Euro area, 8% of all households are severely indebted according to the above definition. This ratio increases to 8.9% after “shock 1” and to 9.2% after “shock 2”. Consequently, the percentage of households plagued by over-indebtedness increased by 11.6% and 15.3% respectively, suggesting that an unemployment shock could have a major impact on the financial solvency of Euro area households. This overall result, however, masks important variations across countries. The highest increases are observed in Belgium, France, Germany and Luxembourg. All four countries experienced rises above 20% after “shock 2.” On the other hand, countries like Cyprus, The Netherlands, Portugal and Slovakia appear less vulnerable to unemployment shocks. The ratios in these latter countries change by less than 10% after getting hit by shocks. Interestingly, countries with relatively less over-indebted households before the shocks seem to be impacted the most severely. Overall the differences across countries are similar for both shocks.

[Figure 2]

Tables 8 and 9 complete the picture described above. They report the impact of adverse employment shocks on a percentage of over-indebted households along different demographics. The ratios before and after the shocks are broken down by marital status (couple vs. non-couple households), age and the education level of the reference person. At the Euro area level, the impact of the shock in single-headed households is much higher than in couple-headed ones.

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<sup>18</sup> See Annex 7 for the replacement rates by household status (couple vs. no couple) and country.

<sup>19</sup> Figure 2 illustrates these results.

<sup>20</sup> Annex 8 present the same results for the debt service-income ratio over 30%.

The former see an increase of 16.8% in the percentage of over-indebted households while the latter rises by 14.5% after the unemployment shock. Surprisingly, this result doesn't hold once we look at the differences concerning the impact across countries (Table 9). In France, Greece, Luxembourg, the Netherlands and Spain, for example, the outcome is exactly opposite with couple-headed households being more sensitive to unemployment shocks. For instance, in France the percentage of over-indebted couple-headed households increases by 25.3% compared to 21% in single-headed ones. This result doesn't seem related to the overall percentage of over-indebted households ("before the shock") since Greece, a country with higher ratios compare to France, shows similar patterns (+12.0% for couple-headed households vs. +8.2% for the others). Country-specific characteristics like the institutional frame and/or the demographic structure probably contribute to these striking differences. Hence, the next section attempts to identify those factors that significantly explain falling into over-indebtedness after unemployment shocks.

[Table 8]

As for the distribution across ages, we observe in Table 8 an important variation amongst households in the Euro area. The ratio increases between 0% and more than 27.7%, suggesting that young-headed households are especially vulnerable to financial distress after unemployment shocks. Again, there are differences in the magnitude and the distributional effects across countries (Table 9). If we start by focusing on the youngest-headed households (16-34 years old), we can broadly classify countries in three groups: in the first one, these households are extremely sensitive to change in the probability of being unemployed. The increase in this category is above 40%. This group includes four countries (Belgium, France, Germany and Luxembourg) with a relatively low number of over-indebted households. At the other end of the spectrum, we have a group of 5 countries (Cyprus, the Netherlands, Portugal, Slovakia and Spain) where the increases are much lower, ranging between +13% and +17%. Finally, Austria, Greece and Italy form an in-between group with an increase around +20%.

Besides the differences observed for the youngest-headed households, a few more lessons could be gleaned from Table 9. First, contrary to all the other age groups, the impact of the shock on the "65+"-headed households seems negligible and consistent across the Euro area. Indeed in all the countries surveyed, there was not a rise after the changes in unemployment. This result could be explained by the fact that most of those 65 years-old and above are already out of the labor market. Second, only three countries (France, Greece and Spain) show a comparable

pattern to the Euro area average for the three intermediary age groups (35-44, 45-54 and 55-64 groups). Finally, the 55-64 age group seems particularly fragile in Austria, Italy and Luxembourg with an increase of 25%, 33.5% and 35.3% respectively in the percentage of over-indebted households.

[Table 9]

Finally, risks of over-indebtedness seem positively correlated to a household-head's educational attainments. Hence, results at the bottom of Table 8 show an increase of more than +20.3% for households with heads having a tertiary education level and only an increase of +8.6% for the ones with primary or no education. The bottom of Table 9 presents the same figures by countries. In France, Luxembourg and Portugal, changes are particularly noticeable for "tertiary education" households, as this group shows increases around 30%. For several other countries, the changes are much smaller like in Cyprus, Greece and the Netherlands where the ratio only increases by approximately 12%.

Overall, we have shown in this section the impact of unemployment shocks on household's over-indebtedness in both the Euro area and within different country's members while accounting for varying characteristics within individual household's characteristics. All in all, the findings show an important heterogeneity both across countries and by household's types. In the next section, we will try to identify *ceteris paribus* characteristics that increase the likelihood of households to topple into over-indebtedness after an unemployment shock.

## **6.2. Characteristics of Households toppling into Over-Indebtedness after Unemployment Shocks**

Bearing the findings of Tables 8 and 9 in mind, we next run a logit model on the likelihood of becoming over-indebted after our "two" unemployment shocks, i.e. an overall shock and a specific shock for young/old workers. In other words, our dependent variable in these regressions is equal to one if the household's debt-service-income ratio exceeds 30% or 40% after one of these shocks and is equal to 0 otherwise, i.e. the ratio below the thresholds both before and after the shocks. The households' characteristics used in these regressions to explain this switch are similar to the ones described in equation (1) except for the vector of dummy variables capturing the labor market status of the household's reference person. They include country-fixed effects as well as a vector of dummy variables capturing the labor market status

of the household's reference person (sex, age and education) and household characteristics (ownership status, income and household size).

[Table 10]

Table 10 presents the results for both shocks and for the two thresholds used throughout this paper with the debt-service-income indicator. For each case, we first report the odds-ratios with country-fixed effects and then with all the independent variables. Interestingly, country-fixed effects never prove significant. This suggests that the probability to be over-indebted after the shocks is consistent across the entire Euro area. Not surprisingly, when considering other variables, age plays an impactful role especially within the specifications that use age in assessing the magnitude of shock (Shock "2"). Besides that, a higher income seems to reduce the likelihood of becoming over-indebted while having a mortgage increases the probability to become over-indebted after an unemployment shock. Hence, households with a mortgage have an odd ratio which is about 2.2 times the one of owner-outright.

## **7. Conclusion**

This paper isolates the role of labor market status to determine the probability of over-indebtedness. We explore these relationships both across the Euro area level and through country-specific regressions. This approach captures country-specific institutional effects concerning all the different factors which can explain household indebtedness in its most severe form. Hence, we examine the role that each country's legal and economic institutions play in explaining these differences.

The analysis also includes a macro-micro frame to identify households and countries that are especially vulnerable to adverse macroeconomic shocks in the labor market. Finally, we chart the impact of unemployment shocks on the percentage of over-indebted households by county and across different groups of demographics.

We use the Household Finance and Consumption Survey to create our data set. Our findings show that the likelihood of being over-indebted is higher for the inactive/unemployed group relative to the employed one. The odds ratio is also higher for the self-employed group. These results are stable across different over-indebtedness indicators and specifications.

We also look at differences across countries. Hence, the country-by-country regressions show that there are obvious differences in the effects of the labor market status throughout the Euro



area. In Spain, France or Portugal, for example, the odds ratio for the unemployed group is just below 2, whereas in Austria, Belgium, or Italy the odds ratio is higher than 4. These findings suggest that the odds of being over-indebted are much greater in households with an unemployed head of household in Austria or Belgium, but not in other countries like Spain and France.

When we try to examine how these country-specific results could be related to different institutions, we find that the most vulnerable households, such as those retired and not working, are more likely to be over-indebted (relative to the reference group) where foreclosure costs are higher. These results suggest that any increase in the cost to foreclose on debt escalates the uncertainty for the lenders and pushes them to ask for higher interest rates from riskier groups like the unemployed or the retired. Surprisingly, when we move to examine the role of financial regulation and unemployment insurance systems, there seem to be little evidence of their impact in accounting for differences across labor market status. Finally, better information on borrowers appears to decrease the likelihood of being over-indebted for the retired group. This result suggests that the accurate identification of a borrowers profile proves particularly relevant for retired parties.

Switching to the macro-micro frame, we explore how adverse shocks at the macroeconomic level could potentially impact the overall percentage of over-indebted households. For the Euro area, we find that the percentage of households plagued by over-indebtedness increased by more than 10%, suggesting that an unemployment shock could have a major impact on the financial solvency of Euro area households. This overall result, however, masks important variations across countries. Interestingly, countries with fewer over-indebted households before the shocks seem to be impacted the most severely by the shocks.

Looking at the results by demographics, we find that the impact of the shock in single-headed households is even higher than in couple-headed ones. We also observe that households with younger heads are especially vulnerable to financial distress after unemployment shocks. Finally, risks of over-indebtedness seem positively correlated to a household-head's educational attainments.

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**Table 1.a Debt Service-Income Ratio over 30% of Monthly Household Income, Euro Area & by Country: All, by Household Size & by Housing Status**

(% above or equal to 30%)	Euro Area	Austria	Belgium	France	Germany	Greece	Italy	Luxembourg	Netherlands	Portugal	Slovakia	Spain
<b>All</b>	14.1 (0.5)	6.1 (1.9)	12.9 (1.5)	12.4 (0.6)	8.7 (1)	14.2 (1.5)	12.9 (1.5)	14.5 (1.7)	16 (2.1)	21.9 (1.4)	14 (1.5)	28.2 (1.5)
<b>Household Size</b>												
1	13.2 (1.3)	8.5 (2.4)	16.9 (3.6)	13.5 (1.4)	9 (2.4)	16.8 (3.3)	18.4 (2.7)	19.2 (4.6)	14.2 (4.1)	36 (4.5)	20 (5.5)	27.6 (3.9)
2	12.9 (0.8)	4.6 (2.7)	12 (3)	10.7 (1.1)	10.3 (1.5)	13.4 (2.5)	11.6 (2.2)	11.4 (2.8)	13 (3.1)	21.8 (2.5)	14.5 (3)	26.5 (2.9)
3	14.7 (1.1)	4.7 (2.6)	10.3 (3.2)	11.4 (1.4)	7.6 (2.9)	14.2 (2.7)	13.3 (3)	6.9 (2.7)	20.4 (6.6)	20 (2.4)	12.9 (2.1)	26.7 (2.3)
4	15.8 (1)	6.8 (3)	10 (2.5)	15.2 (1.5)	6.9 (2.7)	14 (2.3)	11.1 (2.2)	14.3 (3.2)	17.3 (4.5)	22.8 (2.9)	16.1 (3.1)	29 (2.7)
5 and more	15.3 (1.7)	5 (4.3)	18.1 (4.5)	11.6 (1.8)	4.1 (2.3)	13.5 (5.1)	13 (3.7)	22.8 (6.3)	24.2 (7.1)	15.4 (3.7)	5.6 (3.6)	36.5 (6.8)
<b>Housing Status</b>												
Owner-Outright	10.6 (0.8)	2.5 (2.2)	4.8 (2.3)	11.1 (1)	5.4 (1.7)	8.5 (1.9)	8.6 (1.6)	4.9 (2.4)	13.4 (6.2)	13.5 (3.1)	2.9 (1.1)	17.1 (2.4)
Owner-with Mortgage	22.2 (0.9)	8.4 (4)	16.5 (2.1)	21.1 (1.4)	16.1 (1.9)	24.1 (2.8)	19.2 (2.9)	20.2 (2.6)	19 (2.1)	25.7 (1.9)	34 (3.3)	37.8 (2.3)
Renter or Other	5.9 (0.8)	4.5 (1.4)	8.1 (3)	4 (0.7)	3.7 (1.2)	7.5 (1.4)	9.5 (2.3)	8.5 (3.3)	9.1 (5.5)	16 (2.7)	6.7 (2.9)	17.7 (2.8)

Notes: The table reports the debt service-to-income ratio, which is calculated as the ratio between total monthly debt payments (DL2000) and household gross monthly income (DI2000/12) for indebted households (See Definitions (Section 3) for more details. Finland, Malta & Slovenia are excluded from the country analysis since some of the variables are missing from the country datasets. Standard errors are in brackets, which were calculated with the Rao-Wu rescaled bootstrap method using replicate weights provided by the countries (100 replicates).

**Table 1.b** Debt Service-Income Ratio over 30%, Euro Area & by Country: by Percentile of Income & by Percentile of Net Wealth

(% above or equal to 30%)	Euro Area	Austria	Belgium	France	Germany	Greece	Italy	Luxembourg	Netherlands	Portugal	Slovakia	Spain
<b>Percentile of Income</b>												
Less than 20 (s.e.)	30.6 (2.2)	14 (5.3)	44.2 (6.5)	22.6 (2.7)	11.5 (3.2)	41.3 (7.4)	32.8 (5.7)	32.8 (7)	40.1 (7.8)	74.4 (5.3)	28.1 (7.6)	60.9 (4.7)
20-39 (s.e.)	18.7 (1.4)	9.7 (3.7)	27.4 (6.8)	10.7 (1.4)	7 (2.6)	25.7 (3.7)	23.1 (3.9)	21.4 (5.5)	17.9 (5.3)	49.7 (4.9)	24 (4.8)	41.8 (3.9)
40-59 (s.e.)	15.1 (1.1)	6.8 (3.6)	12.9 (3.8)	13.8 (1.7)	7.8 (2.6)	13.7 (2.5)	12.4 (2.5)	14.7 (3.8)	11 (4)	24.1 (3.6)	14.3 (2.9)	31.2 (3)
60-79 (s.e.)	10.6 (0.9)	3.4 (2.9)	4.2 (1.4)	12.2 (1.3)	9.6 (2.2)	9.7 (2.4)	9.9 (2.5)	11.5 (3.2)	9.7 (3.6)	13.2 (2.1)	9 (2.9)	24 (3.1)
80-100 (s.e.)	7.8 (0.8)	1.8 (1.7)	2.5 (1.2)	8.8 (0.9)	7.9 (1.8)	4.3 (1.2)	4.6 (1.4)	2.2 (0.9)	7.3 (3)	4.3 (0.9)	5.9 (2.3)	12.5 (2.3)
<b>Percentile of Net Wealth</b>												
Less than 20 (s.e.)	11 (1.1)	7.9 (3.6)	12.7 (4.6)	3.8 (1.3)	7 (1.7)	13.5 (2.4)	13 (3.7)	16.5 (5.4)	25.2 (8)	25.5 (4.2)	18.1 (3.4)	37.5 (3.5)
20-39 (s.e.)	12.8 (1.1)	3 (2.2)	18.9 (3.8)	9.4 (1.6)	3 (1.4)	14.8 (3.2)	21.4 (3.4)	23.4 (4.6)	12.6 (4.1)	29.5 (4)	14.3 (3.8)	33.7 (3.7)
40-59 (s.e.)	17.6 (1.4)	7.4 (3.3)	9.9 (2.8)	15.9 (1.6)	10.7 (3)	12.9 (3)	9.4 (1.9)	10.4 (3.5)	14.1 (3.5)	22.6 (3.4)	11 (3)	27.6 (3)
60-79 (s.e.)	14 (1)	5.1 (2.7)	10.1 (2.9)	12.7 (1.4)	10.5 (2.6)	14.5 (3.7)	11.5 (2.7)	10.5 (4.5)	13.4 (2.9)	17 (3)	13.5 (4)	18.9 (2.4)
80-100 (s.e.)	14.9 (1)	5.4 (3.1)	11.4 (3.1)	17.4 (1.5)	11.6 (2.3)	15.2 (2.9)	9.2 (2.4)	10.6 (3.9)	13.3 (3.2)	17.2 (2.6)	12.3 (3)	23.5 (2.8)

*Notes:* The table reports the debt service-to-income ratio, which is calculated as the ratio between total monthly debt payments (DL2000) and household gross monthly income (DI2000/12) for indebted households (See Definitions (Section 3) for more details. Finland, Malta & Slovenia are excluded from the country analysis since some of the variables are missing from the country datasets. Standard errors are in brackets, which were calculated with the Rao-Wu rescaled bootstrap method using replicate weights provided by the countries (100 replicates).

**Table 1.c Debt Service-Income Ratio over 30%, Euro Area & by Country: Reference Person's Characteristics: Age, Work Status & Education**  
(% above or equal to 30%)

	Euro Area	Austria	Belgium	France	Germany	Greece	Italy	Luxembourg	Netherlands	Portugal	Slovakia	Spain
<b>Age of Reference Person</b>												
16-34	15.2	8.7	16.3	12	6.1	16.4	13.3	19.8	23.3	27.5	18.5	36.6
(s.e.)	(1.3)	(4)	(3.7)	(1.5)	(1.9)	(3.3)	(3.2)	(4.8)	(7.5)	(4.8)	(2.8)	(4.3)
35-44	16.6	8	11.4	16.3	7.9	15.2	15.5	19.1	17.9	20.9	18.9	33
(s.e.)	(0.9)	(3.1)	(2.8)	(1.4)	(2)	(2.7)	(2.4)	(3.9)	(4.5)	(2.4)	(3.4)	(2.4)
45-54	13.1	3	11.7	11.7	7.7	13.7	13.6	10.7	17.8	21.2	11	23.7
(s.e.)	(0.9)	(1.4)	(2.6)	(1.1)	(1.7)	(2.4)	(2.4)	(2.4)	(4.2)	(2.3)	(2.9)	(2.4)
55-64	12.8	6.3	11.9	10.6	14.5	14	8.9	10.1	10.4	19.9	5.9	17
(s.e.)	(1.2)	(2.8)	(3.3)	(1.2)	(3.3)	(3.2)	(2.7)	(3.6)	(3.5)	(3.2)	(2.7)	(2.2)
65-74	10.8	6.6	21.6	6.4	8.8	11.3	8.7	5.4	9.3	17.5	0	25.8
(s.e.)	(1.3)	(4.2)	(6.1)	(1.7)	(2.9)	(3.8)	(2.8)	(5.1)	(3.1)	(4.5)	(0)	(4.8)
75+	7.9	5.8	0	5.7	7.3	6.2	3.6	8.6	3.9	30.8	0	19.2
(s.e.)	(1.9)	(7.1)	(0)	(2.9)	(4.4)	(5.2)	(4)	(11.9)	(3.3)	(11.6)	(0)	(6.8)
<b>Work Status of Reference Person</b>												
Employee	12.7	4.5	9.2	12.3	7.4	10.4	11	15.3	14.1	17.9	16.2	26.9
(s.e.)	(0.6)	(2)	(1.6)	(0.9)	(1.1)	(1.7)	(1.8)	(2.1)	(2.1)	(1.6)	(2)	(1.8)
Self-Employed	22.8	10.7	16	22.1	19.3	21.3	18.8	14.1	35.5	39.4	8.5	33.5
(s.e.)	(1.8)	(5.3)	(6.3)	(2.2)	(5.5)	(3.9)	(3.2)	(5.1)	(14)	(4.1)	(3)	(3.9)
Retired	9.7	5.7	15.2	6.4	7.8	13.7	7.3	6.5	7.1	22.2	3.6	20.7
(s.e.)	(0.9)	(2.2)	(4.3)	(1)	(2.4)	(3.1)	(2.4)	(3.4)	(2.3)	(3.1)	(3.1)	(3.6)
Other Not Working	18	14.6	24.8	14.1	7.6	28.2	29.5	26.4	17.7	30.4	16.4	34.8
(s.e.)	(1.6)	(6.4)	(5.6)	(2.5)	(3.1)	(6.6)	(8.6)	(10.7)	(5.8)	(5.6)	(7.5)	(3.3)
<b>Education of Reference Person</b>												
Primary or No Education	18.2	10.8	16.2	11.1	9.7	15.9	15.7	10.6	13.1	26.4	21	30.4
(s.e.)	(1)	(4)	(3.6)	(1.3)	(4)	(2.6)	(3)	(3.2)	(3.2)	(1.9)	(20.3)	(2.2)
Secondary	12.2	6.2	12.7	12.3	7.5	15.3	11.4	20.8	14.4	16.9	13.5	33.4
(s.e.)	(0.7)	(2.3)	(2.7)	(1)	(1.2)	(2)	(1.9)	(3.6)	(2.9)	(2.9)	(1.7)	(3.1)
Tertiary	13.9	1.7	11.8	13.5	10.4	10.5	9.7	10.7	19.3	10.3	16.1	21.7
(s.e.)	(0.9)	(1.3)	(1.9)	(1.2)	(2.1)	(2.2)	(2.8)	(2.8)	(3.7)	(2)	(3.9)	(2.2)



**Table 2.a** Debt-Income Ratio over 100% of Household Income, Euro Area & by Country: All, by Household Size & by Housing Status

(% above or equal to 100%)	Euro Area	Austria	Belgium	France	Germany	Greece	Italy	Luxembourg	Netherlands	Portugal	Slovakia	Spain
<b>All</b>	40.8	26.9	44.5	37.6	32.2	36	36.8	46.9	68.6	56.4	28.3	52.4
(s.e.)	(0.7)	(3.9)	(1.9)	(0.9)	(1.6)	(2)	(1.4)	(2.5)	(2.4)	(2)	(2)	(1.7)
<b>Household Size</b>												
1	35.5	19.7	45.6	30.5	28.7	25.5	43.5	49.6	58.7	59.9	31.8	51.3
(s.e.)	(1.6)	(3.5)	(4.6)	(2.1)	(3.2)	(3.4)	(4.7)	(5.6)	(5.1)	(5.1)	(6.5)	(5.3)
2	37	23.5	40.3	31.7	29.6	37	32.7	32.6	67	53	27.4	50.4
(s.e.)	(1.2)	(4.8)	(3.9)	(1.5)	(2.5)	(3.9)	(4.2)	(4.7)	(3.7)	(3.6)	(3.6)	(3.2)
3	43.3	34.6	41.5	43.5	33	36.7	36.8	51.2	71.8	55.9	28.5	53.7
(s.e.)	(1.6)	(5.2)	(4.8)	(2.2)	(4.2)	(4.2)	(3.5)	(5.2)	(7.9)	(3.2)	(3.4)	(3.1)
4	47.2	37.7	47.7	47.2	39.6	38	39.1	52.1	79.8	62.7	30.6	53
(s.e.)	(1.1)	(8.5)	(4.1)	(2.2)	(3.9)	(4.3)	(2.7)	(4.2)	(4.8)	(3.1)	(3.8)	(2.9)
5 and more	46	29.2	51.7	40.8	45.1	38.7	28.7	54.2	83.3	45	20	52.1
(s.e.)	(1.7)	(7.1)	(5.2)	(3)	(6.2)	(6.4)	(4.2)	(6.8)	(6.1)	(5.4)	(7.9)	(6.2)
<b>Housing Status</b>												
Owner-Outright	24.4	15.4	11.3	27.9	24.6	18.5	17.1	14.2	31.7	25.2	6.4	30.9
(s.e.)	(1)	(6.1)	(2.9)	(1.4)	(4)	(2.4)	(2)	(4)	(11.1)	(3.8)	(1.4)	(2.3)
Owner-with Mortgage	69	43.5	61.2	69.9	60.5	66.3	70.1	68.6	87.4	75.5	69.6	73.2
(s.e.)	(0.9)	(7.5)	(2.5)	(1.6)	(2.6)	(3.2)	(2.3)	(3)	(1.4)	(1.9)	(3.1)	(2.1)
Renter or Other	14.3	11.6	18.9	11.5	12.2	15.7	15.1	22.4	30.4	16.7	6.1	22.6
(s.e.)	(1.1)	(2.2)	(4.2)	(1.1)	(1.9)	(2.2)	(2.4)	(4.1)	(6.4)	(2.5)	(2.7)	(3.3)

*Notes:* The table reports the ratio of total debt to gross annual household income for indebted households. Ratios are calculated for all indebted households and zero income is bottom coded at 1 euro (See Definitions (Section 3) for more details. Finland, Malta & Slovenia are excluded from the country analysis since some of the variables are missing from the country datasets. Standard errors are in brackets, which were calculated with the Rao-Wu rescaled bootstrap method using replicate weights provided by the countries (100 replicates).

**Table 2.b** Debt-Income Ratio over 100% of Household Income, Euro Area & by Country: by Percentile of Income & by Percentile of Net Wealth

(% above or equal to 100%)	Euro Area	Austria	Belgium	France	Germany	Greece	Italy	Luxembourg	Netherlands	Portugal	Slovakia	Spain
<b>Percentile of Income</b>												
Less than 20 (s.e.)	43.9 (2.3)	23.5 (4.9)	42.5 (6.1)	24.9 (3.2)	30.8 (4.9)	54.6 (6.4)	46.1 (5.2)	38.3 (7.3)	69.9 (7.4)	71.0 (5.4)	32.4 (8)	60.9 (5.1)
20-39 (s.e.)	32.9 (1.8)	27.9 (5.1)	37.8 (6.3)	25.4 (2.3)	15.2 (3.5)	41.9 (5)	32.0 (3.5)	47.1 (7.1)	66.5 (7.2)	59.0 (5.3)	34.7 (5.4)	56.7 (4)
40-59 (s.e.)	39.3 (1.4)	28.7 (6.2)	55.7 (5)	34.7 (2.5)	31.6 (3.8)	37.4 (3.7)	32.5 (3.7)	53.1 (6.3)	63.2 (7)	62.2 (3.9)	31.2 (3.7)	55.1 (3.3)
60-79 (s.e.)	43.0 (1.4)	27.5 (5.9)	48.4 (4.5)	45.0 (1.9)	33.6 (3.4)	37.6 (4.2)	44.4 (3.1)	50.0 (5.3)	73.1 (4.2)	50.5 (4)	28.1 (4.3)	52.6 (3)
80-100 (s.e.)	43.3 (1.3)	26.1 (5.7)	36.1 (4)	43.9 (1.6)	41.9 (3.4)	25.2 (3.6)	32.4 (1.8)	43.5 (4)	69.9 (5.2)	52.5 (3.6)	18.8 (4.4)	44.8 (3.5)
<b>Percentile of Net Wealth</b>												
Less than 20 (s.e.)	23.0 (1.5)	20.4 (6.8)	18.9 (5.1)	10.1 (1.6)	19.7 (3)	25.3 (4.1)	26.3 (3.9)	25.0 (6.5)	61.2 (8)	38.3 (4.5)	36.1 (4.2)	47.1 (3.6)
20-39 (s.e.)	36.1 (1.6)	10.6 (4.4)	65.1 (4.1)	32.6 (3)	8.7 (2.3)	46.1 (4.4)	51.9 (3.3)	69.3 (4.8)	56.2 (9.4)	70.7 (4.4)	27.3 (4.3)	68.0 (3)
40-59 (s.e.)	56.4 (1.9)	36.4 (5)	44.0 (4.9)	60.1 (2.2)	39.1 (4.3)	39.0 (4.8)	39.8 (4.1)	54.0 (5.4)	77.5 (7.9)	61.1 (4.1)	23.6 (5.3)	54.6 (3.5)
60-79 (s.e.)	43.5 (1.2)	29.0 (5.7)	39.6 (4.4)	37.7 (2)	46.1 (4.2)	39.4 (5.1)	30.7 (3.6)	39.3 (5)	74.7 (4.1)	56.6 (4.2)	20.2 (5)	41.6 (3.7)
80-100 (s.e.)	43.7 (1.5)	31.7 (5.8)	38.4 (5)	39.8 (2)	46.2 (3.7)	30.6 (4.4)	32.2 (3)	35.6 (5.4)	68.2 (5.5)	52.8 (4.1)	31.7 (6.2)	49.5 (3.3)

Notes: The table reports the ratio of total debt to gross annual household income for indebted households. Ratios are calculated for all indebted households and zero income is bottom coded at 1 euro (See Definitions (Section 3) for more details. Finland, Malta & Slovenia are excluded from the country analysis since some of the variables are missing from the country datasets. Standard errors are in brackets, which were calculated with the Rao-Wu rescaled bootstrap method using replicate weights provided by the countries (100 replicates).

**Table 2.c Debt-Income Ratio over 100% of Household Income: Euro Area & by Country: Reference Person's Characteristics: Age, Work Status & Education**

(% above or equal to 100%)	Euro Area	Austria	Belgium	France	Germany	Greece	Italy	Luxembourg	Netherlands	Portugal	Slovakia	Spain
<b>Age of Reference Person</b>												
16-34	44.5	27.6	71.1	46.1	24.7	35.2	50.9	67.5	68.2	66.1	46.5	66.6
(s.e.)	(1.6)	(6)	(4.7)	(2.3)	(3.5)	(3.7)	(6.5)	(5.1)	(7.2)	(5.2)	(4.2)	(4)
35-44	49.3	36.5	51.9	51.5	35.9	41.4	43.3	62.7	73.3	68.2	34.3	61.3
(s.e.)	(1.3)	(6)	(4.3)	(2)	(3.5)	(3.4)	(3)	(4.3)	(6)	(3)	(5.1)	(2.7)
45-54	40.1	25.5	34.3	32.4	36.6	35.1	35.9	36	75.7	54.7	18	47.8
(s.e.)	(1.3)	(4.8)	(3.8)	(1.7)	(3.2)	(4.4)	(3)	(4.6)	(4.8)	(3.5)	(3.3)	(3)
55-64	30.9	16.4	22.6	24.3	31	35.9	25.6	24.4	60.5	35	7.1	31.5
(s.e.)	(1.7)	(5)	(4.2)	(2)	(4.2)	(4)	(2.6)	(5.1)	(4.6)	(4)	(3.4)	(3.2)
65-74	29.8	24.3	21.9	12.6	30.6	29.4	18	13.2	62.6	25.5	12.1	38.8
(s.e.)	(2)	(6.2)	(5.7)	(2.3)	(4.4)	(5.5)	(4.4)	(6.8)	(5.4)	(5.5)	(10.8)	(5.1)
75+	26.2	7.7	5.5	9.9	26.9	17.5	30.7	44.6	56.3	27.1	0	28.7
(s.e.)	(3.5)	(6.8)	(5.2)	(3.6)	(8.5)	(8.7)	(13)	(23.1)	(8.9)	(10.9)	(0)	(8.1)
<b>Work Status of Reference Person</b>												
Employee	42.6	27.2	49.5	42.7	31.9	34.9	39.6	52.8	72.1	58.2	31	54.7
(s.e.)	(0.9)	(5)	(2.3)	(1.2)	(1.9)	(2.3)	(2)	(2.9)	(3.3)	(2.5)	(2.2)	(2.2)
Self-Employed	48	42.2	51	53	44	37.3	37.1	52	81	69.3	27.8	57.8
(s.e.)	(2.1)	(8)	(7.9)	(3)	(5.8)	(4.4)	(4)	(8.1)	(11.7)	(4.5)	(4.5)	(4.3)
Retired	27.3	17.4	23.8	16.8	27.9	34.4	20.5	17.6	58.1	29.7	11.1	35.5
(s.e.)	(1.5)	(3.7)	(4.7)	(1.6)	(4.1)	(4.3)	(3.3)	(4.7)	(4.1)	(3.6)	(7.3)	(4)
Other Not Working	37	25.5	30.2	19.1	28.4	53.5	55.3	31.8	62.6	56.5	16.6	48.8
(s.e.)	(2.1)	(7.1)	(6.8)	(3)	(4.9)	(10.7)	(8.2)	(11.2)	(7.1)	(6)	(8.6)	(3.2)
<b>Education of Reference Person</b>												
Primary or No Education	36.8	23.7	31.2	23.5	19.8	34.4	31.7	42.3	62.7	54.4	23.6	49.4
(s.e.)	(1.2)	(5.3)	(4.4)	(1.5)	(5.2)	(3.5)	(2.5)	(4.5)	(5.8)	(2.6)	(20.8)	(2.4)
Secondary	36.1	26.7	43.6	35.1	27.5	39	39.1	45.7	62.8	58.2	26	53.8
(s.e.)	(1)	(4.2)	(3.6)	(1.4)	(2)	(3)	(2.7)	(4.4)	(4.2)	(3.7)	(2.4)	(3.3)
Tertiary	51.2	30.2	50	53.3	44	33.5	43	53.2	78	61.7	39.3	55.3
(s.e.)	(1.5)	(5.8)	(3)	(1.7)	(3.4)	(3.5)	(4.9)	(4.3)	(3.6)	(3.8)	(5.3)	(2.9)

Notes: The table reports the ratio of total debt to gross annual household income for indebted households. Ratios are calculated for all indebted households and zero income is bottom coded at 1 euro (See Definitions (Section 3) for more details. Finland, Malta & Slovenia are excluded from the country analysis since some of the variables are missing from the country datasets. Standard errors are in brackets, which were calculated with the Rao-Wu rescaled bootstrap method using replicate weights provided by the countries (100 replicates).

Table 3: Debt service to income ratio  $\geq 30\%$ , all indebted households, All-countries Regressions (logit)

<i>Odds-Ratios</i>	Model A	Model B	Model C	Model D	Model E	Model F	Model G
<b>Labor Market Characteristics (ref. Employee):</b>							
Self-Employed	2.040 ***	2.034 ***	2.106 ***	2.083 ***	2.073 ***	2.408 ***	2.160 ***
(s.e.)	(.233)	(.246)	(.257)	(.246)	(.249)	(.316)	(.255)
Unemployed	1.659 ***	1.430 ***	1.363 **	2.032 ***	1.398 **	0.771 *	1.818 ***
(s.e.)	(.224)	(.187)	(.184)	(.278)	(.189)	(.112)	(.269)
Retired	0.706 ***	0.740 **	0.829	0.880	0.797 *	0.612 ***	0.918
(s.e.)	(.084)	(.093)	(.201)	(.114)	(.104)	(.081)	(.218)
Other*	1.024	1.265	1.219	2.199 **	1.261	0.331 ***	1.859 **
(s.e.)	(.304)	(.369)	(.358)	(.686)	(.372)	(.134)	(.578)
Permanently di:	1.446	1.332	1.394	2.119 *	1.338	0.737	1.990
(s.e.)	(.565)	(.548)	(.584)	(.915)	(.544)	(.319)	(.868)
Fulfilling domes	1.872 **	1.721 *	1.657 *	2.296 ***	1.685 *	0.946	1.824 *
(s.e.)	(.526)	(.506)	(.495)	(.684)	(.507)	(.297)	(.58)
<b>Reference Person's Characteristics:</b>							
Male			0.965				0.981
(s.e.)			(.086)				(.108)
Age (ref. 16-34):							
35-44			1.050				0.834
(s.e.)			(.131)				(.115)
45-54			0.787 *				0.710 **
(s.e.)			(.11)				(.109)
55-64			0.816				0.777
(s.e.)			(.158)				(.157)
65+			0.780				0.685
(s.e.)			(.219)				(.196)
Education (ref. Primary or No Education):							
Secondary			0.815 *				0.721 ***
(s.e.)			(.092)				(.084)
Tertiary			0.820 **				0.625 ***
(s.e.)			(.083)				(.064)
<b>Housing Status (ref. Owner-Outright):</b>							
Owner-with Mortgage				2.713 ***			2.620 ***
(s.e.)				(.312)			(.32)
Renter or Other				0.648 ***			0.517 ***
(s.e.)				(.096)			(.08)
<b>Household Characteristics:</b>							
Number of children in household (0-15)					1.121 ***		1.059
(s.e.)					(.047)		(.057)
Number of household members 16+					0.827 ***		0.860 **
(s.e.)					(.053)		(.061)
couple					1.052		0.791 *
(s.e.)					(.122)		(.104)
Log of total gross income						0.463 ***	
(s.e.)						(.036)	
Constant	0.145 ***	0.058 ***	0.077 ***	0.034 ***	0.076 ***	183.3 ***	0.097 ***
(s.e.)	(.008)	(.019)	(.027)	(.012)	(.027)	(145.7)	(.04)
Country FE	no	yes	yes	yes	yes	yes	yes
Number of Obsi	19429	19429	19429	19429	19429	19389	19429

Table 4: Mortgage debt to income ratio  $\geq 3$ , All-countries Regressions (logit)

<i>Odds-Ratios</i>	Model A	Model B	Model C	Model D	Model E	Model F	Model G
<b>Labor Market Characteristics (ref. Employee):</b>							
Self-Employed	1.343 **	1.456 **	1.761 ***	1.505 ***	1.467 ***	1.704 ***	1.749 ***
(s.e.)	(.193)	(.216)	(.275)	(.22)	(.202)	(.245)	(.257)
Unemployed	2.257 ***	1.896 ***	2.020 ***	1.855 ***	1.802 ***	0.955	1.840 ***
(s.e.)	(.42)	(.376)	(.42)	(.367)	(.357)	(.205)	(.386)
Retired	0.649 ***	0.641 ***	1.071	0.682 **	0.651 **	0.404 ***	1.093
(s.e.)	(.103)	(.105)	(.298)	(.113)	(.111)	(.067)	(.312)
Other*	1.534	1.178	1.533	1.201	0.975	0.410 *	1.270
(s.e.)	(.646)	(.491)	(.674)	(.498)	(.408)	(.189)	(.568)
Permanently disabled	2.088 *	1.539	2.286 *	1.517	1.465	0.707	2.048
(s.e.)	(.906)	(.697)	(1.036)	(.672)	(.639)	(.318)	(.905)
Fulfilling domestic tasks	1.728	1.163	1.063	1.188	0.974	0.385 *	0.989
(s.e.)	(.714)	(.509)	(.544)	(.521)	(.475)	(.215)	(.515)
<b>Reference Person's Characteristics:</b>							
Male			0.782 **				0.973
(s.e.)			(.084)				(.102)
Age (ref. 16-34):							
35-44			0.450 ***				0.443 ***
(s.e.)			(.065)				(.063)
45-54			0.252 ***				0.260 ***
(s.e.)			(.041)				(.041)
55-64			0.204 ***				0.214 ***
(s.e.)			(.039)				(.042)
65+			0.244 ***				0.225 ***
(s.e.)			(.081)				(.076)
Education (ref. Primary or No Education):							
Secondary			0.857				0.826
(s.e.)			(.105)				(.104)
Tertiary			0.757 **				0.717 ***
(s.e.)			(.095)				(.089)
<b>Housing Status (ref. Owner-Outright):</b>							
Owner-with Mortgage				1.480 ***			1.102
(s.e.)				(.215)			(.172)
Renter or Other				1.840 **			1.208
(s.e.)				(.453)			(.309)
<b>Household Characteristics:</b>							
Number of children in household (0-15)					1.149 ***		1.063
(s.e.)					(.06)		(.058)
Number of household members 16+					0.705 ***		0.838 ***
(s.e.)					(.044)		(.054)
couple					0.681 ***		0.535 ***
(s.e.)					(.091)		(.067)
Log of total gross income						0.241 ***	
(s.e.)						(.019)	
Constant	0.310 ***	0.163 ***	0.535	0.109 ***	0.412 *	622189.5 ***	0.933
(s.e.)	(.016)	(.071)	(.259)	(.047)	(.2)	(587346.9)	(.499)
Country FE	no	yes	yes	yes	yes	yes	yes
Number of Observations	11133	11133	11133	11133	11133	11124	11133

Table 5: Debt service to income ratio &gt;= 30 % (all indebted households), Countries Regressions (logit, Model G)

<i>Odds-Ratios</i>	Austria	Belgium	Germany	Spain	France	Greece	Italy	Luxembourg	Netherlands	Portugal	Slovakia
<b>Labor Market Characteristics (ref. Employee):</b>											
Self-Employed	3.931 *	1.978	2.460 **	1.498 *	1.761 ***	2.694 ***	2.363 ***	1.332	3.525 *	3.404 ***	0.337 *
(s.e.)	(3.015)	(1.165)	(1.018)	(.35)	(.28)	(.787)	(.749)	(.762)	(2.598)	(.766)	(.191)
Retired	0.883	3.333	0.716	0.991	0.520 **	1.704	1.033	0.968	1.266	1.937 **	3.200
(s.e.)	(1.074)	(2.827)	(.502)	(.424)	(.157)	(.775)	(.906)	(1.224)	(.838)	(.624)	(5.484)
Other Not Working	4.341 *	4.632 ***	1.782	1.543 **	1.850 **	3.196 ***	4.191 **	3.626 *	1.600	1.958 *	2.680
(s.e.)	(3.737)	(2.543)	(.927)	(.307)	(.453)	(1.438)	(2.473)	(2.509)	(.749)	(.713)	(1.707)
<b>Reference Person's Characteristics:</b>											
Male	0.819	0.715	1.346	0.834	1.147	1.131	1.140	0.816	0.461	0.819	1.150
(s.e.)	(.431)	(.245)	(.484)	(.183)	(.147)	(.355)	(.311)	(.344)	(.223)	(.163)	(.403)
Age (ref. 16-34):											
35-44	0.823	0.590	0.845	0.693	1.031	0.851	1.276	0.728	0.610	0.627	1.713 *
(s.e.)	(.5)	(.284)	(.459)	(.157)	(.185)	(.263)	(.578)	(.316)	(.461)	(.211)	(.548)
45-54	0.355	0.515	0.651	0.645 *	0.756	0.931	1.203	0.374 *	0.643	0.587 *	1.611
(s.e.)	(.323)	(.251)	(.35)	(.157)	(.138)	(.359)	(.545)	(.202)	(.463)	(.175)	(.801)
55-64	1.190	0.652	1.135	0.580 *	0.801	0.887	0.769	0.558	0.365	0.441 **	0.446
(s.e.)	(1.297)	(.388)	(.634)	(.187)	(.194)	(.388)	(.541)	(.347)	(.261)	(.176)	(.425)
65+	1.121	0.759	0.877	1.043	0.684	0.520	0.613	0.411	0.260	0.311 **	
(s.e.)	(1.626)	(.743)	(.724)	(.554)	(.304)	(.306)	(.6)	(.617)	(.254)	(.158)	
Education (ref. Primary or No Education):											
Secondary	0.485	0.745	0.490	0.983	0.803	0.774	0.538 *	2.119	0.824	0.451 ***	0.857
(s.e.)	(.322)	(.312)	(.286)	(.181)	(.154)	(.231)	(.18)	(1.151)	(.382)	(.122)	(1.483)
Tertiary	0.083	0.651	0.480	0.503 ***	0.717 *	0.555	0.374 **	0.851	0.988	0.224 ***	0.552
(s.e.)	(.143)	(.276)	(.301)	(.085)	(.122)	(.24)	(.163)	(.437)	(.473)	(.065)	(.924)
<b>Housing Status (ref. Owner-Outright):</b>											
Owner-with Mortgage	2.609	7.830 ***	3.931 ***	2.829 ***	1.707 ***	3.633 ***	2.784 ***	4.280 *	0.960	2.347 ***	19.317 ***
(s.e.)	(3.501)	(4.933)	(1.632)	(.654)	(.301)	(1.137)	(.894)	(3.535)	(.69)	(.742)	(8.925)
Renter or Other	0.742	1.595	0.525	0.768	0.223 ***	0.793	0.800	1.279	0.265	0.862	1.618
(s.e.)	(1.087)	(1.37)	(.293)	(.205)	(.053)	(.277)	(.319)	(1.184)	(.3)	(.295)	(.969)
<b>Household Characteristics:</b>											
Number of children in household (0-1	1.369	1.192	0.694	1.557 ***	0.926	1.115	1.083	1.429 *	1.231	0.929	0.951
(s.e.)	(.352)	(.194)	(.158)	(.184)	(.065)	(.202)	(.172)	(.27)	(.323)	(.118)	(.158)
Number of household members 16+	0.610	1.331	0.622 **	1.044	0.734 ***	0.660 **	0.829	1.102	1.168	0.747 **	0.616 **
(s.e.)	(.248)	(.277)	(.139)	(.14)	(.081)	(.112)	(.136)	(.279)	(.306)	(.109)	(.138)
couple	0.617	0.306 ***	1.239	0.633 **	0.974	0.913	0.579 *	0.366 *	0.651	0.790	0.908
(s.e.)	(.456)	(.131)	(.518)	(.145)	(.2)	(.333)	(.184)	(.214)	(.394)	(.19)	(.357)
Constant	0.228	0.046 ***	0.212 *	0.348 ***	0.364 ***	0.211 ***	0.195 ***	0.089 **	0.464	0.783	0.100
(s.e.)	(.388)	(.046)	(.185)	(.13)	(.117)	(.108)	(.112)	(.096)	(.487)	(.372)	(.185)
Number of Observations	798	992	1773	2450	6918	1118	1794	580	785	1579	621

Table 6: Effects of Institutions on the odds of Overindebtedness across Labor Market Statutes (Pearson Correlations)

Institutions Odds-ratios	Duration of Foreclosure (1)		Taxation of Mortgage Payments (2)		Regulatory Loan- to-Value ratio (3)		Credit Conditions (4)		Financial Literacy (5)		Unemployment Insurance (6)	
	Duration	Cost	Tax Exemption	No limit to Deductibility	Existence	Limit	Fixed Interest rate	I-only- payments	Information on Borrowers	Economic Literacy	Maximum Duration	Replacement Rate
Reference Groupe	-0.05 (.89)	-0.53 (.15)	0.28 (.4)	0.17 (.63)	0.26 (.44)	0.28 (.41)	-0.02 (.96)	0.659** (.03)	-0.17 (.63)	-0.39 (.23)	0.47 (.15)	0.27 (.43)
Self-Employed	-0.07 (.84)	-0.38 (.31)	0.42 (.2)	0.662** (.03)	-0.29 (.38)	-0.27 (.42)	0.10 (.77)	0.795*** (.003)	0.49 (.16)	0.20 (.55)	0.27 (.42)	-0.03 (.92)
Retired	0.08 (.83)	0.69** (.04)	-0.23 (.49)	-0.22 (.51)	-0.09 (.8)	-0.05 (.87)	-0.04 (.91)	-0.10 (.78)	-0.60* (.06)	-0.05 (.89)	0.08 (.83)	-0.33 (.32)
Other Not Working	0.40 (.26)	0.58* (.1)	0.26 (.44)	0.05 (.89)	-0.46 (.15)	-0.41 (.22)	-0.26 (.44)	-0.12 (.73)	0.06 (.86)	0.17 (.61)	-0.39 (.24)	-0.30 (.37)
Observations:	11	11	11	11	11	11	11	11	11	11	11	11

Notes: P in parentheses; \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01. Pearson correlation coefficients and p values (in parentheses) between labor market status odds ratios from country regressions (Table 5) and Institutional characteristics. Institutional variables cover: (1) Duration of Foreclosure which is the process of taking possession of a mortgaged property as a result of the failure to keep up mortgage payments (Duration: the typical duration of a foreclosure procedure number of months; Cost: Typical cost of foreclosure (% of loan)); (2) Taxation of Mortgage Payments (Tax Exemption: Existence of a tax exemption; No Limit to Deductibility: Absence of a limit to deductibility); (3) Regulatory Loan-to-Value ratio (Existence: Existence of LTV limit; Limit: the value of the limit measured as the percentage of the value of the property); (4) Credit Conditions (Fixed Interest rate: Part of mortgage loans with first fixed-interest period longer than 10 years > 50%; I-only-payments: Part of mortgage loans with interest only payment (at least in the initial 3 years) > 10%); (5) Financial Literacy (Information on Borrowers: Depth of credit information index (scale 0-6); Economic Literacy: Economic literacy (avg 1995-2009)); (6) Unemployment Insurance (Maximum Duration in months; Replacement Rate refers to gross earnings except for Austria and Germany; see Boeri and van Ours (2013) for a complete description).

Table 7: Debt Service-Income Ratio over 40% of Monthly Household Income, EA &amp; by Country

(% above or equal to 40%)	EU Area	Austria	Belgium	Cyprus	France	Germany	Greece	Italy	Luxembourg	Netherlands	Portugal	Slovakia	Spain
Before Shock	8.0	4.0	7.8	24.3	5.4	4.9	8.4	7.2	7.0	11.0	13.2	8.6	16.8
(s.e.)	(.4)	(1.8)	(1.4)	(2.1)	(.5)	(.8)	(1.4)	(1.3)	(1.3)	(2.)	(1.2)	(1.2)	(1.3)
After Shock "1" (+5% unemployed)	8.9	4.4	9.1	26.0	6.4	5.7	9.0	8.1	8.1	11.6	14.1	9.1	18.1
(s.e.)	(.4)	(1.7)	(1.4)	(2.1)	(.5)	(1.)	(1.5)	(1.4)	(1.4)	(1.9)	(1.2)	(1.3)	(1.4)
<i>an increase of</i>	+11.6%	+8.7%	+17.0%	+7.0%	+18.1%	+16.5%	+7.2%	+12.7%	+15.4%	+5.8%	+6.9%	+6.0%	+8.0%
After Shock "2" (+5%/+10% unemployed)	9.2	4.6	9.4	26.6	6.7	5.9	9.3	8.4	8.7	11.9	14.4	9.4	18.4
(s.e.)	(.5)	(1.8)	(1.4)	(2.3)	(.5)	(1.)	(1.5)	(1.4)	(1.4)	(2.1)	(1.2)	(1.3)	(1.4)
<i>an increase of</i>	+15.3%	+13.6%	+21.5%	+9.3%	+23.8%	+22.2%	+11.0%	+17.0%	+22.9%	+8.1%	+8.5%	+9.0%	+10.0%

Notes: Income shock "1" is defined as a 5% probability of employee losing their job in the private sector. Income shock "2" is defined as a 5% probability of employee losing their job if they are 35 to 54 years old and as a 10% probability if they are 16 to 34 years old or above 55 in the private sector. In this case, their labor income is replaced by unemployment benefits. The value of the unemployment benefits is calculated as a percentage of last earned labor income. The percentage is based, country by country, on the ratio of the average unemployment benefit and the average labor income and depends on the household status (couple vs. no couple). These averages are estimated with the HFCS dataset.



Table 8: Debt Service-Income Ratio over 40% of Monthly Household Income across Demographics

(% above or equal to 40%)	EU Area			
	Before Shock	After Shock "1"	After Shock "2"	<i>an increase of</i>
<b>Couple:</b>				
yes	7.7	8.6	8.8	+14.5%
(s.e.)	(.4)	(.5)	(.5)	
no	8.7	9.8	10.2	+16.8%
(s.e.)	(.8)	(.9)	(.9)	
<b>Age of Reference Person:</b>				
16-34	8.5	9.8	10.9	+27.7%
(s.e.)	(1.1)	(1.1)	(1.2)	
35-44	8.3	9.5	9.5	+13.8%
(s.e.)	(.7)	(.7)	(.7)	
45-54	8.0	9.1	9.0	+12.9%
(s.e.)	(.7)	(.8)	(.8)	
55-64	7.9	8.5	9.0	+13.1%
(s.e.)	(1.1)	(1.2)	(1.2)	
65+	6.3	6.3	6.3	0.0%
(s.e.)	(1.)	(1.)	(1.)	
<b>Education of Reference Person:</b>				
Primary or No Education	10.8	11.5	11.7	+8.6%
(s.e.)	(.9)	(.9)	(.9)	
Secondary	6.8	7.7	8.0	+17.0%
(s.e.)	(.5)	(.6)	(.7)	
Tertiary	7.6	8.7	9.1	+20.3%
(s.e.)	(.9)	(.9)	(1.)	
<b>Euro Area Total Gross Income Quintile</b>				
I	24.5	24.9	25.1	+2.7%
(s.e.)	(2.)	(2.2)	(2.2)	
II	10.3	11.4	11.8	+13.7%
(s.e.)	(1.1)	(1.2)	(1.2)	
III	7.8	9.1	9.6	+23.8%
(s.e.)	(.9)	(.9)	(1.)	
IV	4.9	6.0	6.2	+28.3%
(s.e.)	(.7)	(.7)	(.8)	
V	3.5	4.1	4.2	+21.8%
(s.e.)	(.6)	(.6)	(.6)	

Notes: The increase is estimated after shock "2". Income shock "1" is defined as a 5% probability of employee losing their job in the private sector. Income shock "2" is defined as a 5% probability of employee losing their job if they are 35 to 54 years old and as a 10% probability if they are 16 to 34 years old or above 55 in the private sector. In this case, their labor income is replaced by unemployment benefits. The value of the unemployment benefits is calculated

Table 9a: Debt Service-Income Ratio over 40% of Monthly Household Income, by Couple, Age &amp; Education Level (by Country)

(% above or equal to 40%)	Austria			Belgium			Cyprus			France			Germany			Greece		
	Before Shock	After Shock	an increase of	Before Shock	After Shock	an increase of	Before Shock	After Shock	an increase of	Before Shock	After Shock	an increase of	Before Shock	After Shock	an increase of	Before Shock	After Shock	an increase of
	"2"	"2"	"2"	"2"	"2"	"2"	"2"	"2"	"2"	"2"	"2"	"2"	"2"	"2"	"2"	"2"	"2"	"2"
<b>Couple:</b>																		
yes	3.8	4.2	+10.3%	6.4	7.5	+17.4%	22.1	24.1	+9.2%	5.0	6.3	+25.3%	4.8	5.7	+18.9%	8.3	9.3	+12.0%
(s.e.)	(2.4)	(2.4)		(1.5)	(1.7)		(2.3)	(2.3)		(1.5)	(1.5)		(9)	(1.1)		(1.5)	(1.7)	
no	4.4	5.2	+17.9%	10.6	13.4	+26.8%	30.7	33.7	+9.7%	6.3	7.7	+21.0%	5.0	6.4	+27.6%	8.4	9.1	+8.2%
(s.e.)	(1.7)	(1.9)		(2.4)	(3)		(4.4)	(5.1)		(1)	(1.1)		(1.5)	(2.1)		(2.2)	(2.4)	
<b>Age of Reference Person:</b>																		
16-34	4.5	5.4	+21.8%	9.0	13.1	+46.0%	26.2	29.7	+13.5%	4.3	6.7	+53.7%	3.8	5.5	+44.7%	9.6	11.6	+21.1%
(s.e.)	(3.3)	(3.8)		(3.2)	(3.6)		(4.4)	(5.2)		(1.1)	(1.4)		(1.1)	(1.9)		(2.9)	(3.2)	
35-44	5.8	6.4	+9.4%	5.8	6.8	+16.8%	22.1	25.2	+14.2%	6.9	8.1	+18.3%	3.1	4.0	+30.4%	8.2	9.0	+9.9%
(s.e.)	(3.2)	(3.1)		(2)	(2.3)		(3.6)	(4)		(9)	(1)		(1.5)	(2)		(2.1)	(2.4)	
45-54	2.1	2.4	+15.6%	9.6	10.7	+11.1%	25.2	26.3	+4.5%	6.0	7.2	+20.4%	3.5	4.6	+30.8%	8.0	8.8	+9.9%
(s.e.)	(1.3)	(1.3)		(2.8)	(2.7)		(3.9)	(4)		(8)	(1)		(1.2)	(1.7)		(1.9)	(2)	
55+	2.9	3.6	+24.9%	8.3	9.8	+18.7%	23.5	25.8	+9.7%	4.6	5.4	+17.3%	10.5	11.7	+11.5%	10.2	11.0	+8.4%
(s.e.)	(1.6)	(1.9)		(2.9)	(3.4)		(5)	(5.7)		(1.1)	(1.2)		(3.4)	(3.6)		(2.9)	(3)	
65+	4.7	4.7	+0%	4.3	4.3	+0%	24.0	24.0	+0%	3.8	3.7	-3.1%	5.5	5.6	+1.0%	4.8	4.8	+0%
(s.e.)	(3.6)	(3.6)		(2.2)	(2.2)		(7.6)	(7.6)		(1.2)	(1.2)		(2.2)	(2.2)		(2.7)	(2.7)	
<b>Education of Reference Person:</b>																		
Primary or No Education	6.5	6.5	+0%	6.9	8.6	+24.8%	31.4	31.9	+1.6%	5.1	5.7	+12.5%	5.6	5.8	+3.2%	8.3	9.1	+9.4%
(s.e.)	(3.3)	(3.3)		(2.5)	(3.2)		(7)	(7.4)		(1.1)	(1.1)		(3.2)	(3.4)		(2.2)	(2.3)	
Secondary	4.1	4.6	+12.8%	8.6	9.9	+15.8%	28.8	30.4	+5.8%	5.7	7.0	+22.5%	3.8	5.0	+31.3%	8.7	9.7	+11.2%
(s.e.)	(2.1)	(2.1)		(2.2)	(2.5)		(3.8)	(4.1)		(6)	(8)		(8)	(1.3)		(1.9)	(2)	
Tertiary	1.5	2.6	+72.5%	7.4	9.3	+25.5%	21.3	23.8	+11.7%	5.3	7.1	+34.9%	6.5	7.6	+17.0%	7.9	8.9	+12.7%
(s.e.)	(1.2)	(2.4)		(2)	(1.8)		(2.9)	(3.5)		(8)	(1)		(1.8)	(1.9)		(2)	(2.3)	
<b>Country Total Gross Income Quintile</b>																		
I	11.7	11.9	+1.6%	36.3	36.9	+1.6%	63.6	64.6	+1.6%	15.3	15.5	+1.0%	8.6	9.7	+12.8%	34.5	35.1	+1.8%
(s.e.)	(5.1)	(5)		(6.5)	(6.6)		(7.8)	(8.1)		(2.4)	(2.4)		(2.9)	(3.5)		(7.8)	(7.8)	
II	2.8	3.2	+16.7%	17.0	19.9	+17.4%	35.8	38.4	+7.2%	6.4	7.5	+16.9%	4.3	5.1	+19.3%	13.2	13.8	+5.1%
(s.e.)	(2)	(2.1)		(5.1)	(6.2)		(5.5)	(6.1)		(1.2)	(1.4)		(1.9)	(2.1)		(3.1)	(3.3)	
III	5.1	6.2	+21.4%	4.0	7.4	+84.5%	21.9	24.7	+13.0%	5.5	7.5	+36.3%	4.8	5.9	+22.9%	8.2	9.6	+17.6%
(s.e.)	(3.7)	(3.8)		(2.9)	(2.7)		(4.2)	(4.5)		(1.3)	(1.7)		(1.8)	(2.4)		(2.4)	(2.5)	
IV	2.2	2.5	+16.1%	1.2	3.0	+155.7%	14.9	17.7	+18.8%	3.7	5.3	+42.4%	5.3	6.6	+24.9%	3.7	4.6	+26.3%
(s.e.)	(2.6)	(2.5)		(6)	(1.6)		(3)	(3.8)		(7)	(9)		(1.8)	(2)		(1.3)	(1.7)	
V	1.7	2.2	+33.0%	1.6	1.8	+9.8%	14.1	15.6	+10.0%	3.1	4.1	+33.5%	2.9	3.8	+33.9%	2.3	3.1	+32.2%
(s.e.)	(1.6)	(2)		(8)	(9)		(3.6)	(4.1)		(6)	(7)		(1.2)	(1.3)		(1)	(1.2)	

Notes: Income shock "2" is defined as a 5% probability of employee losing their job if they are 35 to 54 years old and as a 10% probability if they are 16 to 34 years old or above 55 in the private sector. In this case, their labor income is replaced by unemployment benefits. The value of the unemployment benefits is calculated as a percentage of last earned labor income. The percentage is based, country by country, on the ratio of the average unemployment benefit and the average labor income and depends on the household status (couple vs. no couple). These averages are estimated with the HFCS dataset.

Table 9b: Debt Service-Income Ratio over 40% of Monthly Household Income, by Couple, Age &amp; Education Level (by Country)

	Italy			Luxembourg			Netherlands			Portugal			Slovakia			Spain		
	Before Shock	After Shock "2"	an increase of	Before Shock	After Shock "2"	an increase of	Before Shock	After Shock "2"	an increase of	Before Shock	After Shock "2"	an increase of	Before Shock	After Shock "2"	an increase of	Before Shock	After Shock "2"	an increase of
<b>Couple:</b>																		
yes	6.2 (1.4)	7.1 (1.5)	+15.1%	5.6 (1.2)	7.0 (1.6)	+25.3%	9.8 (1.5)	10.6 (1.6)	+8.5%	12.6 (1.3)	13.6 (1.4)	+8.4%	7.4 (1.3)	8.0 (1.4)	+7.8%	16.0 (1.4)	17.7 (1.6)	+10.5%
(s.e.)																		
no	10.6 (2.2)	12.8 (2.8)	+20.9%	9.8 (2.8)	11.7 (2.8)	+20.2%	12.7 (4.3)	13.7 (4.6)	+7.6%	16.0 (2.3)	17.4 (2.7)	+9.1%	11.6 (2.7)	12.9 (3.1)	+11.1%	19.6 (2.7)	21.2 (2.9)	+8.4%
(s.e.)																		
<b>Age of Reference Person:</b>																		
16-34	9.3 (2.6)	11.6 (3.4)	+24.5%	8.1 (3.2)	11.5 (3.9)	+42.1%	15.9 (5.5)	18.0 (6.2)	+13.2%	17.3 (3.8)	20.2 (4.4)	+16.9%	10.7 (2.6)	12.4 (2.7)	+16.6%	21.5 (4.2)	25.3 (4.7)	+17.6%
(s.e.)																		
35-44	7.8 (1.8)	9.2 (2.2)	+17.2%	9.5 (2.7)	11.4 (3.3)	+20.0%	11.0 (4.8)	11.7 (4.8)	+6.6%	12.4 (1.9)	13.5 (2.2)	+8.9%	11.9 (2.8)	12.5 (2.8)	+4.8%	17.6 (1.8)	19.1 (2.1)	+8.7%
(s.e.)																		
45-54	8.0 (1.9)	8.9 (2.1)	+10.9%	5.7 (1.9)	6.3 (2.1)	+9.7%	13.0 (3.8)	13.4 (3.8)	+3.6%	13.3 (2.1)	14.1 (2.1)	+5.9%	7.4 (2.4)	7.9 (2.9)	+5.8%	16.5 (2.2)	17.8 (2.3)	+7.6%
(s.e.)																		
55+	4.4 (1.8)	5.9 (3.1)	+33.5%	4.4 (2.8)	5.9 (3.3)	+35.3%	8.3 (3.1)	9.4 (2.9)	+13.2%	11.3 (2.4)	11.6 (2.3)	+2.4%	2.4 (1.8)	2.6 (2.1)	+12.2%	9.9 (1.8)	10.8 (2.1)	+9.0%
(s.e.)																		
65+	4.9 (1.7)	5.2 (2.1)	+6.4%	4.9 (3.6)	4.9 (3.6)	+0%	5.3 (2.3)	5.3 (2.3)	+0%	11.5 (4.1)	11.6 (4.1)	+1%	0.0 (.1)	0.0 (.1)	+15.2%	15.2 (3.2)	15.0 (3.2)	+1.5%
(s.e.)																		
<b>Education of Reference Person:</b>																		
Primary or No Education	8.9 (2.6)	10.0 (2.7)	+12.7%	5.6 (1.9)	6.9 (2.4)	+23.9%	10.0 (3.5)	10.4 (3.6)	+3.8%	16.3 (1.6)	17.3 (1.8)	+6.2%	21.0 (20.3)	21.0 (20.3)	+0%	19.2 (1.8)	20.8 (2.1)	+8.0%
(s.e.)																		
Secondary	6.3 (1.6)	7.7 (1.8)	+22.6%	9.1 (2.5)	10.5 (2.9)	+15.9%	9.1 (2.2)	9.7 (2.1)	+6.4%	10.5 (2.6)	11.5 (2.8)	+9.2%	8.7 (1.4)	9.2 (1.4)	+6.3%	21.3 (2.9)	22.4 (3.1)	+5.6%
(s.e.)																		
Tertiary	5.4 (2.1)	6.2 (2.3)	+16.3%	6.1 (1.9)	8.3 (2.9)	+34.8%	13.5 (3.9)	14.9 (4.3)	+11.1%	4.8 (1.4)	6.6 (2.4)	+37.3%	7.5 (2.8)	9.4 (3.6)	+25.6%	10.2 (1.8)	12.4 (2.2)	+21.4%
(s.e.)																		
<b>Country Total Gross Income Quintile</b>																		
I	27.8 (5.1)	29.0 (5.1)	+4.2%	20.5 (5.6)	22.2 (5.8)	+8.1%	33.6 (8.7)	33.2 (8.8)	+1.1%	67.7 (6.2)	68.4 (6.3)	+1.0%	22.4 (6.5)	24.7 (6.9)	+10.4%	48.4 (5.1)	49.4 (5.3)	+2.2%
(s.e.)																		
II	10.4 (3.1)	12.8 (3.7)	+22.7%	9.4 (3.8)	11.6 (4.6)	+23.4%	12.2 (4.8)	13.9 (4.6)	+13.7%	28.3 (4.1)	29.2 (4.4)	+3.3%	16.8 (4.2)	18.0 (4.1)	+6.8%	27.0 (3.5)	29.2 (3.6)	+8.3%
(s.e.)																		
III	6.7 (2.3)	8.5 (2.5)	+27.1%	6.4 (2.3)	8.1 (3.3)	+27.0%	6.7 (3.2)	8.0 (4.1)	+18.2%	14.1 (2.9)	16.2 (3.1)	+14.5%	9.0 (2.4)	9.6 (2.6)	+7.6%	15.0 (2.1)	17.2 (2.7)	+14.7%
(s.e.)																		
IV	3.2 (1.4)	4.6 (1.8)	+42.3%	4.6 (2.1)	6.0 (2.7)	+29.5%	5.2 (2.3)	6.7 (3.2)	+30.1%	5.2 (1.2)	5.8 (1.4)	+13.5%	2.9 (1.5)	3.3 (2.1)	+13.9%	13.3 (2.7)	14.9 (3.1)	+12.6%
(s.e.)																		
V	2.4 (1.1)	2.8 (1.3)	+13.9%	0.8 (.6)	2.1 (1.5)	+163.0%	2.8 (1.3)	3.1 (1.4)	+13.7%	1.3 (.5)	2.2 (1.1)	+75.9%	2.3 (1.2)	2.6 (1.3)	+13.1%	7.2 (1.9)	8.2 (2.1)	+14.1%
(s.e.)																		

Notes: Income shock "2" is defined as a 5% probability of employee losing their job if they are 35 to 54 years old and as a 10% probability if they are 16 to 34 years old or above 55 in the private sector. In this case, their labor income is replaced by unemployment benefits. The value of the unemployment benefits is calculated as a percentage of last earned labor income. The percentage is based, country by country, on the ratio of the average unemployment benefit and the average labor income and depends on the household status (couple vs. no couple). These averages are estimated with the HFCS dataset.

Table 10: Determinants of Becoming Over-Indebted after the Shocks

Odds-Ratios	Debt service-Income Ratio >= 30%				Debt service-Income Ratio >= 40%			
	"Shock 1"		"Shock 2"		"Shock 1"		"Shock 2"	
<b>Countries (ref: Austria)</b>								
Belgium	3.387	2.689	3.089	2.462	4.104	3.158	3.600	2.793
(s.e.)	(5.257)	(4.154)	(3.306)	(2.733)	(5.918)	(4.548)	(4.641)	(3.684)
Germany	2.162	2.421	1.840	2.056	2.217	2.479	2.100	2.387
(s.e.)	(3.163)	(3.674)	(2.109)	(2.497)	(3.258)	(3.662)	(3.064)	(3.576)
Spain	3.360	2.878	2.737	2.428	4.764	3.811	4.108	3.391
(s.e.)	(6.025)	(5.027)	(3.55)	(3.217)	(7.298)	(5.881)	(5.402)	(4.523)
France	2.606	2.678	2.223	2.237	3.171	3.136	2.795	2.748
(s.e.)	(4.228)	(4.41)	(2.528)	(2.657)	(4.379)	(4.328)	(3.081)	(3.042)
Greece	1.468	1.567	1.409	1.498	1.634	1.682	1.900	1.968
(s.e.)	(2.289)	(2.411)	(1.632)	(1.764)	(2.649)	(2.774)	(2.144)	(2.206)
Italy	2.467	2.555	2.094	2.396	2.878	3.074	2.604	3.068
(s.e.)	(4.083)	(4.246)	(2.448)	(2.859)	(4.225)	(4.593)	(2.929)	(3.522)
Luxembourg	4.609	4.500	3.823	3.947	3.394	3.300	3.421	3.466
(s.e.)	(7.785)	(7.964)	(4.622)	(5.108)	(5.688)	(5.544)	(4.095)	(4.166)
the Netherlands	1.857	1.616	1.817	1.573	2.042	1.735	1.906	1.614
(s.e.)	(3.341)	(2.877)	(2.069)	(1.872)	(4.035)	(3.449)	(3.168)	(2.774)
Portugal	2.829	2.192	2.217	1.824	3.065	2.335	2.517	1.986
(s.e.)	(4.363)	(3.381)	(2.259)	(1.911)	(4.223)	(3.379)	(3.02)	(2.48)
Slovakia	0.876	0.744	0.995	0.732	1.018	0.717	1.379	0.886
(s.e.)	(1.687)	(1.344)	(1.171)	(.829)	(2.32)	(1.594)	(2.433)	(1.57)
<b>Reference Person's Characteristics:</b>								
Male		1.537		1.306		1.603		1.446
(s.e.)		(.827)		(.503)		(.765)		(.499)
<b>Age (ref. 16-34):</b>								
35-44		0.973		0.432 **		0.731		0.372 *
(s.e.)		(.561)		(.172)		(.317)		(.195)
45-54		0.955		0.412 *		0.837		0.409
(s.e.)		(.61)		(.205)		(.562)		(.259)
55+		0.323		0.269 *		0.255		0.267
(s.e.)		(.3)		(.189)		(.283)		(.254)
<b>Education (ref. Primary or No Education):</b>								
Secondary		1.005		1.162		1.103		1.174
(s.e.)		(.486)		(.57)		(.436)		(.418)
Tertiary		0.992		1.188		1.275		1.376
(s.e.)		(.747)		(.828)		(.723)		(.765)
<b>Housing Status (ref. Owner-Outright):</b>								
Owner-with Mortgage		2.000		2.098		2.109		2.264 *
(s.e.)		(1.25)		(1.095)		(1.13)		(1.057)
Renter or Other		0.427		0.484		0.362		0.419
(s.e.)		(.409)		(.331)		(.413)		(.346)
<b>Household Characteristics:</b>								
Number of children		1.013		1.007		1.019		1.026
(s.e.)		(.292)		(.238)		(.263)		(.271)
Number of household members		0.795		0.882		0.799		0.860
(s.e.)		(.23)		(.206)		(.218)		(.225)
couple		0.724		0.724		0.654		0.636
(s.e.)		(.424)		(.345)		(.346)		(.286)
Log of total gross income		0.836		0.810		0.743		0.722 *
(s.e.)		(.312)		(.167)		(.236)		(.126)
Constant	0.005 ***	0.043	0.007 ***	0.129	0.003 ***	0.113	0.005 ***	0.282
(s.e.)	(.007)	(.151)	(.007)	(.242)	(.005)	(.395)	(.006)	(.652)
Number of countries	16539	16523	16537	16537	17841	17825	17839	17823

Figure 1: Unemployment Rate, 2000-2013, Euro Area, 2013 Top/Bottom Countries (source: Eurostat)

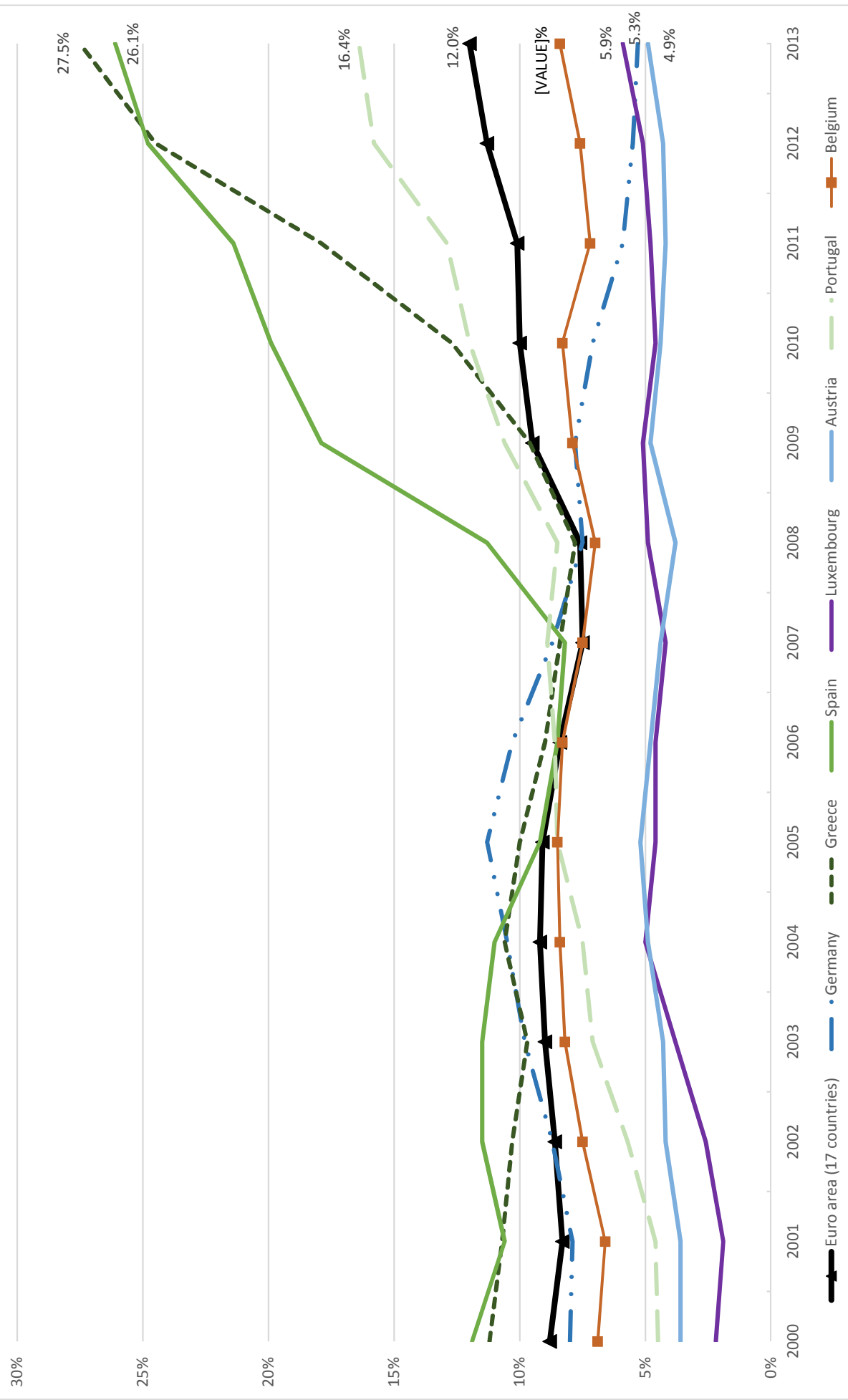


Figure 2: Debt Service-Income Ratio over 40% of Monthly Household Income, EA & by Country: before and after an employment shock

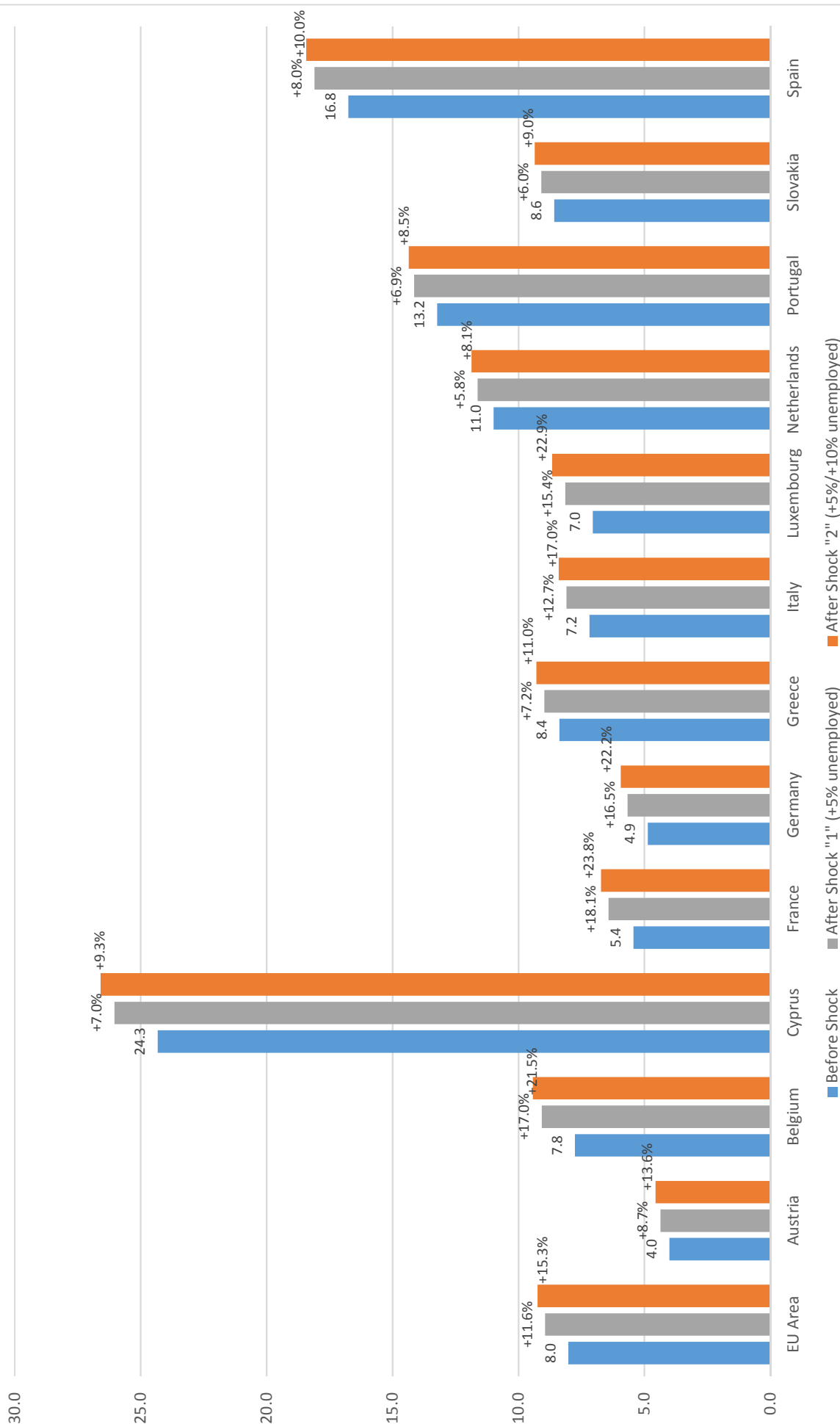
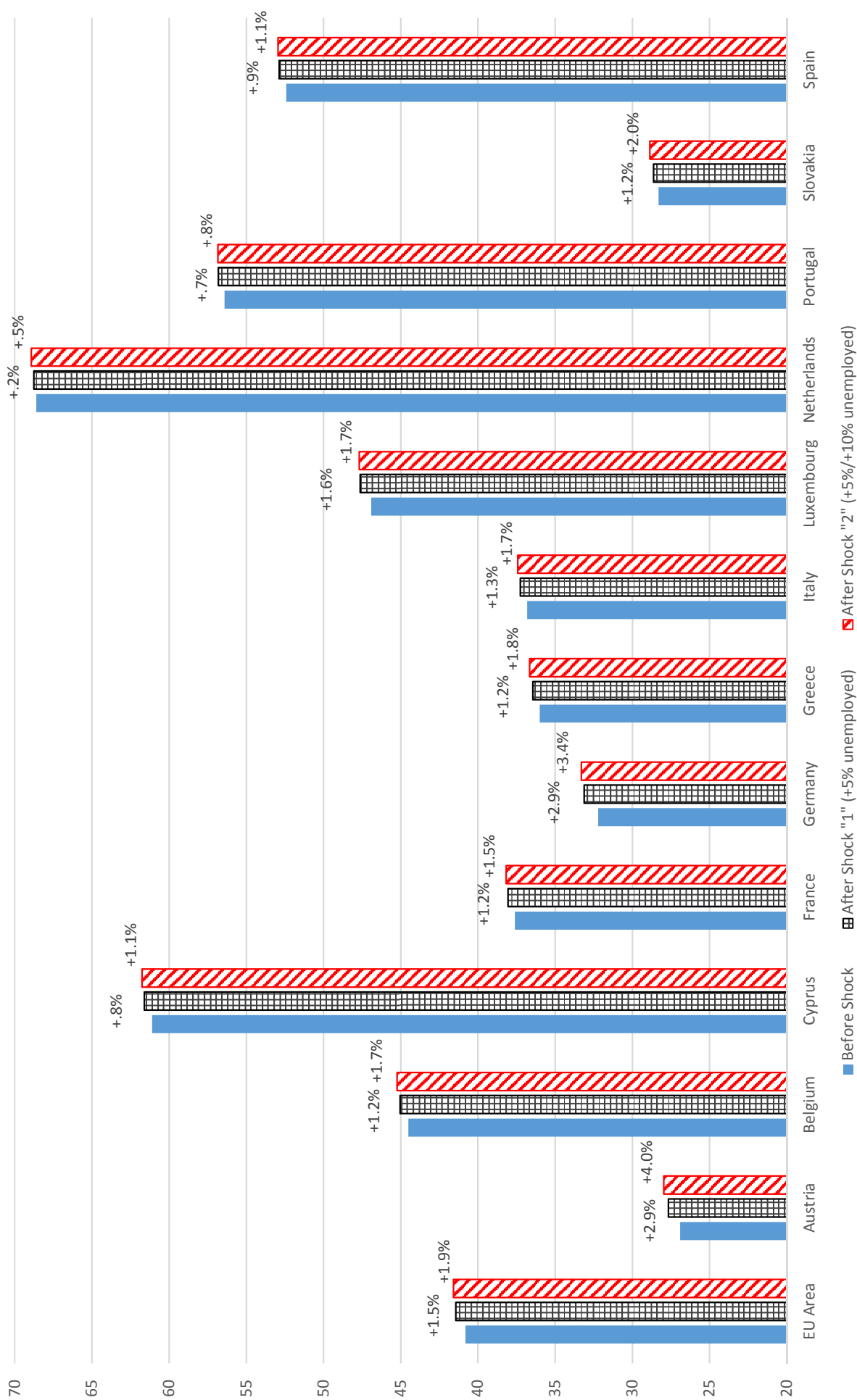


Figure 3: Debt-Income Ratio over 100% of Household Income, EA & by Country: before and after an employment shock



Annex 1: Debt service to income ratio >= 30 %, all indebted households , All-countries Regressions (logit)

<i>Odds-Ratios</i>	Model A	Model B	Model C	Model D	Model E	Model F	Model G
<b>Labor Market Characteristics (ref. Employee):</b>							
Self-Employed	2.040 ***	2.034 ***	2.104 ***	2.083 ***	2.073 ***	2.404 ***	2.158 ***
(s.e.)	(.233)	(.246)	(.257)	(.246)	(.249)	(.315)	(.255)
Unemployed	1.659 ***	1.430 ***	1.362 **	2.032 ***	1.397 **	0.777 *	1.818 ***
(s.e.)	(.224)	(.187)	(.184)	(.278)	(.189)	(.113)	(.269)
Retired	0.706 ***	0.740 **	0.821	0.880	0.799 *	0.614 ***	0.919
(s.e.)	(.084)	(.093)	(.198)	(.114)	(.105)	(.081)	(.217)
Other*	1.370	1.408 *	1.394	2.203 ***	1.399	0.618 **	1.904 ***
(s.e.)	(.267)	(.289)	(.29)	(.458)	(.29)	(.145)	(.407)
<b>Reference Person's Characteristics:</b>							
Male			0.959				0.983
(s.e.)			(.086)				(.108)
Age (ref. 16-34):							
35-44			1.058				0.834
(s.e.)			(.129)				(.113)
45-54			0.792 *				0.712 **
(s.e.)			(.109)				(.108)
55-64			0.824				0.779
(s.e.)			(.157)				(.156)
65+			0.795				0.683
(s.e.)			(.222)				(.194)
Education (ref. Primary or No Education):							
Secondary			0.812 *				0.722 ***
(s.e.)			(.092)				(.083)
Tertiary			0.817 **				0.626 ***
(s.e.)			(.083)				(.064)
<b>Housing Status (ref. Owner-Outright):</b>							
Owner-with Mortgage				2.713 ***			2.620 ***
(s.e.)				(.309)			(.32)
Renter or Other				0.648 ***			0.517 ***
(s.e.)				(.095)			(.079)
<b>Household Characteristics:</b>							
Number of children in household (0-15)					1.124 ***		1.059
(s.e.)					(.047)		(.057)
Number of household members 16+					0.829 ***		0.859 **
(s.e.)					(.053)		(.06)
couple					1.045		0.791 *
(s.e.)					(.12)		(.104)
Log of total gross income						0.468 ***	
(s.e.)						(.036)	
Constant	0.145 ***	0.058 ***	0.077 ***	0.034 ***	0.076 ***	164.4 ***	0.097 ***
(s.e.)	(.008)	(.019)	(.027)	(.012)	(.027)	(129.672)	(.04)
Country FE	no	yes	yes	yes	yes	yes	yes
Number of Observation	19429	19429	19429	19429	19429	19389	19429



## Annex 2: Debt service to income ratio &gt;= 40 % (all indebted households) , All-countries Regressions (logit)

<i>Odds-Ratios</i>	Model A	Model B	Model C	Model D	Model E	Model F	Model G
<b>Labor Market Characteristics (ref. Employee):</b>							
Self-Employed	2.735 ***	2.735 ***	2.829 ***	2.779 ***	2.795 ***	3.353 ***	2.861 ***
(s.e.)	(.38)	(.394)	(.407)	(.386)	(.403)	(.523)	(.403)
Unemployed	2.286 ***	1.984 ***	1.872 ***	2.599 ***	1.896 ***	0.882	2.298 ***
(s.e.)	(.373)	(.325)	(.314)	(.424)	(.326)	(.175)	(.411)
Retired	0.948	1.007	1.169	1.155	1.074	0.811	1.284
(s.e.)	(.15)	(.164)	(.389)	(.196)	(.187)	(.139)	(.424)
Other*	1.726	2.088 *	1.952	3.284 ***	1.998 *	0.350	2.740 **
(s.e.)	(.678)	(.843)	(.8)	(1.382)	(.823)	(.228)	(1.167)
Permanently disabled	1.706	1.418	1.397	2.048	1.359	0.662	1.813
(s.e.)	(.878)	(.741)	(.758)	(1.1)	(.715)	(.381)	(.999)
Fulfilling domestic tasks	3.212 ***	2.812 ***	2.487 ***	3.525 ***	2.578 ***	1.335	2.627 ***
(s.e.)	(.983)	(.897)	(.818)	(1.149)	(.853)	(.497)	(.927)
<b>Reference Person's Characteristics:</b>							
Male			0.834				0.885
(s.e.)			(.099)				(.126)
Age (ref. 16-34):							
35-44			0.927				0.762
(s.e.)			(.146)				(.136)
45-54			0.861				0.816
(s.e.)			(.151)				(.152)
55-64			0.863				0.860
(s.e.)			(.246)				(.245)
65+			0.700				0.633
(s.e.)			(.269)				(.244)
Education (ref. Primary or No Education):							
Secondary			0.811				0.739 **
(s.e.)			(.115)				(.106)
Tertiary			0.795				0.647 ***
(s.e.)			(.121)				(.103)
<b>Housing Status (ref. Owner-Outright):</b>							
Owner-with Mortgage				2.221 ***			2.181 ***
(s.e.)				(.344)			(.369)
Renter or Other				0.686 *			0.560 ***
(s.e.)				(.145)			(.119)
<b>Household Characteristics:</b>							
Number of children in household (0-15)					1.113		1.092
(s.e.)					(.077)		(.09)
Number of household members 16+					0.851 *		0.860
(s.e.)					(.076)		(.08)
couple					0.890		0.742 *
(s.e.)					(.139)		(.129)
Log of total gross income						0.382 ***	
(s.e.)						(.042)	
Constant	0.065 ***	0.032 ***	0.047 ***	0.021 ***	0.043 ***	703.5 ***	0.061 ***
(s.e.)	(.005)	(.015)	(.021)	(.01)	(.022)	(820.2)	(.033)
Country FE	no	yes	yes	yes	yes	yes	yes
Number of Observation	19429	19429	19429	19429	19429	19389	19429

Annex 3: Debt to income ratio  $\geq 1$ , All-countries Regressions (logit)

<i>Odds-Ratios</i>	Model A	Model B	Model C	Model D	Model E	Model F	Model G
<b>Labor Market Characteristics (ref. Employee):</b>							
Self-Employed	1.244 **	1.310 ***	1.384 ***	1.338 ***	1.340 ***	1.343 ***	1.490 ***
(s.e.)	(.123)	(.134)	(.145)	(.143)	(.141)	(.138)	(.173)
Unemployed	0.709 ***	0.672 ***	0.758 **	1.285 **	0.690 ***	0.599 ***	1.346 **
(s.e.)	(.075)	(.073)	(.086)	(.165)	(.079)	(.067)	(.184)
Retired	0.508 ***	0.488 ***	0.806	0.557 ***	0.567 ***	0.480 ***	1.008
(s.e.)	(.039)	(.04)	(.107)	(.054)	(.05)	(.039)	(.142)
Other*	0.916	0.715 *	0.913	1.704 **	0.801	0.636 **	1.831 ***
(s.e.)	(.154)	(.124)	(.162)	(.361)	(.141)	(.118)	(.364)
<b>Reference Person's Characteristics:</b>							
Male			1.079				0.949
(s.e.)			(.081)				(.087)
Age (ref. 16-34):							
35-44			1.168 *				0.641 ***
(s.e.)			(.104)				(.076)
45-54			0.815 **				0.500 ***
(s.e.)			(.077)				(.066)
55-64			0.564 ***				0.343 ***
(s.e.)			(.069)				(.053)
65+			0.602 ***				0.330 ***
(s.e.)			(.11)				(.07)
Education (ref. Primary or No Education):							
Secondary			1.112				0.923
(s.e.)			(.083)				(.082)
Tertiary			1.910 ***				1.324 ***
(s.e.)			(.155)				(.126)
<b>Housing Status (ref. Owner-Outright):</b>							
Owner-with Mortgage				6.240 ***			5.529 ***
(s.e.)				(.524)			(.464)
Renter or Other				0.459 ***			0.317 ***
(s.e.)				(.059)			(.048)
<b>Household Characteristics:</b>							
Number of children in household (0-15)					1.251 ***		1.120 **
(s.e.)					(.041)		(.052)
Number of household members 16+					0.796 ***		0.850 ***
(s.e.)					(.03)		(.042)
couple					1.480 ***		0.875
(s.e.)					(.107)		(.084)
Log of total gross income						0.920 *	
(s.e.)						(.046)	
Constant	0.742 ***	0.409 ***	0.337 ***	0.160 ***	0.429 ***	1.0	0.459 **
(s.e.)	(.027)	(.083)	(.082)	(.044)	(.096)	(.549)	(.167)
Country FE	no	yes	yes	yes	yes	yes	yes
Number of Observation	19423	19423	19423	19423	19423	19389	19423

## Annex 4: Debt to asset ratio&gt;=75% , All-countries Regressions (logit)

<i>Odds-Ratios</i>	Model A	Model B	Model C	Model D	Model E	Model F	Model G
<b>Labor Market Characteristics (ref. Employee):</b>							
Self-Employed	0.407 ***	0.439 ***	0.542 ***	0.523 ***	0.448 ***	0.480 ***	0.587 **
(s.e.)	(.09)	(.099)	(.121)	(.116)	(.102)	(.115)	(.131)
Unemployed	2.980 ***	3.340 ***	2.959 ***	2.239 ***	2.933 ***	2.050 ***	2.014 ***
(s.e.)	(.456)	(.498)	(.479)	(.358)	(.431)	(.332)	(.33)
Retired	0.431 ***	0.416 ***	0.923	0.548 ***	0.416 ***	0.347 ***	0.938
(s.e.)	(.056)	(.056)	(.195)	(.087)	(.061)	(.05)	(.229)
Other*	4.518 ***	3.680 ***	2.519 ***	2.212 ***	3.001 ***	1.709	1.740 *
(s.e.)	(1.202)	(1.008)	(.773)	(.637)	(.903)	(.598)	(.562)
Permanently disabled	2.743 ***	2.239 **	2.852 ***	1.594	1.756	1.298	1.654
(s.e.)	(1.029)	(.844)	(1.075)	(.631)	(.632)	(.461)	(.657)
Fulfilling domestic tasks	1.406	1.245	0.977	1.154	0.961	0.766	0.890
(s.e.)	(.568)	(.5)	(.373)	(.49)	(.37)	(.344)	(.367)
<b>Reference Person's Characteristics:</b>							
Male			0.715 ***				0.898
(s.e.)			(.073)				(.1)
Age (ref. 16-34):							
35-44			0.498 ***				0.650 ***
(s.e.)			(.063)				(.096)
45-54			0.337 ***				0.537 ***
(s.e.)			(.046)				(.079)
55-64			0.265 ***				0.490 ***
(s.e.)			(.049)				(.095)
65+			0.175 ***				0.307 ***
(s.e.)			(.046)				(.093)
Education (ref. Primary or No Education):							
Secondary			0.621 ***				0.651 ***
(s.e.)			(.073)				(.076)
Tertiary			0.452 ***				0.563 ***
(s.e.)			(.069)				(.084)
<b>Housing Status (ref. Owner-Outright):</b>							
Owner-with Mortgage				9.545 ***			9.459 ***
(s.e.)				(2.854)			(2.866)
Renter or Other				41.141 ***			32.008 ***
(s.e.)				(12.425)			(9.795)
<b>Household Characteristics:</b>							
Number of children in household (0-15)					1.108 *		1.058
(s.e.)					(.064)		(.071)
Number of household members 16+					0.736 ***		0.901
(s.e.)					(.052)		(.063)
couple					0.639 ***		0.723 **
(s.e.)					(.085)		(.098)
Log of total gross income						0.501 ***	
(s.e.)						(.045)	
Constant	0.200 ***	0.257 ***	0.972	0.012 ***	0.562 **	372.4 ***	0.047 ***
(s.e.)	(.012)	(.049)	(.273)	(.005)	(.133)	(366.1)	(.022)
Country FE	no	yes	yes	yes	yes	yes	yes
Number of Observation	19445	19445	19445	19445	19445	19389	19445

Annex 5: Debt to income ratio  $\geq 3$  , All-countries Regressions (logit)

<i>Odds-Ratios</i>	Model A	Model B	Model C	Model D	Model E	Model F	Model G
<b>Labor Market Characteristics (ref. Employee):</b>							
Self-Employed	1.547 ***	1.694 ***	1.895 ***	1.713 ***	1.744 ***	1.952 ***	1.964 ***
(s.e.)	(.19)	(.222)	(.254)	(.221)	(.23)	(.267)	(.255)
Unemployed	1.096	1.046	1.073	1.627 ***	1.010	0.561 ***	1.610 ***
(s.e.)	(.146)	(.143)	(.154)	(.239)	(.139)	(.085)	(.246)
Retired	0.515 ***	0.505 ***	0.782	0.582 ***	0.554 ***	0.432 ***	0.945
(s.e.)	(.07)	(.071)	(.192)	(.086)	(.083)	(.064)	(.236)
Other*	0.852	0.791	0.665	1.665	0.768	0.273 ***	1.307
(s.e.)	(.296)	(.283)	(.255)	(.663)	(.276)	(.109)	(.502)
Permanently disabled	1.035	0.662	0.919	1.223	0.640	0.389 **	1.568
(s.e.)	(.367)	(.248)	(.348)	(.478)	(.243)	(.166)	(.61)
Fulfilling domestic tasks	1.279	0.854	0.990	1.099	0.822	0.515 *	1.017
(s.e.)	(.38)	(.273)	(.352)	(.394)	(.287)	(.18)	(.437)
<b>Reference Person's Characteristics:</b>							
Male			0.937				0.952
(s.e.)			(.088)				(.099)
Age (ref. 16-34):							
35-44			0.741 ***				0.499 ***
(s.e.)			(.085)				(.062)
45-54			0.499 ***				0.365 ***
(s.e.)			(.061)				(.048)
55-64			0.375 ***				0.275 ***
(s.e.)			(.069)				(.055)
65+			0.473 ***				0.291 ***
(s.e.)			(.136)				(.089)
Education (ref. Primary or No Education):							
Secondary			0.992				0.856
(s.e.)			(.107)				(.097)
Tertiary			1.274 **				0.908
(s.e.)			(.135)				(.102)
<b>Housing Status (ref. Owner-Outright):</b>							
Owner-with Mortgage				3.333 ***			2.951 ***
(s.e.)				(.48)			(.413)
Renter or Other				0.507 ***			0.293 ***
(s.e.)				(.099)			(.063)
<b>Household Characteristics:</b>							
Number of children in household (0-15)					1.182 ***		1.070
(s.e.)					(.051)		(.056)
Number of household members 16+					0.731 ***		0.834 **
(s.e.)					(.055)		(.063)
couple					1.097		0.671 ***
(s.e.)					(.133)		(.082)
Log of total gross income						0.530 ***	
(s.e.)						(.032)	
Constant	0.187 ***	0.101 ***	0.148 ***	0.054 ***	0.157 ***	77.8 ***	0.267 ***
(s.e.)	(.008)	(.034)	(.055)	(.019)	(.059)	(55.8)	(.121)
Country FE	no	yes	yes	yes	yes	yes	yes
Number of Observation	19423	19423	19423	19423	19423	19389	19423

Annex 6: Effects of Institutions on the odds of Overindebtedness across Labor Market Statutes (Spearman Correlations)

Institutions Odds-ratios	Duration of Foreclosure (1)		Taxation of Mortgage Payments (2)		Regulatory Loan- to-Value ratio (3)		Credit Conditions (4)		Financial Literacy (5)		Unemployment Insurance (6)	
	Duration	Cost	Tax Exemption	No limit to Deductibility	Existence	Limit	Fixed Interest rate	I-only- payments	Information on Borrowers	Economic Literacy	Maximum Duration	Replacement Rate
Reference Groupe	-0.24 (.5)	-0.60* (.08)	0.22 (.51)	0.37 (.26)	0.24 (.48)	0.18 (.59)	0.12 (.73)	0.65 (.03)	0.05 (.89)	-0.23 (.49)	0.42 (.2)	0.43 (.18)
Self-Employed	-0.07 (.84)	-0.55 (.12)	0.30 (.37)	0.67** (.02)	-0.24 (.48)	-0.18 (.59)	0.12 (.73)	0.77*** (.005)	0.51 (.14)	0.26 (.45)	0.21 (.53)	0.00 (.99)
Retired	0.29 (.42)	0.27 (.48)	0.00	-0.15 (.66)	-0.06 (.86)	0.12 (.72)	-0.18 (.6)	0.06 (.85)	-0.54* (.1)	-0.08 (.82)	0.11 (.74)	-0.44 (.17)
Other Not	0.49 (.15)	0.37 (.33)	0.22 (.51)	0.00	-0.42 (.2)	-0.29 (.39)	-0.24 (.48)	-0.06 (.85)	-0.12 (.75)	0.20 (.55)	-0.37 (.26)	-0.43 (.18)
Working												
Observations:	11	11	11	11	11	11	11	11	11	11	11	11

Notes: P in parentheses; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Pearson correlation coefficients and p values (in parentheses) between labor market status odds ratios from country regressions (Table 5) and Institutional characteristics. Institutional variables cover: (1) Duration of Foreclosure which is the process of taking possession of a mortgaged property as a result of the failure to keep up mortgage payments (Duration: the typical duration of a foreclosure procedure number of months; Cost: Typical cost of foreclosure (% of loan)); (2) Taxation of Mortgage Payments (Tax Exemption: Existence of a tax exemption; No Limit to Deductibility: Absence of a limit to deductibility); (3) Regulatory Loan-to-Value ratio (Existence: Existence of LTV limit; Limit: the value of the limit measured as the percentage of the value of the property); (4) Credit Conditions (Fixed Interest rate: Part of mortgage loans with first fixed-interest period longer than 10 years > 50%; I-only-payments: Part of mortgage loans with interest only payment (at least in the initial 3 years) > 10%); (5) Financial Literacy (Information on Borrowers: Depth of credit information index (scale 0-6); Economic Literacy: Economic literacy (avg 1995-2009)); (6) Unemployment Insurance (Maximum Duration in months; Replacement Rate refers to gross earnings except for Austria and Germany; see Boeri and van Ours (2013) for a complete description).

## Annex 7: Unemployment Insurance Benefits: Replacement Rates by Household Status & Country

	Couple	no Couple
<b>Countries:</b>		
Austria	16.4%	25.5%
Belgium	20.0%	28.1%
Cyprus	9.7%	10.9%
France	26.8%	31.5%
Germany	16.1%	19.2%
Greece	10.7%	17.3%
Italy	16.9%	17.3%
Luxembourg	21.1%	32.8%
Netherlands	34.5%	28.6%
Portugal	29.7%	29.8%
Slovakia	44.2%	18.2%
Spain	26.2%	26.6%

Notes: The replacement rates applied are estimated separately for each country based on the HFCS dataset and depend on household status (couple vs. no couple). Accordingly, their values are equal to the ratio of the average unemployment benefit and the average labor income in each country respectively.

Annex 8: Debt Service-Income Ratio over 30% of Monthly Household Income, EA &amp; by Country

(% above or equal to 30%)	EU Area	Austria	Belgium	Cyprus	France	Germany	Greece	Italy	Luxembourg	Netherlands	Portugal	Slovakia	Spain
Before Shock	14.1	6.1	12.9	35.1	12.4	8.7	14.2	12.9	14.5	16.0	21.9	14.0	28.2
(s.e.)	(.5)	(1.9)	(1.5)	(2.2)	(.6)	(1.)	(1.5)	(1.5)	(1.7)	(2.1)	(1.4)	(1.5)	(1.5)
After Shock "1" (+5% unemployed)	15.1	6.6	14.3	36.4	13.4	9.6	14.8	13.9	16.3	16.8	22.9	14.4	29.4
(s.e.)	(.5)	(1.9)	(1.6)	(2.4)	(.7)	(1.2)	(1.5)	(1.6)	(1.8)	(2.)	(1.4)	(1.5)	(1.6)
<i>an increase of</i>	<i>+7.4%</i>	<i>+8.7%</i>	<i>+10.8%</i>	<i>+3.8%</i>	<i>+8.3%</i>	<i>+10.7%</i>	<i>+4.5%</i>	<i>+7.5%</i>	<i>+12.6%</i>	<i>+4.8%</i>	<i>+4.7%</i>	<i>+3.1%</i>	<i>+4.3%</i>
After Shock "2" (+5%/+10% unemployed)	15.5	6.9	14.9	37.0	13.8	9.9	15.1	14.2	16.9	17.1	23.2	14.7	29.8
(s.e.)	(.6)	(1.9)	(1.6)	(2.4)	(.7)	(1.2)	(1.5)	(1.6)	(1.9)	(2.1)	(1.4)	(1.5)	(1.6)
<i>an increase of</i>	<i>+9.9%</i>	<i>+13.1%</i>	<i>+15.5%</i>	<i>+5.3%</i>	<i>+11.4%</i>	<i>+14.4%</i>	<i>+6.7%</i>	<i>+10.4%</i>	<i>+16.8%</i>	<i>+7.1%</i>	<i>+5.8%</i>	<i>+5.0%</i>	<i>+5.5%</i>

Notes: Income shock "1" is defined as a 5% probability of employee losing their job in the private sector. Income shock "2" is defined as a 5% probability of employee losing their job if they are 35 to 54 years old and as a 10% probability if they are 16 to 34 years old or above 55 in the private sector. In this case, their labor income is replaced by unemployment benefits. The value of the unemployment benefits is calculated as a percentage of last earned labor income. The percentage is based, country by country, on the ratio of the average unemployment benefit and the average labor income and depends on the household status (couple vs. no couple). These averages are estimated with the HFCS dataset.

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Registered office: boulevard de Berlaimont 14 – BE-1000 Brussels  
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Layout: Analysis and Research Group  
Cover: NBB AG – Prepress & Image

Published in February 2016