The Distribution of Debt Across Euro Area Countries:

The Role of Individual Characteristics, Institutions and Credit Conditions*

Olympia Bover[a§], Jose Maria Casado[a], Sonia Costa[b], Philip Du Caju[c], Yvonne McCarthy[d], Eva Sierminska[e], Panagiota Tzamourani[f], Ernesto Villanueva[a] and Tibor Zavadil[g ‡]

First Version: April 2013
This draft: February 2014

Abstract The aim of this paper is twofold. First, we present an up-to-date assessment of the differences across euro area countries in the distributions of various measures of debt conditional on household characteristics. We consider three different outcomes: the probability of holding secured debt, the amount of secured debt held and the interest rate paid on the main mortgage. Second, we examine the role of legal and economic institutions in accounting for these differences. We use data from the first wave of a new survey of household finances, the Household Finance and Consumption Survey, to achieve these aims. We find that the patterns of secured debt outcomes vary markedly across countries. Among all the institutions considered, the length of asset repossession periods best accounts for the features of the distribution of secured debt. In countries with longer repossession periods, the fraction of people who borrow is smaller, the youngest group of households borrow lower amounts (conditional on borrowing), and the mortgage interest rates paid by low-income households are higher. Regulatory loan-to-value ratios, the taxation of mortgages and the prevalence of fixed-rate mortgages deliver less robust results.

Keywords: Household debt and interest rate distributions, Time to Foreclose, Taxation, Loan-to-Value ratios, Fixed rate mortgages.

JEL: D14, G21, G28, K35.

*This paper is a shortened version of Bover et al. (2013). The original version studies the determinants of both secured and unsecured debt. The methods used in the working paper version include quantile regression models. Furthermore, the working paper examines additionally the response of debt profiles to the prevalence of interest-only mortgages and to measures of country-level financial literacy. The views expressed here are those of the authors and do not necessarily reflect those of the respective National Central Banks or the European Central Bank. We would like to thank Asa Johansson for providing data on pre- and after-tax mortgage interest rates and Richard Blundell and an anonymous referee for helpful comments. All remaining errors are our own.

§Corresponding author: Olympia Bover. *email* bover@bde.es

‡(a) Banco de España, (b) Banco de Portugal (c) Banque Nationale de Belgique (d) Central Bank of Ireland (e) CEPS / INSTEAD Research Institute (f) Bank of Greece and Deutsche Bundesbank (g) National Bank of Slovakia.

1 Introduction

New micro data reveal striking differences in the incidence, amount and cost of debt held by comparable households across countries in the Euro area. For example, nearly half of all Dutch households hold secured debt while only one in ten Italian households do. Debt-to-income ratios of Austrian debt holders are three times smaller than those of Dutch households. Age-cohort profiles of debt holding itself vary markedly across countries, being flat in Italy, steeply decreasing in Spain, and increasing in the Netherlands. The purpose of this paper is to document these differences and to find out to what extent they are associated with cross-country differences in legal and economic institutions.

We use the new Household Finance and Consumption Survey (HFCS), a harmonized survey that contains information on household demographics, debt, wealth and income across euro area countries. We also use quantitative indicators of institutions and credit conditions in the different countries. We proceed in two steps. In the first one, we run country–specific regressions of secured debt outcomes on a parsimonious set of household characteristics that includes age, schooling, labor status of core household members as well as household income and size. We examine three secured debt outcomes: the fraction of households with debt, the average amount borrowed and the interest rate on the mortgage that financed the house of residence.[1] In a second stage, we relate such country–specific estimates to various institutions and credit conditions. The country specific estimates we use are the probability of holding debt, the average amount of debt held and the interest rate paid by the reference group household as well as measures of the age-cohort, income, self-employment and schooling profiles.[2]

We mostly focus on those institutions that capture the legal or regulatory framework faced by borrowers and lenders. Hence, we examine legal enforcement of contracts – measured by the time needed to repossess a house –, several indicators of the tax treatment of mortgage payments, regulatory loan-to-value ratios (LTVs) at origination, the share of fixed-rate mortgages and depth of information about borrowers.[3] Other credit market outcomes, such as the sources of financing by lenders (like securitization) or credit conditions (such as specific mortgage types) are more likely to be endogenous outcomes of the legal and regulatory environment. We first conduct a separate analysis for each institution and then examine the robustness of the results in a multivariate setting.

We note three advantages of our strategy. Firstly, the two-step approach we follow leads to effects of the institutional variables on household debt outcomes that allow for endogeneity with respect to unobserved country effects, both additive and interacting with the remaining household characteristics. We argue that this strategy is less restrictive than alternatives that pool the data across countries and interact key household characteristics and institutional variables.

Secondly, we consider many institutions. We conduct one-by-one analyses of the impact of institutions on various debt outcomes. This permits both an empirical assessment of the merits of each institution in accounting for age and income profiles of borrowing, as well as an explicit comparison to the theoretical

[1] Among others, Georgarakos et al. (2010) or Crook and Hochguertel (2007) study the country-specific determinants of financial distress in EU countries (the former) and of the probability of loan rejections and the amount of debt (the latter, in a subset of Euro area countries but also including the US).

[2] The reference group is a two-person household with the median income in the country, where both members are aged between 35 and 44 years, have mid schooling levels, where the core member with the highest earnings is an employee, and the other core member works. In addition, the HFCS is a cross-section, so in the remainder of the paper we use the shorthand age-profile for what really is an age-cohort profile.

[3] ECB (2009), World Bank (2012) or Andrews and Caldera (2011) report the substantial heterogeneity of these institutions across countries in the Euro area.

and quantitative papers in the literature - that typically deal with one institution at a time. We also propose a multivariate analysis to establish which institutions matter most. This latter analysis is quite informative; when considered in isolation, certain institutions may correlate with the debt profiles we consider. However, this correlation may not hold in a multivariate setting when we consider the importance of a number of institutions simulataneously.

Finally, we assess the explanatory power of each institution by examining its impact on *three* debt outcomes: the fraction of households who borrow secured (the extensive margin), the amount of secured debt borrowed, conditional on borrowing (the intensive margin), and the cost of secured debt. By comparing the impact of an institution on the cost, incidence and amount of debt held, we obtain indications about the channel through which each institution affects borrowing behavior. For example, consider the impact of the time length of foreclosure procedures on borrowing outcomes. If shorter repossessions increase the incidence of secured borrowing while diminishing the relative cost of borrowing among one demographic group, one would expect that repossessions affect borrowing through a supply-side effect.

On the downside, our second stage is based on correlations using a sample of only eleven countries. This is necessarily so, because that is the variation available in the data - and the situation would be exactly the same in a pooled regression.

The findings of the first stage suggest that the age, income and education level of household members are important determinants of debt outcomes. In that context, we find evidence of a hump-shaped profile of secured debt holding over age-cohort groups. Specifically, the propensity to borrow peaks for cohorts aged 35-44 at the time of the survey, before the (cross-sectional) income profile peaks, possibly suggesting a role for secured debt in smoothing household consumption. Nevertheless, cross-country differences in the age, income and education profiles of borrowers are substantial. There is also substantial heterogeneity in how mortgage interest rates are related with income across countries.

Our findings from the second stage suggest that among all the institutions we consider, the length of repossession periods best explains the features of the distribution of debt we analyze. In countries with 15 months (one standard deviation) longer repossession procedures, and holding the rest of the characteristics constant at those of the reference group, the fraction of borrowers is 16 per cent smaller, the amount borrowed by the youngest set of households (conditional on borrowing) is 12 per cent lower, and the interest rates paid by low (high) income households are 0.3 percentage points higher (lower). These results are robust to the inclusion of other institutions. The analysis of the remaining institutions – regulatory LTVs, the taxation of mortgages, the availability of information about borrowers and the prevalence of fixed-rate mortgages (FRMs) – delivers less robust results. We interpret these results as suggesting that the supply of secured debt is affected by legal processes that delay the recovery of collateral in the case of non-repayment and furthermore, that banks react to expected losses due to longer repossession periods by pricing secured debt differently across income groups.

Theoretical and quantitative models have stressed the role of each of the institutions we consider in shaping the distribution of debt outcomes among age or income groups. In particular, the models of Chambers et al. (2009a) and Ortalo-Magné and Rady (1999, 2006) analyze the impact of LTV ratios on the chances of young and low-income households holding debt. Another strand of the literature discusses how the supply and distribution of debt is affected by bank losses in the event of non-repayment, measured as the opportunity and uncertainty costs of longer repossession processes (Jappelli et al. 2005), or by the

presence of the bankruptcy option - Livshits et al. (2007), or Chatterjee et al. (2007). Gervais (2002) uses an OLG model to show that tax exemptions for the implicit rents of owner occupied housing and mortgage payments leads mid- and high-income households to anticipate housing consumption over the life cycle. Regarding the role of depth of information, Edelberg (2006) discusses the consequences of the increased possibilities of credit scoring that occurred during the 1990s in the US on the pricing of default risk and, ultimately, on the distribution of debt. Finally, the simulations of a life cycle model in Campbell and Cocco (2003) suggest that fixed rate mortgages are most attractive for households with riskier income profiles.

In sum, the theoretical literature stresses that legal enforcement, taxation of mortgages or credit market regulation affects the composition of borrowers and the distribution of the (individual-specific) price of debt. Hence, our analysis of how institutions correlate with different age or income profiles of debt outcomes extends previous empirical studies that disentangle the relative importance of law enforcement or of information about borrowers by using cross country regressions of total private sector debt-to-GDP ratios on indicators of law enforcement (Djankov et al. 2007, Jappelli et al. 2005).

An alternative empirical approach pools observations from different provinces or states within the same country to test if more generous state-level bankruptcy exemptions in the US - Gropp et al. (1997) - or lengthier repossession periods across Italian provinces -Fabbri and Padula (2003) - result in a lower amount of debt granted to low-asset households. Those studies interact wealth with the institution of interest. However, the theoretical models mentioned above predict that banks use all available information to price loans so that variation in repossession periods may affect the age or income profile, unlike what is assumed in those empirical studies.

The rest of this paper is structured as follows. The next section presents an overview of the data used in this paper. In Section 3 we discuss the empirical approach employed to examine debt across euro area countries. Section 4 presents the results from the first part of our empirical investigation. In Section 5 we present the results from the second part of the empirical analysis, where we assess the impact of institutions and credit conditions on the first stage results and compare the economic magnitude of our results to the previous literature. Finally, in Section 6, we conclude.

2 Data and descriptives

This paper uses newly available data from the first wave of the Household Finance and Consumption Survey (HFCS) to study household debt in euro area countries. The HFCS is a Eurosystem initiative aimed at collecting comparable micro-level information on household balance sheets. It is a unique survey in that it collects information on household income, assets, liabilities and consumption that is comparable across euro area countries. The first wave of the survey was conducted in 15 countries of the Eurosystem between end-2008 and mid-2011, with the majority of countries carrying the survey out in 2010.

The analysis in this paper is based on the HFCS data for only eleven of these countries since some of the variables important to this study are missing from the datasets in Cyprus, Finland, Malta and Slovenia. Full details of the sampling methodology employed for the HFCS are available in HFCN (2013).

2.1 Questions on household debt

The HFCS includes a number of questions on household debt, and these form the basis for the analysis. Households are asked to provide detailed information on the quantity and terms of debt secured on the household's main residence, and separately for loans secured on other properties.

Specifically, respondents are asked to provide information about the loan terms at the time of origination as well as current information such as the amount outstanding, the current interest rate and the monthly repayment. We focus on the current outstanding balance of debt secured against the main residence or some other property as well as the current interest rate applying to the first important loan collateralized on the house of residence.

Table 1 shows the proportion of households with secured debt, the secured debt to income ratio, and the current interest rate chargeable on the main mortgage, across the countries in the HFCS dataset.[4] The proportion of households with secured debt ranges from a low of around 10 per cent in Italy or Slovakia to a high of almost 45 per cent in the Netherlands. Households in the Netherlands hold the largest amount of secured debt as a proportion of their income, while households in Austria hold the lowest secured debt to income ratio.

Finally, Table 1 also presents an overview of the debt holdings, socio-economic and demographic characteristics of households in the sample. As discussed below, the summary statistics refer to the respondent when that person is single. In the case of a couple, the age reported is that of the eldest person in the couple, the education is that of the member with a highest level of schooling and the employment status is that of the person with the highest individual income. Table 1 reflects the substantial cross-country heterogeneity in variables likely to correlate with debt outcomes, such as income levels or the age of household members.

3 Empirical methodology

This paper has two aims; first, to identify differences across euro area countries in the relationship between household characteristics and three debt outcomes –the incidence of secured debt holding, the amount borrowed and the cost of debt. This is done by estimating country-specific equations, thus allowing for country effects both in the intercepts and slopes. Secondly, our study examines the role of institutions in accounting for these differences. In the second part, we regress a selection of the first-step coefficients on relevant country level legal and financial institutions.

3.1 Modelling background

The most stylized version of the permanent income model predicts that a consumer's desired nondurable consumption is proportional to his or her stream of future earnings, discounted at the lending or borrowing rate - with a proportionality factor that depends on preferences.[5] Holding such preference shifters

[4] In Table 1 we do not control for differences in fieldwork period across countries (but do so in our econometric analysis).

[5] See Dynan and Kohn (2007) for a related discussion. Note that those predictions are not specific of models without housing consumption. For example, if housing consumption could be adjusted costlessly, and preferences for non-durable goods and for housing services were homothetic, the desired amount of both goods would also depend on the discounted stream of future income.

constant, the desired amount of debt is then determined by a household's current income and by the discounted stream of future earnings. Those basic results highlight the need to control for variables like the household's current income as well as the age, level of education and the employment status of "core" household members.[6]

However, uncertainty about the borrower's ability to repay makes it likely that the pricing of debt is also affected by the bank's assessment of the borrower's risk, as reflected by age, earning capacity, or current assets. Furthermore, cross-country differences in the degree of legal enforcement or in access to past information about borrowers will then determine how the bank's assessment of risk is transmitted into risk pricing and, ultimately, the distribution of debt outcomes across groups of the population.

Our reduced form approach regresses the three outcomes of interest (incidence of debt, amount of debt held and the cost of debt) on the set of demographics and socio-economic variables mentioned above. The discussion in the preceding paragraphs suggests that country-specific estimates of the age, income or schooling profile of debt reflect a mixture of demand and supply-side factors.

The second step examines how country-specific institutions affect those coefficients separately. We infer if an institution affects debt outcomes through demand or supply channels by examining how a particular variable affects separately the incidence, amount and cost of debt. For example, one institution – say, the time length of foreclosure procedure - that increases the incidence of secured borrowing by a group and diminishes the relative cost of borrowing among that group may operate through a supply-side effect.

Finally, we deliberately ignore variables like household wealth because they are mechanically linked to household collateralized borrowing, where such loans require owning or purchasing a house (in the case of real wealth) or systematically vary around house purchases (the case of financial wealth, see Ejarque and Leth-Petersen, 2009). In a similar vein, we do not include housing price dynamics, as variation in the institutions we analyze in the second step have a separate impact on house prices through the credit market –see Ortalo Magné and Rady, 1999, 2006.

3.2 Modelling strategy

Namely, our first step is to run separate regressions on the micro-data of each country to obtain estimates $\widehat{\beta}_{0c}, \widehat{\beta}_{1c}, \widehat{\beta}_{2c}$ for each country c in an equation of the form (here there are only two household characteristics x_{1hc}, x_{2hc} for the sake of simplicity):

$$y_{hc} = \beta_{0c} + \beta_{1c} x_{1hc} + \beta_{2c} x_{2hc} + \varepsilon_{hc} \quad (c = 1, ..., C)$$

Where y_{hc} denotes one of three different outcomes in three different sets of regressions. In the first model, the outcome is $1(D_{hc}= 1)$, a dummy variable indicating the ownership of debt for household h in country c (where c=$AT, BE, DE, ..., SK$). The model is a Logit and we focus on the odds ratio for each variable of interest as that parameter is invariant to different values of the covariates. We also examine the probability of a common reference group holding debt across the countries in our sample.

[6] Preference factors are likely to vary across countries – impatience or the curvature of the utility function. Unfortunately, self-reported information on the degree of patience or risk aversion was not collected in all countries.

That group is formed by households comprising two core members in a couple and no other adults in the household, where the relevant core members are aged 35 to 44 years, have a medium education level, are both employed, and the household has the median income level in their country. Comparisons of the outcome of this group in different countries are free of composition bias.

In the second model, the outcome is the logarithm of the amount of secured debt held, conditional on having secured debt. We mainly use OLS regression techniques to assess the effect of the independent variables on the mean and variance of the log of secured debt. Furthermore, we also examine the cross-country variation in the log-amount of debt held by the reference group. In addition, a further regression of the absolute value of OLS residuals on the same regressors provides the effects on the variance of log secured debt. The model consisting of these two regression equations we call the location-scale model. We make no adjustment for the fact that the amount of debt cannot be negative.[7]

The third and final model in this first step of the analysis is identical to that of the log of the amount of debt, but uses the interest rate payable on the mortgage for the household's principal dwelling as the dependent variable.[8]

Our second step is to run a sequence of regressions on country-level data (11 observations), one for each β in the first step. For example, we obtain estimates $(\widehat{\gamma}_{20}, \widehat{\gamma}_{21})$ from a regression of the $\widehat{\beta}_{2c}$ on z_c , our measure of country-specific legal and financial institutions, credit conditions or financial literacy

$$\widehat{\beta}_{2c}=\gamma_{20}+\gamma_{21}z_c+v_{0c},$$

Where v_{0c} is an error term that captures unobserved country-level variables, as well as possible specification errors.

Inference about $(\widehat{\gamma}_{20}, \widehat{\gamma}_{21})$ can be performed by decomposing standard errors into two parts, one associated with the variance of v_{0c} - a source of error that arises if we interpret the 2^{nd} stage as estimating regressions in an underlying super population of countries. The second part takes into account the first step estimation error $\widehat{\beta}_c-\beta_c$.

However, in a separate specification, we regress on as many as seven institutions. In that case, we present standard errors that take into account only the sampling variability due to estimated $\widehat{\beta}_c-\beta_c$, implicitly assuming that the moment of interest is the within-sample regression of the first step coefficients on a set of country-specific institutions – not the relationship in the population of countries –see Appendix 1 in Bover et al. (2013).

[7] Sample selection corrections would rely heavily on functional form assumptions, which may or may not be convincing. In Bover et al. (2013) we examine whether quantile regression models of the logarithm of the debt amount capture non-linearities in the responses that could signal strong sample selection biases and conclude that in most cases, the heterogeneity in responses in QR models is adequately captured by a location scale model.

[8] To correct for differences in fieldwork periods across countries, we make some adjustments to the specifications when using the log debt amount and the interest rate as dependent variables. In the case of the debt amounts specification, we convert all monetary amounts to 2010 values by adjusting by the country-specific HICP index. In the case of interest rates, we adjust the reported interest rate by the change in the Euribor rate between the fieldwork period and the first quarter of 2010 multiplied by the country-specific share of adjustable mortgages.

Modeling of core household members and the reference group

We define the core household members as the respondent to the survey and his or her partner (if any). When there is only one core member we include his-her characteristics but in the case of couples we include information on both core members and relate their characteristics to each other. We do this by first defining the person of interest in the couple as that person with the highest value of the relevant independent variable and then capturing the difference between the two core members. This is a parsimonious way of modeling the characteristics of both members of the couple that focuses on the traits of the household as a group without requiring the definition of a "reference person", all of whose characteristics would be emphasized relative to other members.

The covariates included are listed in Table 2 and include four age dummies for the age of the oldest person (the omitted group is 35-44 years of age) as well as the age difference between members, two schooling dummies (the omitted group being secondary education) as well as an indicator of whether the core members have different schooling levels, four indicators of the labor status of the highest income earner (the omitted group being employee), an indicator of the presence of a partner, whether the partner works and, finally the logarithm of the number of adults (minus the log of 2) and the logarithm of income (minus the log of the median income in the country).

A digression: alternative modelling methods

The estimates $(\widehat{\gamma}_{20}, \widehat{\gamma}_{21})$ are identical to the estimates one would obtain from running a regression at household level, pooling all the countries, including country fixed effects not only as intercepts but also interacted with x_{1ic}. Such a pooled regression would be as follows:

$$y_{hc}=\beta_{0c}+\beta_{1c}x_{1hc}+\gamma_{20}x_{2hc}+\gamma_{21}z_c x_{2hc}+u_{hc} \tag{1}$$

This regression (and our second step estimates) takes into account that the institutional variables z_c may affect the impact of other socioeconomic characteristics simultaneously. Those effects are subsumed within the country effects β_{0c} and β_{1c}, which capture all country differences both observed and unobserved in the relationship, except for those operating through x_{2hc}.

An alternative to our two-step approach would be a pooled regression with, for example, additive country fixed effects but constraining $\beta_{kc}=\gamma^*_{k0}+\gamma^*_{k1}z_c$, where $k= 1, 2$.

$$y_{ic}=\beta^*_{0c}+\gamma^*_{01}z_c+\gamma^*_{10}x_{1hc}+\gamma^*_{11}z_c x_{1hc}+\gamma^*_{20}x_{2hc}+\gamma^*_{21}z_c x_{2hc}+u^*_{hc} \tag{2}$$

Note that equation (2) is a special case of equation (1) *but subject to the <u>additional</u> restriction* $\beta_{1c}=\gamma^*_{10}+\gamma^*_{11}z_c$. In this case the estimated effects $\widehat{\gamma}^*_{11}$ and $\widehat{\gamma}^*_{21}$ will have causal validity only under more restrictive conditions than $\widehat{\gamma}_{11}$ or $\widehat{\gamma}_{21}$. For example $\widehat{\gamma}^*_{11}$ and $\widehat{\gamma}^*_{21}$ allow for *additive* country effect endogeneity but not for country-effect endogeneity operating interactively through other household characteristics.[9]

[9] On a related note, Bryan and Jenkins (2013) recommend using a two-step approach similar to ours to analyze the impact of country-level variables on household-level outcomes. Using a series of Monte Carlo simulations conducted on a sample based on EU-SILC, the authors show that even single-step methods tailored to dealing with multi-level data deliver severely understated standard errors when the number of countries is around 10.

Interpretation of the coefficients

The weakest interpretation of our estimates $\widehat{\gamma}_{01}$, $\widehat{\gamma}_{11}$, $\widehat{\gamma}_{21}$ is that these reflect unbiased predictive (not causal) effects of the corresponding $\beta's$. In our view, assessing the predictive ability of institutional variables in explaining differences in debt held by comparable households across Euro-area countries is in itself of considerable economic interest.[10]

However, an alternative and stronger claim is that γ_{21} reflects the causal impact of the institution z_c on the borrowing profile defined by x_{2hc}. That interpretation requires ruling out endogeneity with respect to interacted country effects, arguably present in an observational cross-sectional setting such as ours. We note two points here. Firstly, as mentioned above the two step procedure we follow implies that each individual coefficient γ_{21} would be biased if an omitted institution were correlated with the interaction $z_c x_{2hc}$, but not if it were correlated with other country fixed effects or country slope effects. In that sense each individual estimated effect has a stronger claim to causal validity than any effect estimated from, for example, the pooled regression (2). Secondly, we check for the relevance of confounding country-specific factors by regressing $\widehat{\beta}_{2c}$ on several institutions z_c at the same time. By comparing the estimated impact of z_c on $\widehat{\beta}_{2c}$ across univariate and multivariate specifications we obtain indications of whether the estimated γ_{21} is causal.

Issues related to timing

Finally, it should be noted that while we examine cross-country variation in debt outcomes as of 2009-2010, the institutions are measured as of 2007. Arguably, we would need to measure institutions at the time the representative mortgage was signed. We mitigate this timing problem in two ways.

Firstly, to the extent that the institutions have been stable over time, the problem of different time periods is lessened by modeling the presence of an institution -such as the existence of tax deductibility of tax payments- instead of its quantification –following the example, the exact measure of the amount of tax relief. The reason is that the presence of an institution is a much more stable feature of the legislation than quantification.

Secondly, in discussing the impact of institutions on age profiles, we focus mainly on those age profiles up to 54 years of age and, in some instances, below 44 years of age. The reason is that these groups will arguably have borrowed using secured debt originated under current regulations.

Finally, an additional reason to focus on cohorts below 44 is that theory predicts differential debt responses at different stages of the life cycle, but little is known about cohort-specific responses. As groups below 44 years have had a similar exposure to the institutions that affect credit markets, and our regressions hold variables like income and schooling constant, the focus on age groups alleviates the biases associated with interpreting age-specific responses as life-cycle responses.

[10] To fix ideas, assume that there is a country-specific omitted characteristic like "thrift" that results both in a lower regulatory LTV and in a smaller response of the debt amount of young households to LTVs. In this scenario, our estimate of γ_{21} would not reflect a causal impact of LTVs on the indebtedness of the youth. However, the statement that "holding income and a wide set of demographics constant, in Euro area countries with lower LTV ratios, indebted youths borrow relatively less" would still be correct.

Interest rates

Interest rate fixation modes vary across the Euro area. Such heterogeneity poses problems in comparing the price of debt across countries because interest rates in FRMs may reflect risks associated with the evolution of aggregate interest rates, on top of issues about the quality of the borrower.

We note however that 8 of 11 countries specialize in one type of mortgage, implying that the country-specific first step coefficients we estimate are identified *for a given interest rate fixation regime.*[11] Hence, the coefficients in the 2^{nd} step regressions, when we use the share of FRMs as an independent variable, are informative about how variation in FRMs across countries accounts for cross-country variation in the distribution of the cost of debt or in debt outcomes.

4 First-stage results: the association between debt holdings and household characteristics

4.1 The probability of holding debt

The results of the first specification, where the dependent variable is binary and captures people who hold secured debt versus those who do not have secured debt, are shown in Figure 1 and Table 2. We present the probability of holding debt for the reference group, the country-specific odds ratios and the associated confidence intervals. The odds ratios should be interpreted relative to the omitted category for each group.[12]

Firstly, the chart in the top left corner of Figure 1 shows the probability of holding debt among the reference group specified earlier. The probability is highest for this type of household in Spain, where the probability of holding secured debt is approximately 65 per cent and lowest in Italy where this type of household has about a 10 per cent probability of holding secured debt.

In terms of the other charts in Figure 1, the results are in keeping with the existing literature on household debt; in general, the relationship between secured debt holding and age-cohort displays a humped shape, where the likelihood of holding secured debt generally increases up to the ages of 35 to 44 years and decreases thereafter. Higher income, higher levels of education and employment are also associated with a greater likelihood of holding secured debt in all countries.

The positive relationship between income and borrowing can partly be explained by the fact that secured debt is often tied to owner-occupied housing consumption, a normal good. The positive link between schooling and secured debt holding is also consistent with the basic life cycle model if one assumes that households with higher education are more likely to have higher future income. But these profiles display significant heterogeneity across countries.

[11] The exceptions being Germany (58% share of FRMs), Italy (40% share) and Luxembourg (38% share) –see ECB (2009).

[12] For example, in the case of the Netherlands, the odds ratio for the "age 45-54" variable is 1.52. Since the omitted category here is "age 35-44", this implies that the odds of holding secured debt among households where the eldest person is between 45 and 54 years is about 1.5 times that of households where the eldest person is between 35 and 44.

In the case of Austria, France, Germany or Portugal, for example, a head of household who is aged between 16 and 34 years has a lower chance of holding secured debt relative to 35 to 44 year olds (the omitted group); the odds ratio in these cases is around 0.5. In the Netherlands or Slovakia, however, the age-cohort profile is much flatter. The odds ratio is higher than 1 in the latter case, suggesting that the odds of holding secured debt are greater for households where the head is aged between 16 and 34 years relative to those aged between 35 and 44 years.

Finally, the fraction of borrowers does not change much with household income in the Netherlands and Slovakia but the income profile is much stronger in Germany, Spain, and Luxembourg.

We show the pseudo R-squared from our estimated regressions in the final chart in Figure 1 and it is relatively high in Belgium, at a value of close to 0.3 and lowest in Greece, at just under 0.1.

4.2 The amount of debt held

The country level results for the OLS regressions are presented in Figure 2 and Table 3 where we show the estimated coefficients and their confidence intervals, as well as the results from the location scale model that provides a test of heteroscedasticity. The omitted categories for the dummy variables are detailed in Section 3.2. The first chart on the top row of Figure 2 reports the results for the reference group.

Across all countries, the log amount of secured debt holdings is highest for households where the reference person is aged 16 to 34 years. Households with heads older than 45 years hold lower amounts of debt relative to the omitted group, 35 to 44 year olds. The full triangles below zero for the variable age 16-34 in Figure 2 are those of the location scale model and indicate that, conditional on covariates, the within-country dispersion of the logarithm of secured debt is lowest for households aged 16-34. However, the dispersion in log debt amounts increases among older cohorts - notice the blue triangles above zero for the rest of the age groups. A possible interpretation is that while young adults borrow a similarly (large) amount of funds early in the life cycle, the speed of repayment of this debt varies across households, resulting in a progressively higher dispersion of outstanding debt amounts over the life cycle.

Turning to the coefficients on the education variables, it is clear that higher education is associated with higher debt levels. The cross-country differences in the income profile of the amount of secured debt held are relatively similar to those corresponding to the fraction of borrowers and, as mentioned above, consistent with basic predictions of the permanent income model.

Finally, we show the R-squared value for the estimated regressions in the final chart of Figure 2 and Table 3. Similar to the first specification shown in Figure 1, we find that the value of the R-squared varies from a low of .11 in Italy and Spain to a high of .32 for Luxembourg.

4.3 Cost of secured debt

Interestingly, while interest rates vary little with demographic characteristics (see Figure 3), the cost of debt falls smoothly along the income distribution in all countries but in France, Italy, Portugal and Luxembourg, countries where the semi-elasticity of interest rates to household income is negative and statistically different from zero.

The estimates imply that a move of two standard deviations along the country specific income distribution decreases interest rates by 60 basis points in Italy, 24 in Portugal, 140 in Luxembourg and 32 in Greece. The negative relationship between interest rates and income is consistent with the hypothesis that banks price in a relatively higher expected probability of default among low income households by increasing the borrowing costs.

Finally, the interest rate payable by the reference group varies from a low of about 2.4 percent in Luxembourg, to a high of 4.6 per cent in Germany. However, the R-squared value is typically small, ranging from about .03 in Spain to .12 in Italy.

4.4 Summary

The results thus far suggest that socio-economic and demographic factors are important determinants of debt holdings. A possible interpretation of the results is that secured debt is a derived demand of housing, as it correlates strongly with income and, more tentatively, displays a significant schooling profile. In contrast, the probability of holding unsecured debt has much weaker income or schooling profiles – see Bover et al. (2013). The results in Arrondel et al. (2013) and Teppa et al. (2013) also point in the same direction, the former showing that the demand for real assets grows strongly with income while the latter finds a counterbalancing negative effect of income in the case of consumption debt. However, those profiles vary across countries.

Figure 4 illustrates the heterogeneity of age, income and schooling profiles by plotting a selection of predicted probabilities of holding secured debt, by country, for key covariates in our regressions. The chart shows three patterns. Firstly, cross-country differences in the fraction of borrowers with secured debt are most noticeable when we compare the reference groups – specifically, the 35-44 year age group. Secondly, the strong age-cohort effects in Spain, Belgium, Luxembourg and Portugal contrast with much flatter profiles in Austria, Italy, the Netherlands and Slovakia. Finally, while the fraction of borrowers increases rather slowly with current income in the Netherlands and Slovakia, the schooling profile of lending is relatively strong in these countries. On the other hand, the strong income profile of borrowing in Luxembourg or Spain contrasts with the weak schooling profiles in these countries. Taking schooling as a proxy for future income, the results suggest that banks in different countries value the household's earnings capacity in different horizons. The second step of the analysis examines the role of country level institutions in driving some of these differences.

5 Second stage results: the influence of institutions and credit conditions

5.1 The effect of institutions

The previous charts highlight the varying impacts of the socio-economic and demographic factors in explaining household debt behaviour across euro area countries. This section examines the role of institutions and credit conditions in driving the heterogeneity in these patterns. To do this, we regress each of the estimated effects from the first step covariates on each of the institutional variables of interest. Details of the institutions we use may be found in Appendix Tables A.1 and A.2.

In keeping with the presentation of the first stage results, we present the results of this stage in graphical form where we group the charts into three columns. In all of the figures that follow, the first column of charts shows the impact of the institutional variables on the odds of holding debt -the dependent variables correspond to the estimated coefficients shown in Figure 1 from the first step[13]. The second column of charts reports the effect of institutions on the amount of debt held (the dependent variables are the estimated OLS coefficients from the first step). The third and final column of charts reports the effect of institutions on the interest rate on the household's primary mortgage. The charts show the point estimates from the regressions, and the 95 per cent confidence intervals associated with these estimates. At this stage we focus mainly on those coefficients from the first step that are particularly interesting from a theoretical or empirical perspective.

We focus on five main institutions: "duration of foreclosure", "taxation of mortgage payments", "regulatory loan-to-values", "information about borrowers" and the "prevalence of fixed-rate mortgages". As mentioned above, there is a literature providing hints on how these institutions affect the distribution of debt. In addition, the first three institutions relate to the legal system where banks operate and are, in that sense, exogenous to the decisions of lenders or borrowers.[14]

Duration of foreclosure

Factors that increase the incidence and cost of lender's asset recovery process in the event of non-payment have an important impact on household debt holdings. Duration of repossession and bankruptcy are similar institutions in that respect. Chatterjee et al. (2007), Livshits et al. (2007) and Hintermeier and Koeniger (2011), for example, simulate the general equilibrium behaviour of US consumers in a world with bankruptcy and in another in which no such option is available. Their results suggest that lenders react to the increase in uncertainty in repayment in a world where bankruptcy is allowed by charging group-specific interest rates to unsecured loans. Due to their limited ability to save, the youth should be a riskier subpopulation, so lenders price this risk in by charging higher interest rates to this group.[15]

The first chart in Figure 5, for example, shows that a one-month delay in the time to repossess leads to a 0.7 percentage point reduction in the chances of holding secured debt, and this result is statistically significant at the 95 per cent confidence level. However, an increase in the duration of foreclosure tends to lead to a modest reduction in debt amounts held by the reference group.

Conditional on borrowing, the results in the second row of Figure 5 show that the youngest households borrow lower amounts than the reference group in countries where the repossession period is longer. On the other hand, the amounts borrowed by other age groups, up to age 64, tend to be unaffected by the repossession time (relative to the reference group).

Intuitively, one would expect that when repossession costs are higher, banks restrict their borrowing to "safe", high income households, perhaps by charging relatively lower rates to this group. The results

[13] The constant from the first step logit model was changed to a probability before running the second step regressions.

[14] In Bover et al. (2013), we examine the explanatory power of other country-specific institutions, such as financial literacy and the prevalence of interest-only mortgages. These institutions turned out to have very limited explanatory power when accounting for the variation in debt outcomes or their distribution across socio-demographic groups of the population. The measurement of the level of financial literacy of the overall population is still underway and comparable across countries high-quality measures are hard to obtain.

[15] We focus on the time required to foreclose on secured debt. In terms of the expected impact of these institutions on our results, it is important to bear in mind that the existing literature (mentioned above) focuses on unsecured debt holding, rather than secured debt. Our implicit assumption to take these predictions to the data is that long times to repossess make secured debt look like unsecured debt.

confirm the intuition; a one month longer repossession period increases the relative chances of holding debt among high income households, albeit the result is not significant. At the same time, a one month longer repossession period is associated with a relatively lower interest rate among high income households (when the difference between high and low income households is measured by the coefficient of log-income). The latter effect is precisely estimated.

It is worth noting that the three patterns highlighted in the text are also noticeable in the scatterplots in Figures 5A, 5B and 5C. The long repossession periods in Italy, Greece and Portugal result in a steep income profile of interest rates charged to households, while the short repossession periods in the Netherlands, Austria, Germany or Spain result in comparatively weaker income profiles.

Taxation of mortgage payments

We employ two measures of institutions relating to mortgage related taxation exemptions; firstly we examine cases where a tax deduction on mortgage interest payments on the main house of residence exists. We generate a dummy variable which equals one if such an exemption exists, and zero otherwise. Only two countries do not have such an exemption for owner-occupied housing – Germany and Slovakia, albeit Germany does have an exemption in the case of buy-to-let property. Secondly, for those countries where an exemption exists, we generate a dummy variable which equals one if there is no limit on the amount of interest payments subject to deductibility, and zero if a limit exists. We then regress the first step coefficients on both dummy variables in a bivariate regression. The results for the indicator of "exemption exists" are presented in the top panel of Figure 6 while we present the results for the indicator "no limit exists" in the bottom panel.

Gervais (2002) predicts that the introduction of a (partial) tax exemption on mortgage interest rate payments increases housing consumption and home ownership over the life cycle. Furthermore, compared to a situation where such incentives are not present, the increase in housing consumption happens through an anticipation of housing purchases over the life cycle.

The results shown in Figure 6 suggest that interest payment tax deductibility increases the chances that the reference household will hold secured debt by 17 percentage points, a large but imprecisely estimated coefficient.

Turning to the amount of debt held by the reference group, the existence of interest payment deductibility increases the amount of debt held by a considerable 34% (=exp(.29)-1), but the effect is again imprecise.

In countries with tax relief for mortgage interest payments, older households are less likely to hold secured debt, relative to the reference group. Furthermore, some age profiles can also be detected in the response of the debt amount, where the youngest group of households tends to hold more debt than the reference households, while older households tend to hold less.

On the contrary, there is no evidence of an income profile in the results. This is contrary to Gervais' predictions as any tax incentive would reinforce the role of higher marginal taxes in shaping debt outcomes.[16]

Financial regulation

Next we focus on regulatory loan-to-value (LTV) ratios. From a theoretical perspective, the models of Ortalo-Magné and Rady (OM-R) (1999, 2006) provide some predictions about the impact of LTV ratios on homeownership and secured debt holdings. In their model, a relaxation of the LTV ratio increases secured debt holding by individuals with a lower ability to save, the young, and especially those with lower income levels. Furthermore, the increased demand for first-time purchases by the credit-constrained young must be met by the property sales of older agents. Hence, the relaxation of the LTV increases the fraction of borrowers among the youth and could diminish borrowing among the elderly, thereby generating an age profile of debt holding. In the OM-R setup, a relaxation of the LTV ratio would mechanically lead to higher debt amounts among the youth.

On the other hand, Chambers et al. (2009) conduct simulations that argue that general equilibrium effects on the interest rate, ignored in the OM-R model, may dampen the impacts previously mentioned.

We run a regression on two variables at this stage; the first variable is the existence of a regulatory LTV limit. Among the sample of countries, such a limit exists in all but four countries – Austria, Belgium, the Netherlands and Luxembourg. Second, for those countries that have a regulatory LTV limit, we examine if the level of that limit helps to explain the variation in the effects of the socio-economic and demographic variables from the first stage regressions. The respective results are shown in Figure 7.

When we examine the reference group, it becomes apparent that the existence of a regulatory LTV does not affect the probability of borrowing, but reduces the amount of secured debt borrowed by 67 per cent. However, when an LTV exists, higher limits do not affect either of those outcomes.

Among countries that do have a regulatory LTV, a higher limit increases the relative chances of holding secured debt among very young households while reducing those of older age groups. That is one of the predictions of the OM-R model. However, the same logic would predict a negative impact of a higher regulatory LTV on the odds ratio of income, because a lower down-payment would allow lower income households to borrow. Our results do not support that basic prediction.

Finally, there is very limited evidence that changes in regulatory LTVs alter the cost of borrowing as among those countries with a maximum LTV ratio, a 10 per cent higher ratio is associated with a *drop*, not an increase, in the interest rate charged to the reference group. Hence, we cannot really argue that a general equilibrium effect dampens the impact of this institution on the distribution of debt outcomes.

Fixed interest rates

Campbell and Cocco (2003) solve a dynamic life-cycle model of the optimal consumption path and mortgage choice when household income is uncertain. In principle, borrowers with adjustable rate mortgages

[16] We repeated the exercise using a quantitative measure in Johansson (2012). The results on the probability of holding debt were similar and more precise than the ones we show but some of the results, such as the young borrowing more in countries with more generous tax exemptions did not hold using that variable.

are exposed to income risks, and these risks can be particularly large when interest rates are high and borrower income is relatively low. Campbell and Cocco show that borrowers who are risk averse or who have uncertain income may find fixed rate mortgages to be a more attractive mortgage choice.

In the context of the current study, the main empirically testable condition of the Campbell and Cocco model is that in countries where fixed rate mortgages are more prevalent, the households most exposed to income risk would have a higher chance of borrowing. To test this, the independent variable in our model is a dummy variable indicating if the proportion of mortgages on fixed interest rates for a period of longer than ten years is over 50 per cent. For the dependent variable, we use the first-step coefficients of self-employment status of the reference person – since the self-employed are subject to income fluctuations - as well as those of age, education level and income of the reference person. The underlying assumption is that low education or age could imply a higher exposure to unemployment risk. The results are presented in Figure 8.

We find no impact of the prevalence of FRMs on the propensity to hold secured debt by households in the reference group, or on the amount of secured debt borrowed. However, interest rates are 74 basis points higher in countries where more than 50% of mortgages were fixed rate as of 2007. On the other hand, in countries where more than 50% of all originations are FRMs, the youngest set of households is not relatively more likely to borrow – possibly because the cost of borrowing is higher in FRM countries for the youth.[17] Furthermore, a higher prevalence of FRMs does not increase borrowing among the less educated. In sum, only the self-employed seem to be more likely to borrow in countries where FRMs are prevalent.

Information on borrowers

Finally, Edelberg (2006) argues that better information allows banks to discriminate among borrowers and, possibly, to price in, at higher interest rates, consumers that may otherwise have their credit applications rejected. Without information on borrowers, banks may use "one size fits all" mortgages, whereby they reject the petitions of riskier profiles. With improved information, banks develop better scoring mechanisms, so that riskier profiles – for example, young or self-employed - can now be observed borrowing, paying above-average interest rates. It is less clear how borrower information might impact the amount of debt held once a borrower's credit application has been accepted because of the conflicting effects of the higher acceptance rates and the higher interest rate.

To account for borrower information, we employ a six-point "depth of credit information index" from the World Bank (2012). The results are shown in Figure 9. Interestingly, we do observe that younger (and possibly riskier) borrowers face higher borrowing costs, and borrow relatively less, in countries with better information about borrowers. For example, a 1 point increase in the depth of information raises interest rates charged to young households by 4 basis points and lowers those charged to 45-54 year olds and 55-64 year olds by 17 and 31 basis points, respectively –all estimates are relative to the impact on the reference group. In addition, we also show in the last row of Figure 9 that the self-employed (a group with risky incomes) pay 20 basis points higher interest rates in countries where the level of borrower information is (one-point) better.

[17] Young households pay 46 basis points higher interest rates in FRM countries than in ARM countries. The result is obtained combining the magnitude of the FRM coefficient of the interest rate paid by the reference group (73.9 basis points) with its impact on the differential rate paid by households aged age between 18 and 34 years of age (-28 basis points).

When we turn to the chances of borrowing, however, the estimates are weaker. For example, age groups who are charged lower rates borrow relatively more, but the coefficients are not statistically different from zero at the 95 percent confidence level. Overall, we cannot reject the hypothesis that, in countries with more information about borrowers, interest rates seem to serve as a screening mechanism.

5.2 Which institutions matter the most?

We conduct a robustness analysis including the five institutions considered thus far, namely "time to repossess", "taxation", "loan-to-value ratios", an indicator for "fixed rate mortgages exceeding 50 per cent of originations" as well as "depth of information". This is done by regressing each of the coefficients of interest on the set of five institutions at the same time. That regression contains 6 degrees of freedom, and we report the standard errors that take into account the estimation error from the first step only. The results are shown in Tables 6.

Variation in time to repossess correlates strongly with many of the patterns of interest even after holding the remaining institutions constant. Namely, a one month longer repossession period diminishes the chances that the reference group has secured debt by 1 per cent. Longer repossession periods diminish less the borrowing chances of households above 45 years of age than the chances of the 35-44 group. Finally, in terms of the amount borrowed (conditional on borrowing), a one month increase in repossession periods reduces the amount granted to the youngest households - with the rest of covariates held at those of the reference group - by 0.008 log points (0.005-0.013). Our results suggest that longer repossession periods affect the pricing of loans; in countries with longer repossession periods, banks charge relatively higher interest rates to low-income households, who, in principle, are most likely to default.

Mortgage tax exemptions do not robustly predict changes in the participation rate in the secured credit market. Nevertheless, conditional on borrowing, the average debt amount held by the reference group is 1.38 log points larger in countries without a limit on mortgage tax exemptions. The effect of tax deductions should, in principle, operate through demand-side effects.

The role of the rest of the institutions is less clear-cut. While a literature has stressed the role of the variation in LTVs in introducing quantity rationing in the credit market, our results suggest that the absence of regulatory LTVs *diminishes* the chances of borrowing and the amount borrowed by the reference group. On the other hand, the prevalence of FRMs correlates with higher interest rates charged to the reference group - the effect is 200 basis points. However, the fraction of borrowers within the reference group or the amount that this group borrows is not affected. Similarly, while information about borrowers accounts for the distribution of the cost of debt across age groups in the univariate analysis, that is no longer the case in the multivariate setting. Those results emphasize the value of the multivariate analysis: some institutions that appear to account for the distribution of debt when considered alone turn out to have a weaker impact when additional institutions are considered.

The magnitude of the estimates

Variation in the time to repossess seems to account for most of the variation in the chances of borrowing within the reference group. The standard deviation of time to respossess is 15 months in our sample. 15 months longer repossession periods decrease the probability of holding secured debt by between 10 and 16 percentage points – depending on whether we focus on our univariate or on the multivariate estimate.

The overall standard deviation of the predicted probability of holding secured debt by the reference group is 16 percentage points, slightly above the 15 percentage points estimated impact.

Using a cross-country and a cross-Italian province panel dataset, Djankov et al. (2007) and Jappelli et al. (2005) respectively assess the impact of various measures of legal enforcement, for which time to repossess is a proxy, on private sector debt-to-GDP ratios. Djankov et al. control, at the same time, for depth of information about borrowers. The authors document that a one year increase in the time to enforce a contract increases debt-to-GDP ratios by more than 7 percentage points.

While those previous results are hard to compare to ours, since we only consider household debt and use different dependent variables, the finding that a 1 month longer repossession period increases the fraction of borrowers by 1 percentage point does not seem at odds with the previous ones. However, and unlike Djankov et al. (2007), the results in Tables 6 and in Bover et al. (2013) suggest that "depth of information" correlates with certain features of the distribution of household debt when introduced alone in the second stage specification.

Regarding the cost of debt, we compare the predicted interest rate paid by households in the bottom income centile - with the rest of the covariates held constant at those of the reference group - in two countries: one with a 20 months repossession period (say, France) and another with a 5 months repossession period (like the Netherlands). To that end, we replace the country specific first stage income coefficient with interest rates in the left hand side by its projection on a constant and on the number of months to repossess -i.e., the fitted value in the second stage. In the country with 15 months longer repossession periods, the household in the lowest income decile and with the rest of the covariates held at those of the reference group, pays a 0.30 percentage points higher interest rate.

Finally, previous studies, like Chiuri and Jappelli (2003) have emphasized the role of quantity restrictions (the down-payment) in shaping the age profile of home ownership. Using a pool of countries, Jappelli et al. (2005) document a close-to-zero correlation between average mortgage interest rate spreads and judicial costs. However, using household level data on borrowing costs, we find that banks price in the risk of non-repayment by charging relatively higher mortgage interest rates to low income households.

6 Conclusions

This paper has studied the distribution of household secured debt outcomes across euro area countries and examined the role of institutions in explaining the heterogeneity in the impact of household socio-economic and demographic characteristics on these debt outcomes. In particular, we analyze the role of legal enforcement of contracts, tax treatment of mortgage payments, loan-to-value ratios and of information about borrowers in shaping the distribution of the fraction of borrowers with secured debt, the amount borrowed and the mortgage interest rate paid. To that end, we use a novel household dataset - the Household Finance and Consumption Survey, a coordinated effort of 15 countries to collect ex-ante harmonized data on household wealth, debt and income.

Our results show that the age, income and education level of household members are important demographic considerations. In this context, we find evidence of a hump-shaped profile of secured debt holding over age-cohort groups; the chances of borrowing peak for cohorts aged 35-44 years, before the (cross-sectional) income profile peaks, possibly suggesting a role for secured debt in smoothing household

consumption. However, there is considerable heterogeneity in the relative importance of these factors across the countries in our sample.

We find that the length of repossession periods best explains the features of the distribution of debt that we analyze. In countries with one standard deviation longer repossession procedures we find that the proportion of households with debt is 16 percentage points smaller, the amount borrowed by the youngest set of households (conditional on borrowing) is 12 per cent lower, and the interest rates paid by low income households are 0.3 percentage points higher when we evaluated impacts with the rest of the covariates evaluated for the reference group. These results are robust to the inclusion of other institutions. Cross country variation in regulatory LTVs, taxation of mortgage payments, the prevalence of FRMs or information about borrowers delivers less robust results. Such a lack of robustness highlights the importance of analysing the impact of several institutions at a time.

One interpretation of our results is that the supply of secured credit is affected by legal processes that delay the recovery of collateral in the case of non-repayment. In this case, banks react to expected losses due to longer repossession periods not necessarily by rationing quantities or rejecting applications, but also by pricing secured debt differently across income groups and charging relatively higher interest rates to low income households.

References

[1] Andrews, D. and A. Caldera Sánchez (2011). "The evolution of homeownership rates in selected OECD countries: demographic and public policy influences" OECD Journal: Economic Studies, OECD Publishing, Vol. 2011(1), pp. 1-37.

[2] Arrondel, L., L. Bartiloro, P. Fessler, M. Haliassos, P. Lindner, T. Mathä, F. Savignac, C. Rampazzi, T. Schmidt, M. Schürz, and P. Vermeulen (2013). "Asset holdings in the euro area: stylized facts and determinants from the HFCS dataset", mimeo.

[3] Blundell, R. and T. M. Stoker (1999). "Consumption and the Timing of Income Risk" *European Economic Review,* 43(3): 475–507

[4] Bover, O., J.M. Casado, S. Costa, P. Du Caju, Y. McCarthy, E. Sierminska, P. Tzamourani, E. Villanueva and T. Zavadil (2013) "The Distribution of Debt Across Euro Area Countries: The Role of Individual Characteristics, Institutions and Credit Conditions" Banco de España Working paper No. 1320.

[5] Bryan, M. and S. Jenkins, (2013) "Regression Analysis of Country Effects Using Multilevel Data: A Cautionary Tale" IZA Discussion Paper No. 7583.

[6] Campbell J. and J. Cocco, (2003). "Household risk management and optimal mortgage choice" *Quarterly Journal of Economics,* Vol 118(4), pp. 1449-1495.

[7] Chambers M., Garriga C. and D. Schlagenhauf, (2009a). "Accounting for changes in the home ownership rate" *International Economic Review,* Vol. 50(3), pp. 677-726.

[8] Chatterjee S, Corbae, D., Nakajima, M. and J. Ríos-Rull, (2007). "A quantitative theory of unsecured debt with risk of default" *Econometrica,* Vol 75(6), pp. 1525-1989.

[9] Chiuri C. and T. Jappelli, (2003). "Financial market imperfections and homeownership: a comparative study" *European Economic Review,* Vol.47, pp. 857-875.

[10] Crook, J. and S. Hochguertel (2007). "US and European household debt and credit constraints: comparative micro evidence from the last 15 years" Tinbergen Institute Discussion Papers 07-087/3, Tinbergen Institute.

[11] Djankov S., McLiesh C. and A. Shleifer (2007). "Private credit in 129 countries" *Journal of Financial Economics,* Vol. 84(2), pp. 299-329.

[12] Dynan K. and D. Kohn (2007). "The Rise in U.S. Household Indebtedness: Causes and Consequences" Finance and Economics Discussion Series Divisions of Research Statistics and Monetary Affairs. Federal Reserve Board, Washington, D.C.

[13] Edelberg W. (2006). "Risk-based pricing of interest rates for consumer loans" *Journal of Monetary Economics,* Vol. 53(8), pp. 2283-2298.

[14] Ejarque J. and S. Leth-Sorensen (2009). "Consumption and Savings of First Time House Owners" Manuscript, University of Copenhaguen.

[15] European Central Bank, (2009). "Housing finance in the euro area" Occasional Paper No. 101, March.

[16] Fabbri D. and M. Padula (2003). "Does poor legal enforcement make households credit-constrained?" manuscript, Cass Business School. http://www.cass.city.ac.uk/__data/assets/pdf_file/0003/106167/LegalInstitutionsCreditMarketandPovertyinItaly.pdf

[17] Georgarakos, D., Lojschova, A. and M. Ward-Warmedinger (2010). "Mortgage indebtedness and household financial distress" European Central Bank working paper No. 1156, February.

[18] Gervais M., (2002). "Housing taxation and capital accumulation" *Journal of Monetary Economics,* No. 49, pp. 1461–1489.

[19] Gropp R., Scholz K. and M. White (1997). "Personal bankruptcy and credit supply and demand" *Quarterly Journal of Economics*, 112(1), pp. 217–251.

[20] Household Finance and Consumption Network (HFCN), (2013). "The Eurosystem Household Finance and Consumption Survey – methodological report for the first wave", http://www.ecb.int/home/html/researcher_hfcn.en.html.

[21] Hintermeier T. and W. Koeniger, (2011). "Debt portfolios" IZA Working paper No. 5653.

[22] Jappelli T., Pagano M., and M. Bianco. (2005). "Courts and banks: effects of judicial enforcement on credit markets" *Journal of Money, Credit, and Banking*, 37(2), pp. 223-244.

[23] Livshits I., MacGee, J. and M. Tertilt, (2007). "Consumer bankruptcy: a fresh start" *American Economic Review,* Vol. 97(1), pp. 402-418.

[24] Ortalo-Magné F. and S. Rady, (1999). "Boom in, bust out, young households and the housing price cycle" *European Economic Review,* No. 43, pp. 755-766.

[25] Ortalo-Magné F. and S. Rady, (2006). "Housing market dynamics: on the contribution of income shocks and credit constraints" *Review of Economic Studies,* No.73, pp. 459-485.

[26] Teppa, F., M. Ziegelmeier, A. Porpiglia, J. Le Blanc and J. Zhu, (2013). "Household saving behaviour and credit constraints", mimeo.

[27] World Bank, (2012). "World Development Indicators 2012".

Table 1: SUMMARY STATISTICS (% of households, unless otherwise stated)[1]

		COUNTRIES										
VARIABLES		AT	BE[1]	DE	ES	FR	GR	IT	LU	NL[1]	PT	SK
SAMPLE SIZE		2380	2327	3565	6197	15006	2971	7951	950	1301	4404	2057
Holding Debt (%)		18.4	30.5	21.5	32.5	24.4	17.5	10.8	38.8	44.7	26.7	9.6
Secured Debt to Income (Median ratio in %)		74.3	132.7	132.6	195.0	129.8	145.0	145.3	157.6	253.7	221.6	185.9
Interest Rate (Median)	*of the HMR mortgage*	2.6	4.1	4.6	5.0	4.4	5.0	4.0	2.4	4.8	2.0	5.0
Age (%)	*16-34*	17.7	16.0	17.9	12.0	18.1	18.0	8.0	16.9	12.7	8.8	20.9
	35-44	17.4	19.0	16.7	22.6	18.9	20.9	19.1	21.9	20.8	20.1	19.1
	45-54	20.2	20.0	20.8	21.0	16.8	16.8	20.7	22.6	22.6	19.3	22.5
	55-64	19.2	17.1	15.1	16.0	19.3	17.2	18.1	16.3	20.6	20.0	17.0
	Over 64	25.5	27.9	29.5	28.3	26.9	27.1	34.0	22.3	23.3	31.8	20.4
	Age difference (Median)	0	0	0	1	0	2	1	1	0	2	1
Education (%)	*No education or primary*	13.4	20.6	10.6	49.3	31.3	39.6	47.9	30.4	24.4	73.5	5.5
	Secondary	70.3	35.6	54.4	19.9	40.8	36.0	37.9	40.2	39.2	13.9	74.0
	Tertiary	16.2	43.8	35.0	30.8	27.9	24.4	14.2	29.4	36.4	12.6	20.5
	Educational difference	15.7	25.5	21.6	25.1	25.0	21.8	24.5	24.0	22.8	20.9	11.0
Labour Status (%)	*Employee*	47.0	46.7	51.5	44.9	47.5	39.2	42.8	59.0	39.3	44.5	56.6
	Self-employed	9.4	5.2	7.2	10.7	7.3	18.9	12.8	5.6	6.7	10.2	10.7
	Retired	36.4	33.5	30.1	23.8	34.3	32.6	32.2	26.6	25.2	35.7	25.3
	Inactive or Unemployed	7.3	14.6	11.1	20.7	11.0	9.3	12.2	8.8	28.8	9.6	7.3
	Other Core Member Working	27.6	28.3	27.5	31.2	28.7	23.1	22.7	29.6	24	32.4	37.7
Couple (%)		51.6	56.3	52.4	66.7	55.1	63.7	63.5	58.9	51.3	69.8	58.6
Total Income (Median in thousand euros)		32.3	33.7	32.5	24.8	29.2	22.0	26.3	64.8	40.6	14.6	11.2

1. Some observations in Belgium and Netherlands had no information on labour status and were dropped from our estimations (22 in Belgium and 140 in Netherlands).

Table 2: HAS SECURED DEBT
Logit Regressions
Odds-Ratios

Each column shows the country-specific odds-ratio estimates and standard errors (in parentheses) of a Logit model with the probability of holding secured debt as a dependent variable and the covariates in the rows as independent variables. The sample includes all households in the country HFCS. All estimates are weighted by population weights and averaged across the five implicates.

COUNTRY / **CONTROL VARIABLES**	AT	BE	DE	ES	FR	GR	IT	LU	NL	PT	SK
Age_16_34	0.467	0.680	0.412	0.770	0.413	0.623	0.873	0.694	0.736	0.532	1.401
	(0.105)	(0.154)	(0.108)	(0.140)	(0.042)	(0.118)	(0.203)	(0.182)	(0.252)	(0.106)	(0.284)
Age_45_54	0.633	0.635	1.438	0.483	0.804	0.959	0.835	0.548	1.516	0.662	0.519
	(0.119)	(0.137)	(0.268)	(0.072)	(0.068)	(0.170)	(0.137)	(0.133)	(0.389)	(0.101)	(0.120)
Age_55_64	0.588	0.238	1.155	0.256	0.555	0.855	0.508	0.623	0.910	0.390	0.257
	(0.134)	(0.059)	(0.237)	(0.046)	(0.057)	(0.191)	(0.100)	(0.197)	(0.238)	(0.066)	(0.094)
Age_Over_64	0.757	0.072	0.833	0.113	0.218	0.296	0.187	0.196	1.139	0.149	...
	(0.258)	(0.034)	(0.276)	(0.027)	(0.035)	(0.102)	(0.057)	(0.099)	(0.424)	(0.038)	...
Age_Differ	1.004	1.011	1.005	0.991	0.986	0.982	1.054	1.079	0.987	0.998	0.999
	(0.018)	(0.025)	(0.020)	(0.020)	(0.010)	(0.019)	(0.018)	(0.033)	(0.028)	(0.016)	(0.032)
Low_Educ	0.899	1.092	0.888	0.826	0.533	0.745	0.797	0.853	0.855	0.740	0.788
	(0.240)	(0.307)	(0.283)	(0.130)	(0.051)	(0.123)	(0.129)	(0.203)	(0.175)	(0.114)	(0.849)
High_Educ	1.382	1.489	1.322	1.112	1.204	0.944	1.029	0.999	1.733	0.950	1.318
	(0.282)	(0.241)	(0.202)	(0.166)	(0.089)	(0.145)	(0.156)	(0.224)	(0.337)	(0.166)	(0.252)
Educ_Differ	0.883	0.889	0.911	1.156	0.944	0.939	1.259	1.270	1.152	1.538	1.424
	(0.168)	(0.166)	(0.148)	(0.161)	(0.070)	(0.144)	(0.180)	(0.300)	(0.238)	(0.200)	(0.350)
Self_Employed	1.163	1.067	1.325	0.876	1.300	0.804	1.018	0.800	0.782	0.732	1.712
	(0.259)	(0.353)	(0.334)	(0.148)	(0.125)	(0.128)	(0.167)	(0.243)	(0.359)	(0.124)	(0.387)
Retired	0.447	0.617	0.537	0.630	0.717	1.134	0.772	0.332	0.645	0.568	0.242
	(0.127)	(0.239)	(0.151)	(0.140)	(0.092)	(0.290)	(0.199)	(0.136)	(0.206)	(0.118)	(0.260)
Inactive_Unemp	0.810	0.365	0.418	0.704	0.362	1.009	0.719	0.315	0.665	0.558	0.816
	(0.260)	(0.099)	(0.116)	(0.116)	(0.051)	(0.282)	(0.204)	(0.142)	(0.186)	(0.111)	(0.396)
Other_Core_Working	1.802	1.989	1.291	0.940	1.763	1.206	1.607	1.524	1.548	1.457	1.340
	(0.356)	(0.416)	(0.231)	(0.128)	(0.139)	(0.182)	(0.242)	(0.372)	(0.349)	(0.202)	(0.357)
Couple	0.957	0.783	0.601	0.343	0.577	0.443	1.103	1.857	0.490	0.908	0.265
	(0.241)	(0.222)	(0.160)	(0.066)	(0.072)	(0.092)	(0.239)	(0.637)	(0.183)	(0.169)	(0.094)
LnAdults	1.989	0.835	1.216	0.513	0.609	1.500	0.842	1.258	1.365	0.859	0.394
	(0.501)	(0.202)	(0.293)	(0.096)	(0.073)	(0.286)	(0.169)	(0.366)	(0.486)	(0.149)	(0.119)
Ln(Income)-Ln(Median_Income)	1.441	1.577	2.327	1.956	1.889	1.277	1.947	2.015	1.255	1.684	0.870
	(0.324)	(0.149)	(0.323)	(0.201)	(0.121)	(0.151)	(0.238)	(0.356)	(0.194)	(0.172)	(0.168)
Cons	0.326	0.881	0.299	1.847	0.646	0.422	0.133	0.870	1.014	0.898	0.218
	(0.073)	(0.229)	(0.070)	(0.339)	(0.066)	(0.074)	(0.026)	(0.260)	(0.293)	(0.179)	(0.063)
Pseudo-R^2	0.139	0.289	0.211	0.229	0.208	0.091	0.149	0.203	0.114	0.211	0.119

Table 3: DEBT BALANCE OF SECURED DEBT
OLS estimates

Each column shows the country-specific estimates and standard errors (in parentheses) of an OLS model where the logarithm of the amount of secured debt is the dependent variable and the covariates in the rows are the independent variables. The sample includes only the households who report holding secured debt. All estimates are weighted by population weights and averaged across the five implicates.

COUNTRY / **CONTROL VARIABLES**	AT	BE	DE	ES	FR	GR	IT	LU	NL	PT	SK
Age_16_34	0.209	0.566	0.157	0.673	0.362	0.177	0.026	0.358	0.201	0.398	0.104
	(0.239)	(0.092)	(0.251)	(0.112)	(0.072)	(0.135)	(0.314)	(0.126)	(0.114)	(0.090)	(0.165)
Age_45_54	-0.533	-0.654	-0.232	-0.006	-0.599	-0.076	-0.405	-0.656	-0.403	-0.535	-0.323
	(0.237)	(0.118)	(0.159)	(0.113)	(0.069)	(0.167)	(0.177)	(0.159)	(0.107)	(0.093)	(0.279)
Age_55_64	-0.967	-0.964	-0.464	-0.241	-0.926	-0.172	-0.642	-1.040	-0.470	-1.028	-1.209
	(0.312)	(0.162)	(0.186)	(0.126)	(0.100)	(0.221)	(0.190)	(0.210)	(0.110)	(0.130)	(0.345)
Age_Over_64	-0.833	-1.429	-0.599	-0.005	-1.328	-0.680	-0.867	-0.586	-0.468	-1.226	...
	(0.423)	(0.365)	(0.274)	(0.250)	(0.175)	(0.363)	(0.266)	(0.457)	(0.168)	(0.290)	...
Age_Differ	0.030	0.040	0.023	0.018	0.050	0.013	0.037	0.022	-0.007	0.018	0.039
	(0.024)	(0.015)	(0.013)	(0.014)	(0.007)	(0.018)	(0.017)	(0.017)	(0.016)	(0.015)	(0.035)
Low_Educ	-0.227	0.090	-0.367	0.027	-0.093	-0.492	0.054	0.059	-0.166	-0.062	0.333
	(0.453)	(0.190)	(0.503)	(0.117)	(0.099)	(0.156)	(0.156)	(0.158)	(0.101)	(0.094)	(0.784)
High_Educ	0.125	0.165	0.238	0.023	0.146	-0.140	0.401	0.075	0.258	0.196	0.238
	(0.314)	(0.099)	(0.131)	(0.111)	(0.059)	(0.128)	(0.167)	(0.136)	(0.095)	(0.094)	(0.190)
Educ_Differ	-0.248	-0.194	-0.107	-0.101	-0.073	-0.011	-0.115	0.026	-0.220	-0.021	-0.277
	(0.249)	(0.107)	(0.142)	(0.095)	(0.058)	(0.129)	(0.168)	(0.144)	(0.091)	(0.082)	(0.281)
Self_Employed	0.046	0.308	0.189	0.193	0.244	0.076	0.024	0.534	0.316	0.493	-0.097
	(0.259)	(0.140)	(0.154)	(0.115)	(0.077)	(0.130)	(0.210)	(0.228)	(0.336)	(0.096)	(0.242)
Retired	-0.426	0.538	0.061	-0.099	-0.278	-0.649	-0.111	-0.178	-0.236	-0.210	0.175
	(0.330)	(0.294)	(0.223)	(0.235)	(0.131)	(0.263)	(0.246)	(0.287)	(0.140)	(0.239)	(0.372)
Inactive_Unemp	-0.221	-0.018	0.172	0.139	-0.245	-0.081	-0.196	-0.685	-0.166	-0.049	0.226
	(0.382)	(0.231)	(0.286)	(0.112)	(0.153)	(0.197)	(0.337)	(0.309)	(0.123)	(0.164)	(0.376)
Other_Core_Working	-0.121	0.208	0.191	0.219	-0.136	0.075	0.098	0.276	0.100	-0.100	0.217
	(0.221)	(0.136)	(0.174)	(0.098)	(0.068)	(0.146)	(0.152)	(0.179)	(0.093)	(0.094)	(0.269)
Couple	0.666	-0.203	-0.293	-0.352	-0.044	0.106	-0.251	-0.175	0.030	-0.127	-0.007
	(0.279)	(0.196)	(0.238)	(0.141)	(0.123)	(0.172)	(0.231)	(0.219)	(0.176)	(0.146)	(0.340)
LnAdults	-0.306	-0.063	-0.244	0.085	-0.076	-0.321	0.002	-0.252	0.137	0.076	-0.230
	(0.272)	(0.167)	(0.177)	(0.134)	(0.113)	(0.194)	(0.219)	(0.178)	(0.184)	(0.131)	(0.278)
Ln(Income)-Ln(Median_Income)	0.374	0.174	0.398	0.391	0.474	-0.027	0.161	0.351	0.067	0.260	0.127
	(0.194)	(0.083)	(0.092)	(0.080)	(0.060)	(0.089)	(0.133)	(0.094)	(0.070)	(0.070)	(0.252)
Cons	10.840	10.720	10.770	10.390	10.670	10.750	10.690	11.540	11.890	10.740	9.693
	(0.481)	(0.156)	(0.222)	(0.152)	(0.089)	(0.169)	(0.175)	(0.198)	(0.144)	(0.128)	(0.347)
R-Squared	0.188	0.265	0.152	0.112	0.240	0.234	0.111	0.316	0.255	0.266	0.128

Table 4: CURRENT INTEREST RATE OF HMR MORTGAGE
OLS estimates

Each column shows the country-specific estimates and standard errors (in parentheses) of an OLS model where the interest rate is the dependent variable and the covariates in the rows are the independent variables. The sample includes only the households who report holding secured debt. All estimates are weighted by population weights and averaged across the five implicates.

COUNTRY / **CONTROL VARIABLES**	AT	BE	DE	ES	FR	GR	IT	LU	NL	PT
Age_16_34	0.413	-0.153	-0.168	-0.103	-0.204	0.105	0.006	-0.221	-0.456	0.243
	(0.462)	(0.198)	(0.193)	(0.196)	(0.092)	(0.316)	(0.463)	(0.167)	(0.198)	(0.288)
Age_45_54	-0.187	0.411	-0.160	-0.148	0.243	0.668	0.175	0.205	-0.030	-0.150
	(0.612)	(0.214)	(0.113)	(0.168)	(0.106)	(0.344)	(0.328)	(0.158)	(0.154)	(0.258)
Age_55_64	-0.427	0.541	-0.020	0.069	0.474	0.598	0.578	0.382	-0.078	0.401
	(0.766)	(0.232)	(0.171)	(0.268)	(0.153)	(0.463)	(0.558)	(0.224)	(0.162)	(0.331)
Age_Over_64	0.086	0.489	0.211	0.056	0.855	0.248	-0.015	0.866	-0.219	-0.073
	(0.780)	(0.770)	(0.393)	(0.346)	(0.441)	(0.760)	(0.757)	(0.642)	(0.216)	(0.614)
Age_Differ	-0.007	-0.007	-0.006	0.009	-0.005	-0.075	-0.049	-0.030	0.018	-0.059
	(0.055)	(0.026)	(0.011)	(0.022)	(0.012)	(0.045)	(0.040)	(0.019)	(0.017)	(0.032)
Low_Educ	0.041	-0.008	-0.101	-0.061	-0.194	-0.142	0.300	-0.083	0.083	0.268
	(0.887)	(0.335)	(0.291)	(0.195)	(0.196)	(0.344)	(0.378)	(0.201)	(0.142)	(0.208)
High_Educ	0.146	0.135	0.040	-0.005	-0.284	-0.219	0.331	0.170	0.135	0.209
	(0.600)	(0.192)	(0.128)	(0.166)	(0.080)	(0.271)	(0.291)	(0.154)	(0.121)	(0.211)
Educ_Differ	0.235	-0.273	0.058	-0.175	0.075	0.251	0.156	-0.139	-0.033	-0.334
	(0.400)	(0.183)	(0.114)	(0.159)	(0.087)	(0.248)	(0.324)	(0.177)	(0.122)	(0.184)
Self_Employed	0.113	0.059	0.336	0.131	-0.031	0.570	0.513	-0.152	0.219	-0.296
	(0.571)	(0.253)	(0.152)	(0.226)	(0.096)	(0.273)	(0.373)	(0.131)	(0.339)	(0.216)
Retired	-0.112	0.387	-0.233	0.470	-0.491	-0.159	-0.151	0.106	-0.091	-0.208
	(0.617)	(0.702)	(0.352)	(0.344)	(0.289)	(0.598)	(0.608)	(0.476)	(0.210)	(0.517)
Inactive_Unemp	0.112	-0.450	0.053	0.157	0.131	-0.613	-0.119	-0.503	-0.209	-0.212
	(0.816)	(0.477)	(0.408)	(0.200)	(0.288)	(0.583)	(0.605)	(0.257)	(0.193)	(0.409)
Other_Core_Working	-0.216	-0.058	0.112	-0.025	-0.130	0.180	-0.024	0.391	-0.071	-0.517
	(0.381)	(0.251)	(0.151)	(0.159)	(0.114)	(0.272)	(0.321)	(0.184)	(0.142)	(0.275)
Couple	0.270	-0.156	0.055	0.023	0.170	0.228	0.744	0.060	-0.093	-0.033
	(0.529)	(0.436)	(0.202)	(0.249)	(0.190)	(0.406)	(0.499)	(0.251)	(0.215)	(0.428)
LnAdults	-0.134	0.066	0.197	0.346	0.156	0.050	0.683	0.249	-0.080	1.291
	(0.543)	(0.331)	(0.173)	(0.280)	(0.204)	(0.459)	(0.490)	(0.210)	(0.182)	(0.479)
Ln(Income)-Ln(Median_Income)	-0.098	-0.074	-0.148	-0.170	-0.133	-0.279	-1.085	-0.285	0.014	-0.333
	(0.344)	(0.161)	(0.105)	(0.135)	(0.066)	(0.335)	(0.294)	(0.114)	(0.130)	(0.156)
Cons	3.318	4.053	4.641	4.208	4.370	4.002	4.423	2.452	4.622	3.033
	(1.997)	(0.312)	(0.150)	(0.244)	(0.132)	(0.312)	(0.379)	(0.202)	(0.200)	(0.351)
R-Squared	0.047	0.060	0.043	0.029	0.049	0.068	0.124	0.110	0.034	0.092

Table 5: SUMMARY OF THE EFFECTS OF INSTITUTIONS (One Institution at a time; secured debt)

Each cell shows the OLS estimate and the standard error (in parentheses) of an OLS regression where the dependent variable is the country-specific constant (first row) or selected first step coefficients described in the row. The independent variable is the institution described in the column. For a given institution, each outcome (use, level or cost) denotes a different regression. In the cases of "Taxation of Mortgage Payments" and "Regulatory LTVs", the institution is measured using two variables, and the coefficients of the bivariate regression are shown in adjacent columns. The sample contains 11 countries. This table is a summary of Figures 5 to 9. One asterisk indicates a statistically significant coefficient at the 5% confidence level.

	DURATION OF FORECLOSURE (number of months)			TAXATION OF MORTGAGE PAYMENTS						INFORMATION ON BORROWERS		
	Use	Level	Cost	Use		Level		Cost		Use	Level	Cost
				Existence	Limit	Existence	Limit	Existence	Limit			
REFERENCE GROUP	**-0.0073***	-0.0014	-0.0037	0.1740	-0.0509	0.2920	0.5420	-0.6490	0.1140	-0.0695	0.0926	0.1270
	(0.0025)	(0.0058)	(0.0194)	(0.1770)	(0.2050)	(0.2830)	(0.3700)	(0.6490)	(0.6150)	(0.0794)	(0.1530)	(0.2380)
AGE												
Age_16_34	0.0061	**-0.0084***	0.0055	-0.1630	-0.0497	0.2080	-0.1390	0.0822	-0.0265	0.0316	-0.0916	0.0406
	(0.0034)	(0.0033)	(0.0065)	(0.2750)	(0.3150)	(0.2210)	(0.2500)	(0.1720)	(0.2290)	(0.1230)	(0.0973)	(0.1060)
Age_45_54	0.0000	-0.0022	0.0100	-0.3610	0.2040	-0.1610	-0.0606	0.3110	-0.2430	0.1480	**0.1790***	-0.1700
	(0.0057)	(0.0048)	(0.0073)	(0.2330)	(0.3060)	(0.2490)	(0.2820)	(0.2780)	(0.2400)	(0.1210)	(0.0901)	(0.1100)
INCOME	0.0014	-0.0046	**-0.0168***	0.0352	-0.4530	0.0190	-0.0518	-0.0897	0.2080	0.1030	-0.0465	-0.0041
	(0.0057)	(0.0030)	(0.0037)	(0.3490)	(0.3960)	(0.1790)	(0.2090)	(0.2560)	(0.2210)	(0.1580)	(0.0785)	(0.1090)
SELF-EMPLOYED	-0.0012	-0.0040	0.0019	-0.4140	-0.0242	0.1340	-0.0764	-0.2850	0.1260	-0.0670	-0.0934	**0.2010***
	(0.0048)	(0.0027)	(0.0074)	(0.2410)	(0.2810)	(0.1630)	(0.1910)	(0.2620)	(0.2260)	(0.1230)	(0.0646)	(0.0833)

	FIXED INTEREST RATE			REGULATORY LTV					
	Use	Level	Cost	Use		Level		Cost	
				Existence	Limit	Existence	Limit	Existence	Limit
REFERENCE GROUP	0.0345	0.1600	**0.7390***	-0.1220	0.0000	-0.6700	-0.0050	-0.0098	-0.0238
	(0.1080)	(0.2130)	(0.3270)	(0.2160)	(0.0068)	(0.3720)	(0.0117)	(0.6110)	(0.0257)
AGE									
Age_16_34	**-0.3050***	0.0546	**-0.2810***	0.1240	**0.0191***	-0.1210	-0.0007	**0.3250***	0.0103
	(0.1240)	(0.1320)	(0.1080)	(0.2400)	(0.0075)	(0.2700)	(0.0084)	(0.1420)	(0.0091)
Age_45_54	0.2430	-0.2220	0.1250	-0.1910	-0.0118	0.3420	**0.0144***	-0.1950	-0.0072
	(0.1520)	(0.1250)	(0.1690)	(0.3240)	(0.0100)	(0.2330)	(0.0071)	(0.2680)	(0.0115)
INCOME	0.1820	**0.1740***	0.2040	0.1950	-0.0060	0.0221	**-0.0117***	-0.2820	-0.0115
	(0.2030)	(0.0867)	(0.1320)	(0.4060)	(0.0124)	(0.1560)	(0.0050)	(0.2120)	(0.0087)
SELF-EMPLOYED	**0.2760***	0.0901	-0.0073	-0.0251	**-0.0205***	-0.2170	-0.0047	0.0801	0.0044
	(0.1380)	(0.0949)	(0.1590)	(0.2340)	(0.0073)	(0.1810)	(0.0060)	(0.2610)	(0.0107)

Table 6 MULTIVARIATE ANALYSIS

Each column shows the OLS estimates and the standard error (in parentheses) of an OLS regression where the dependent variable is the probability of holding secured debt by the reference group(RG) in the first panel, the secured debt balance of the RG in the second panel and the HMR Interest Rate of the RG in the third panel. Covariates are the institutions in the rows. A constant is included in all regressions, but not reported. The sample contains 11 countries. One asterisk indicates a statistically significant coefficient at the 5% confidence level.

HAS SECURED DEBT

	RG	AGE				EDUCATION		SELFEMP	INCOME
CONTROL VARIABLES		16_34	45_54	55-64	Over_64	Low	High		
Duration of Foreclosure	**-0.011***	0.002	**0.006***	**0.004***	0.001	-0.001	-0.002	0.004	0.001
	(0.001)	(0.004)	(0.003)	(0.002)	(0.001)	(0.003)	(0.004)	(0.004)	(0.005)
Existence of Tax Exemption	0.061	0.182	-0.860	-0.486	-0.665	-0.322	0.004	0.519	-0.261
	(0.142)	(0.356)	(0.502)	(0.399)	(0.477)	(0.478)	(0.548)	(0.590)	(0.621)
Existence of Limit to Deductibility	0.033	-0.012	0.833	0.432	1.008	-0.253	0.204	-0.408	-0.122
	(0.206)	(0.608)	(0.876)	(0.550)	(0.911)	(0.617)	(0.840)	(0.949)	(0.530)
Existence of Regulatory LTV Limit	0.321	0.397	0.573	0.147	0.330	-0.313	-0.010	-0.378	0.538
	(0.206)	(0.608)	(0.875)	(0.551)	(0.912)	(0.617)	(0.839)	(0.947)	(0.532)
Value of LTV Regulatory Limit	0.019	0.033	0.020	-0.009	0.009	0.012	0.014	-0.030	0.013
	(0.206)	(0.607)	(0.877)	(0.550)	(0.911)	(0.618)	(0.841)	(0.949)	(0.531)
Fixed Interest Rate	0.158	0.391	0.484	0.064	0.214	-0.026	0.451	0.127	0.376
	(0.207)	(0.608)	(0.875)	(0.550)	(0.911)	(0.617)	(0.837)	(0.948)	(0.532)
Depth of Credit Information Index	-0.109	0.103	-0.089	0.070	-0.024	0.013	0.054	0.297	0.108
	(0.206)	(0.609)	(0.876)	(0.550)	(0.911)	(0.618)	(0.836)	(0.946)	(0.529)

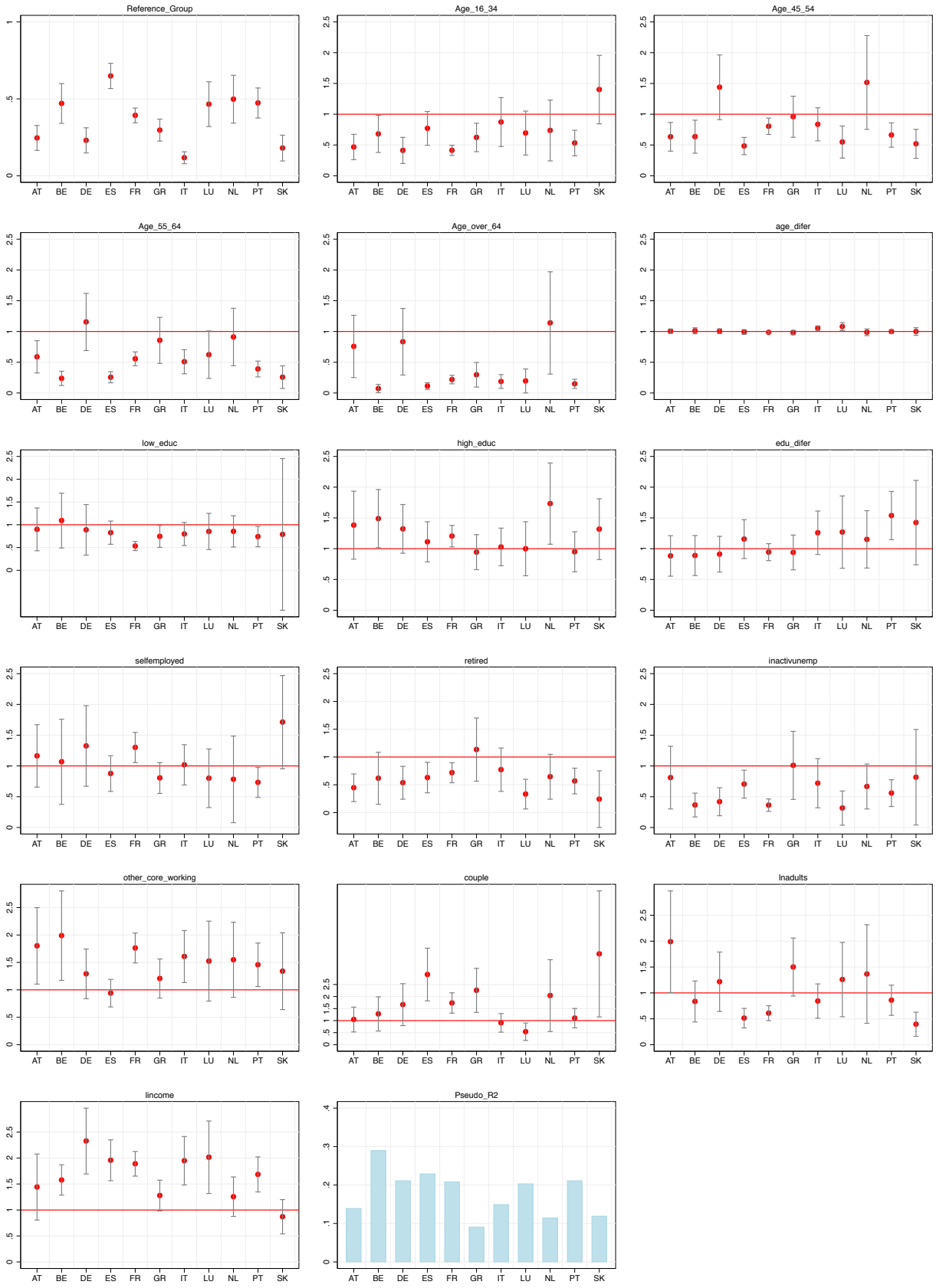
SECURED DEBT BALANCE

	RG	AGE				EDUCATION		SELFEMP	INCOME
CONTROL VARIABLES		16_34	45_54	55-64	Over_64	Low	High		
Duration of Foreclosure	0.005	**-0.013***	**-0.009***	**-0.009***	**-0.018***	0.002	**0.008***	-0.003	-0.004
	(0.004)	(0.006)	(0.004)	(0.004)	(0.007)	(0.003)	(0.004)	(0.004)	(0.003)
Existence of Tax Exemption	-0.817	0.273	0.349	0.692	0.613	0.082	-0.494	-0.712	0.196
	(0.507)	(0.417)	(0.356)	(0.457)	(0.842)	(0.704)	(0.344)	(0.416)	(0.243)
Existence of Limit to Deductibility	**1.380***	-0.394	-0.256	-0.336	0.171	0.041	0.458	0.373	-0.015
	(0.446)	(0.329)	(0.348)	(0.425)	(0.810)	(0.403)	(0.301)	(0.764)	(0.228)
Existence of Regulatory LTV Limit	0.572	0.037	0.558	**0.874***	1.556	0.243	0.227	0.115	0.068
	(0.446)	(0.328)	(0.347)	(0.425)	(0.807)	(0.405)	(0.301)	(0.767)	(0.228)
Value of LTV Regulatory Limit	0.031	0.011	0.024	0.040	0.071	0.022	0.014	0.009	-0.011
	(0.446)	(0.327)	(0.347)	(0.424)	(0.807)	(0.405)	(0.302)	(0.765)	(0.227)
Fixed Interest Rate	0.430	0.072	0.267	0.682	0.891	0.293	0.178	-0.134	0.015
	(0.447)	(0.329)	(0.348)	(0.425)	(0.808)	(0.404)	(0.300)	(0.766)	(0.228)
Depth of Credit Information Index	-0.338	-0.033	0.306	0.517	0.573	-0.079	-0.150	-0.402	0.047
	(0.446)	(0.329)	(0.348)	(0.425)	(0.807)	(0.405)	(0.301)	(0.764)	(0.228)

HMR INTEREST RATE

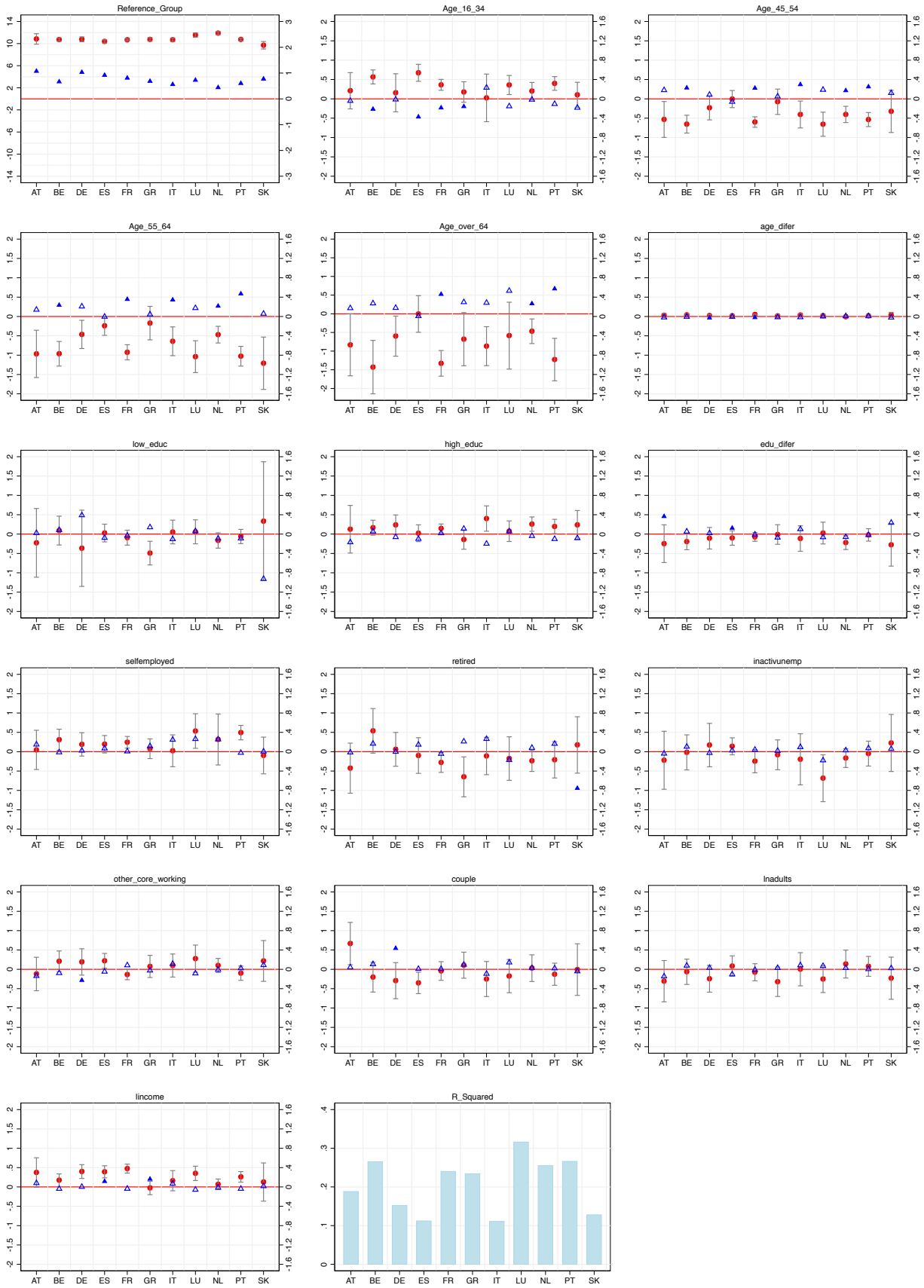
	RG	AGE				EDUCATION		SELFEMP	INCOME
CONTROL VARIABLES		16_34	45_54	55-64	Over_64	Low	High		
Duration of Foreclosure	0.005	0.002	0.008	0.012	-0.002	0.007	0.006	0.009	**-0.019***
	(0.013)	(0.015)	(0.011)	(0.018)	(0.024)	(0.012)	(0.010)	(0.012)	(0.009)
Existence of Tax Exemption	1.578	-0.320	0.923	0.174	1.403	-0.799	-0.901	0.645	0.120
	(1.358)	(0.749)	(0.711)	(0.930)	(1.585)	(0.784)	(0.617)	(0.653)	(0.472)
Existence of Limit to Deductibility	-0.324	-0.143	-0.715	-0.416	-1.093	0.513	0.363	-0.326	-0.120
	(0.777)	(0.514)	(0.485)	(0.588)	(1.239)	(0.568)	(0.414)	(0.627)	(0.358)
Existence of Regulatory LTV Limit	1.517	-0.785	-0.423	-0.041	-0.747	0.116	-0.013	0.219	-0.275
	(0.778)	(0.513)	(0.485)	(0.588)	(1.239)	(0.566)	(0.413)	(0.626)	(0.359)
Value of LTV Regulatory Limit	0.060	-0.037	-0.013	0.002	-0.056	0.016	0.021	0.016	-0.013
	(0.778)	(0.514)	(0.484)	(0.587)	(1.241)	(0.569)	(0.414)	(0.625)	(0.358)
Fixed Interest Rate	**2.262***	-0.985	0.254	0.160	0.083	-0.197	-0.156	0.550	-0.064
	(0.778)	(0.513)	(0.485)	(0.588)	(1.239)	(0.568)	(0.415)	(0.627)	(0.359)
Depth of Credit Information Index	0.949	-0.129	0.292	-0.105	0.372	-0.311	-0.248	0.547	-0.054
	(0.779)	(0.512)	(0.485)	(0.590)	(1.240)	(0.569)	(0.413)	(0.627)	(0.360)

Figure 1: HAS SECURED DEBT. Logit Regressions. Odds-Ratios



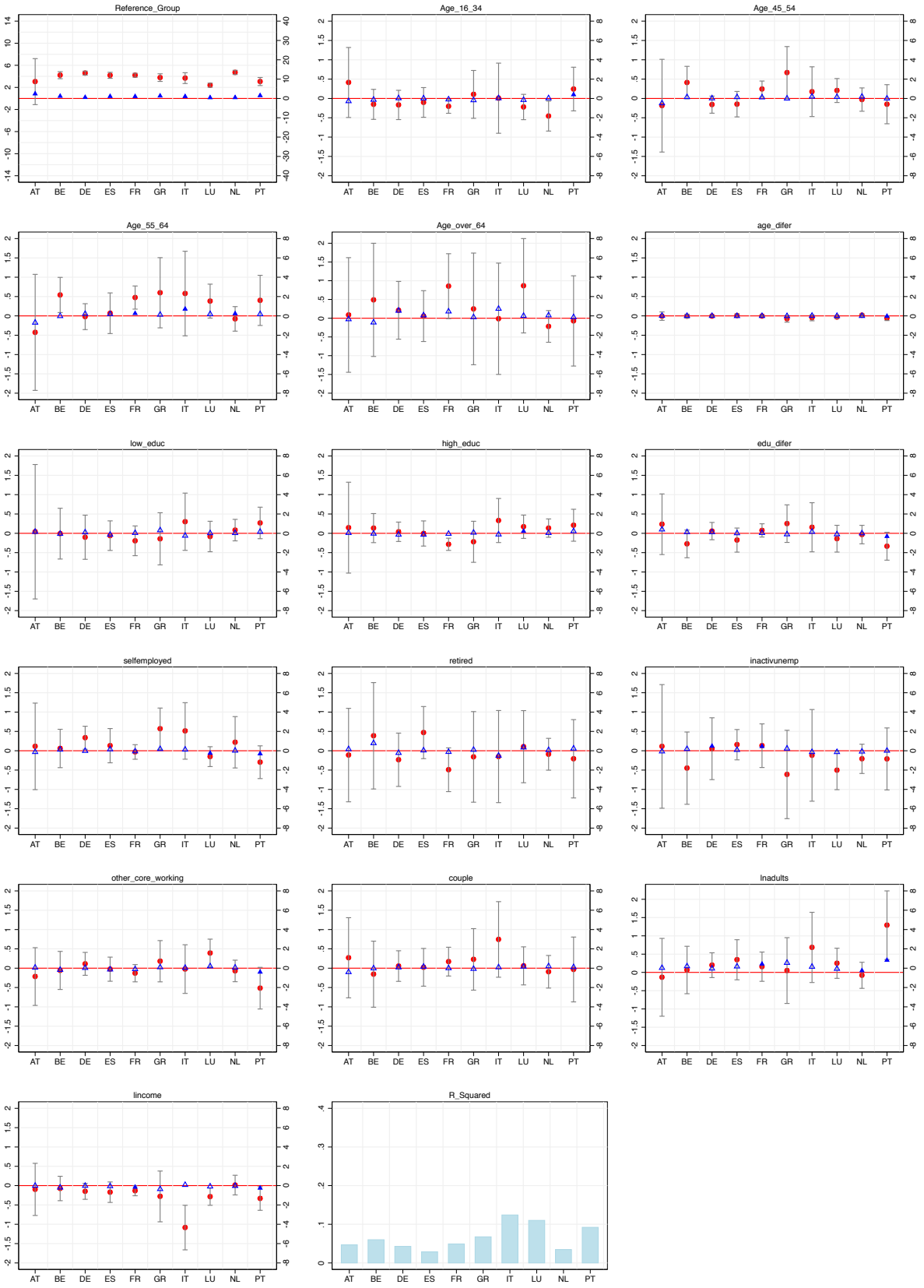
Odds-ratio estimates and standard errors shown in Table 2. The first panel on the left plots the predicted probability of holding secured debt for the reference group in each country.

Figure 2: DEBT BALANCE OF SECURED DEBT. (Location-scale model)



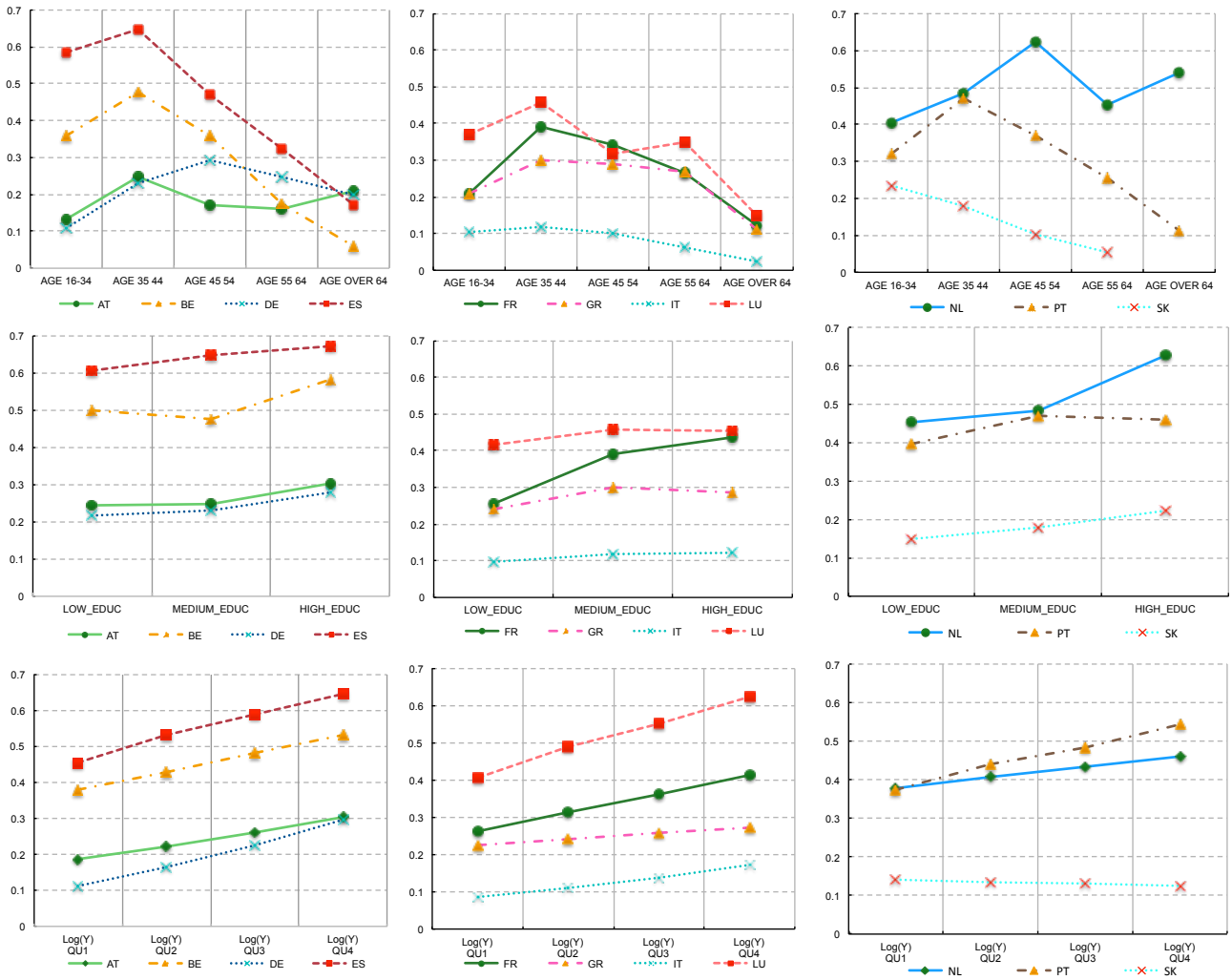
OLS estimates and standard errors in Table 3. The triangles are the coefficients of a regression of the absolute value of the OLS residual on the covariates shown in Table 2. Full triangles denote that the estimate is statistically different from zero at the 5% confidence level.

Figure 3: CURRENT INTEREST LOAN OF HMR MORTGAGE. (Location-scale model)



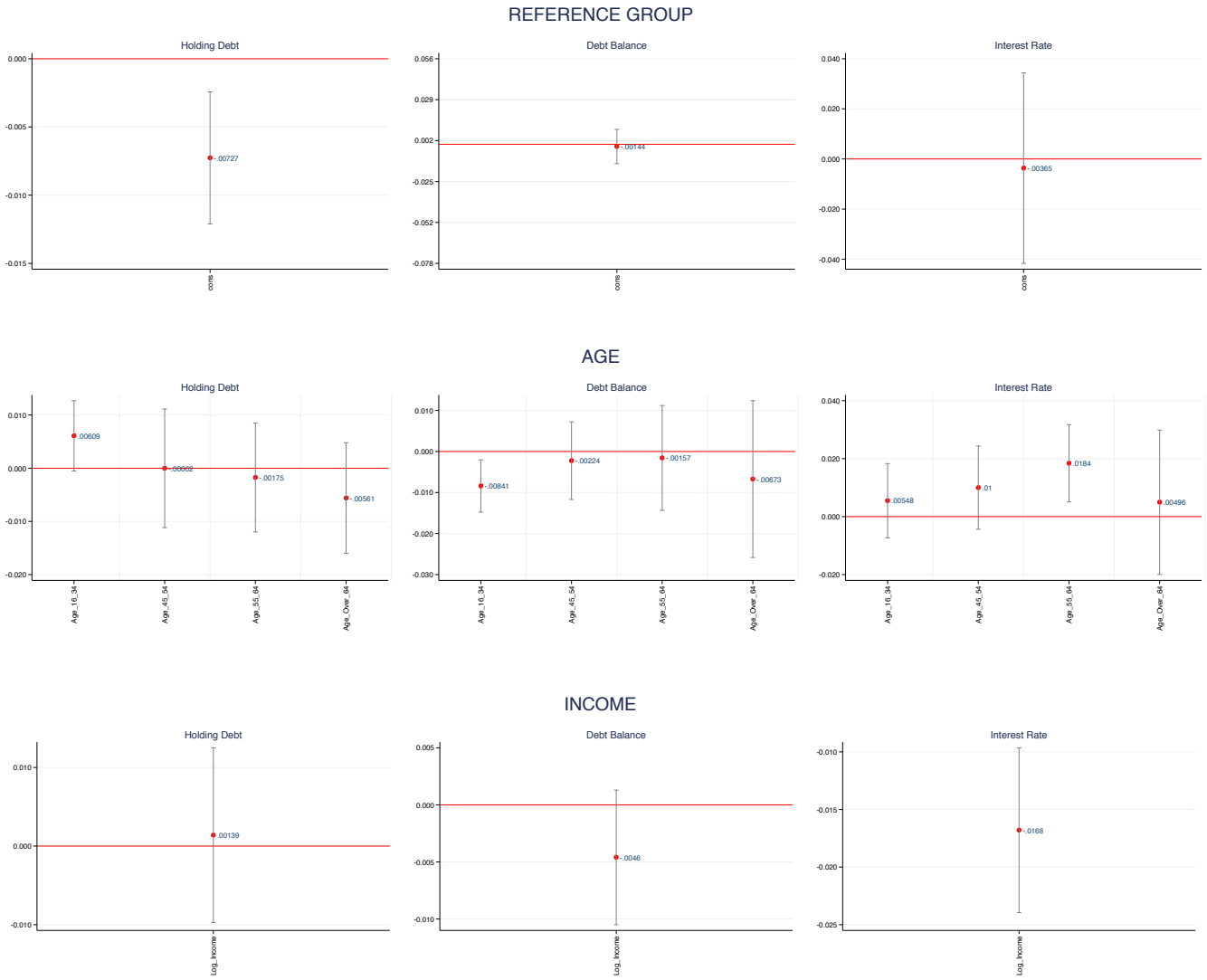
OLS estimates and standard errors shown in Table 4. The triangles are the coefficients of a regression of the absolute value of the OLS residual on the covariates shown in Table 2. Full triangles denote that the estimate is statistically different from zero at the 5% confidence level.

Figure 4: ESTIMATED PROFILES OF THE PROBABILITY OF HOLDING DEBT



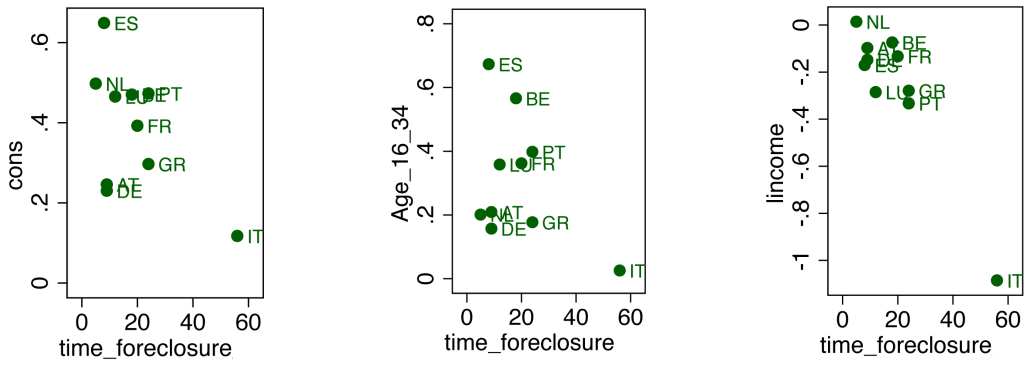
The Figure shows the predicted probability of holding secured debt for various groups of the population. The top three charts evaluate the probability at different ages of the oldest core person in the household. The charts in the middle evaluate the chances of holding secured debt at different education levels and the bottom ones at different income quintiles. The rest of the covariates are those of the reference group.

Figure 5: DURATION OF FORECLOSURE (number of months)



Each graph shows the OLS coefficient and its 95% CI in a regression of the first-step coefficient of the variable in the horizontal axis on the institution that gives title to the figure. The estimates and standard errors are shown in Table 5.

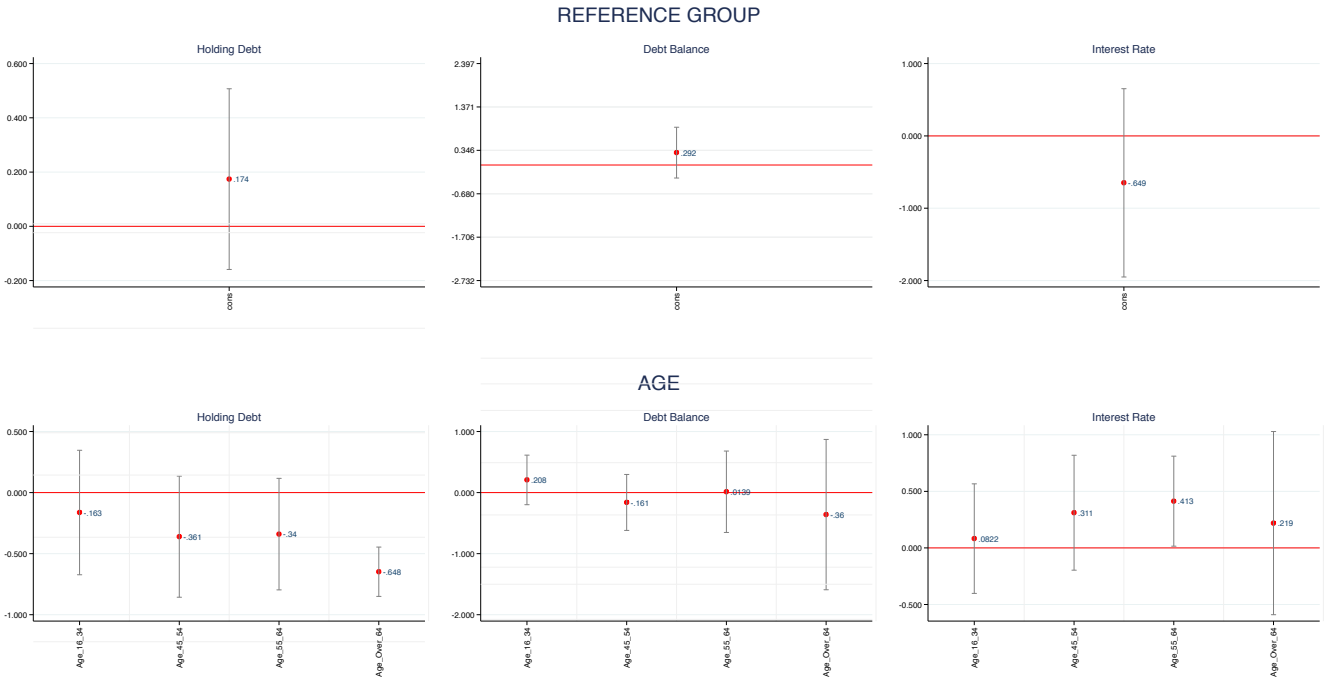
5A Holding Debt Scatterplot 5B Secured Debt Balance Scatterplot 5C Current HMR Interest Rate



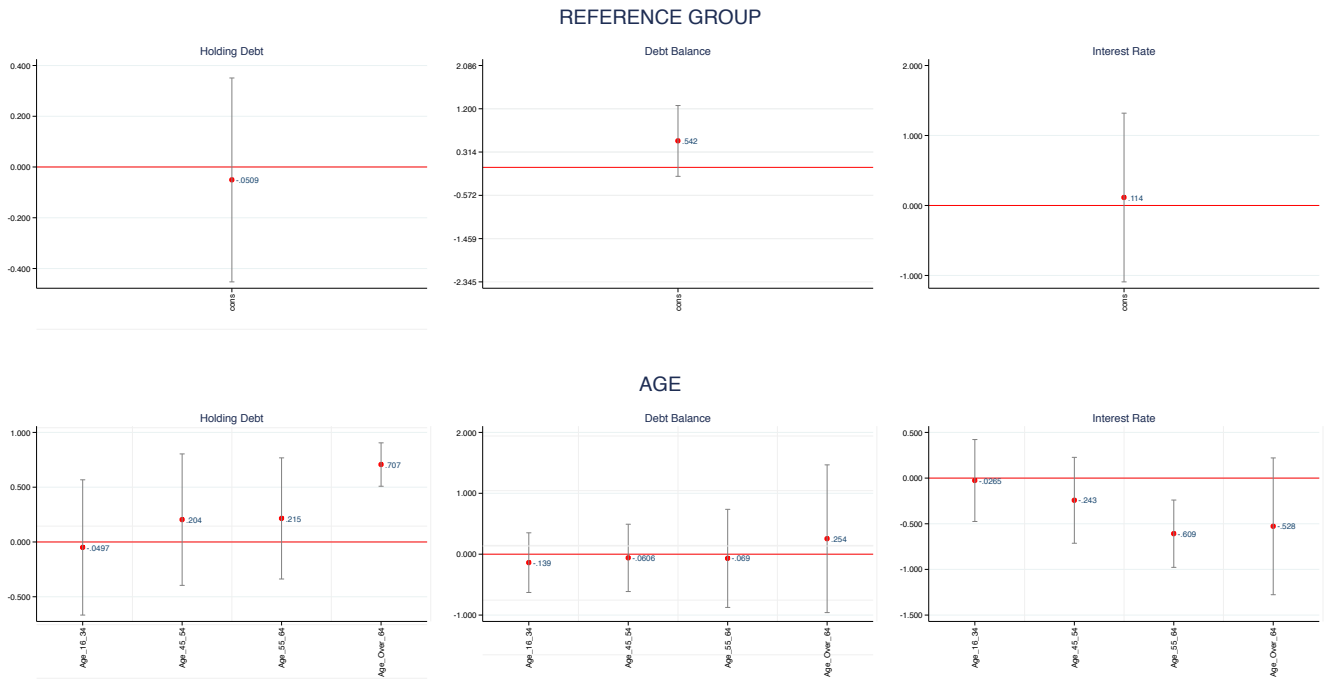
Figures 5A-5C plot selected first-step coefficients against the duration of foreclosure -namely, the probability of holding debt, the differential amount of debt held by youngest group and the semi-elasticity of the interest rate with respect to income, respectively.

Figure 6: TAXATION OF MORTGAGE PAYMENTS.

Existence of tax exemption (controlling for the existence of limit to deductibility)



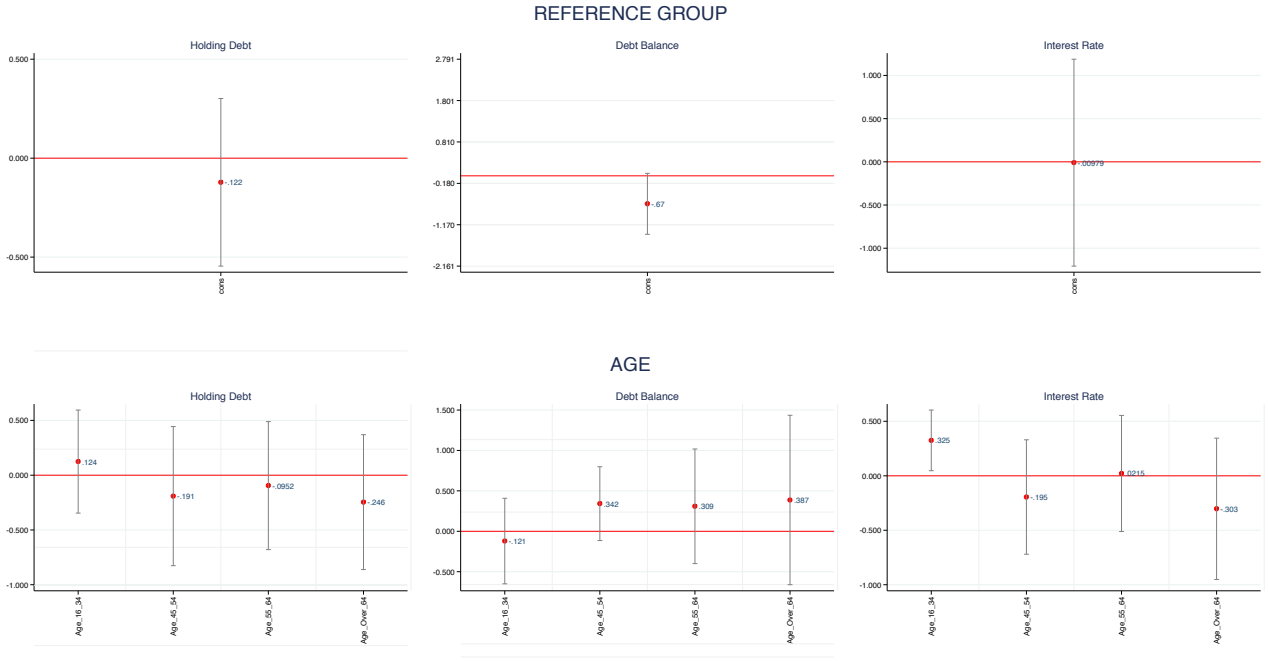
Absence of a limit to tax deductibility (controlling for the existence of tax exemption)



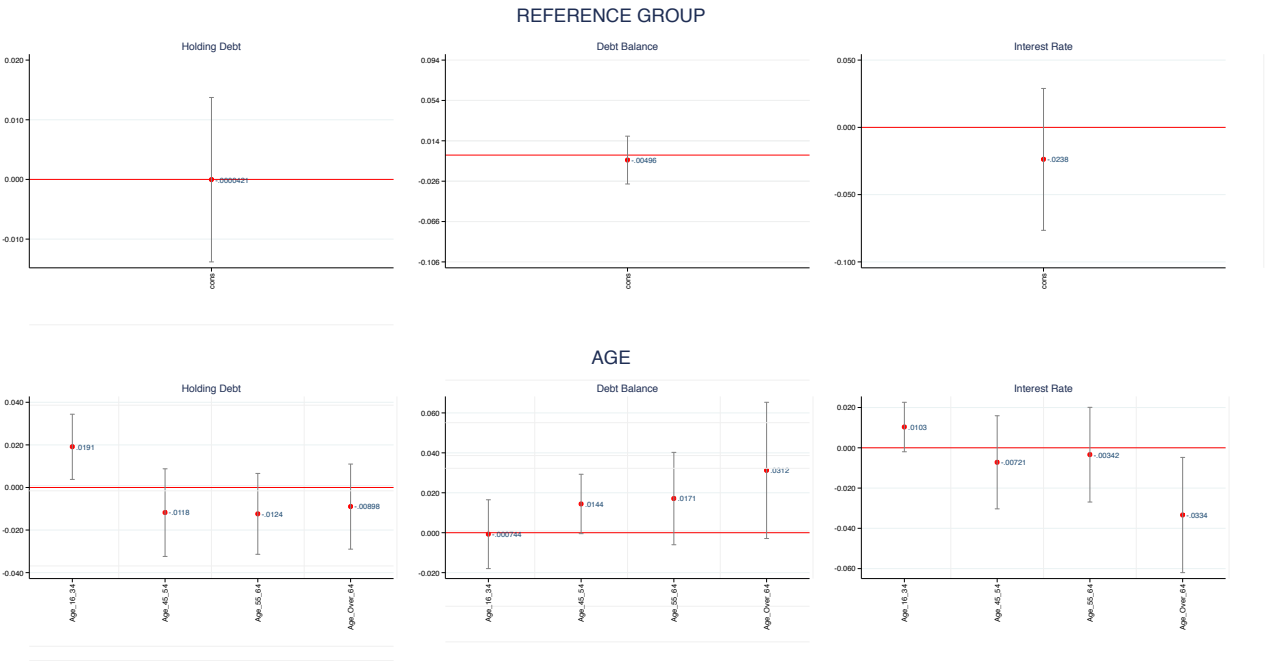
Each graph shows the OLS coefficient and its 95% CI in a regression of the first-step coefficient of the variable in the horizontal axis on the institution that gives title to the figure. The estimates and standard errors are shown in Table 5.

Figure 7: REGULATORY LOAN TO VALUES RATIO

Existence of a regulatory LTV limit (controlling for the value of LTV regulatory limit)



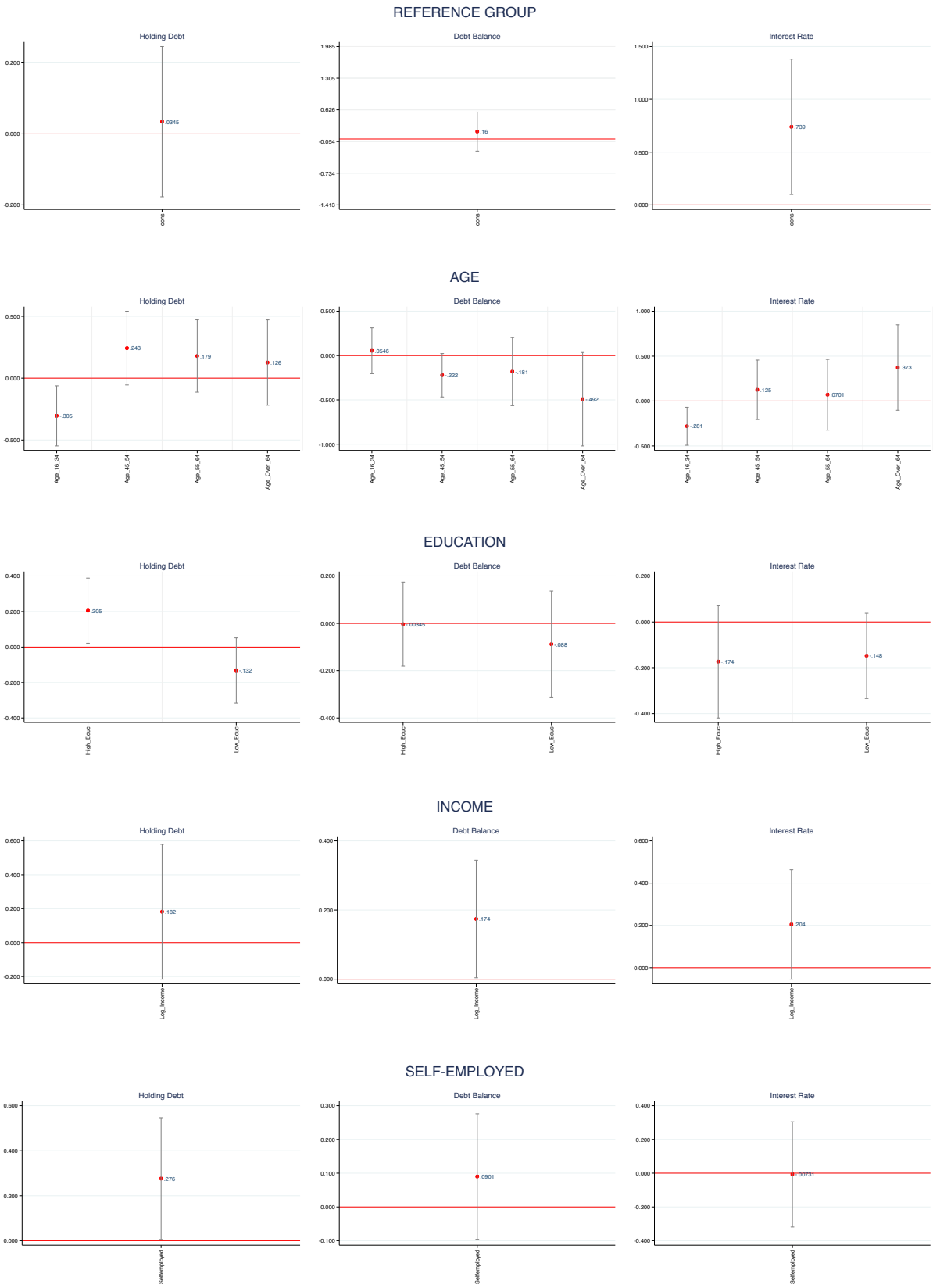
Value of LTV regulatory limit (controlling for the existence of a regulatory LTV limit)



Each graph shows the OLS coefficient and its 95% CI in a regression of the first-step coefficient of the variable in the horizontal axis on the institution that gives title to the figure. The estimates and standard errors are shown in Table 5.

Figure 8: FIXED INTEREST RATE

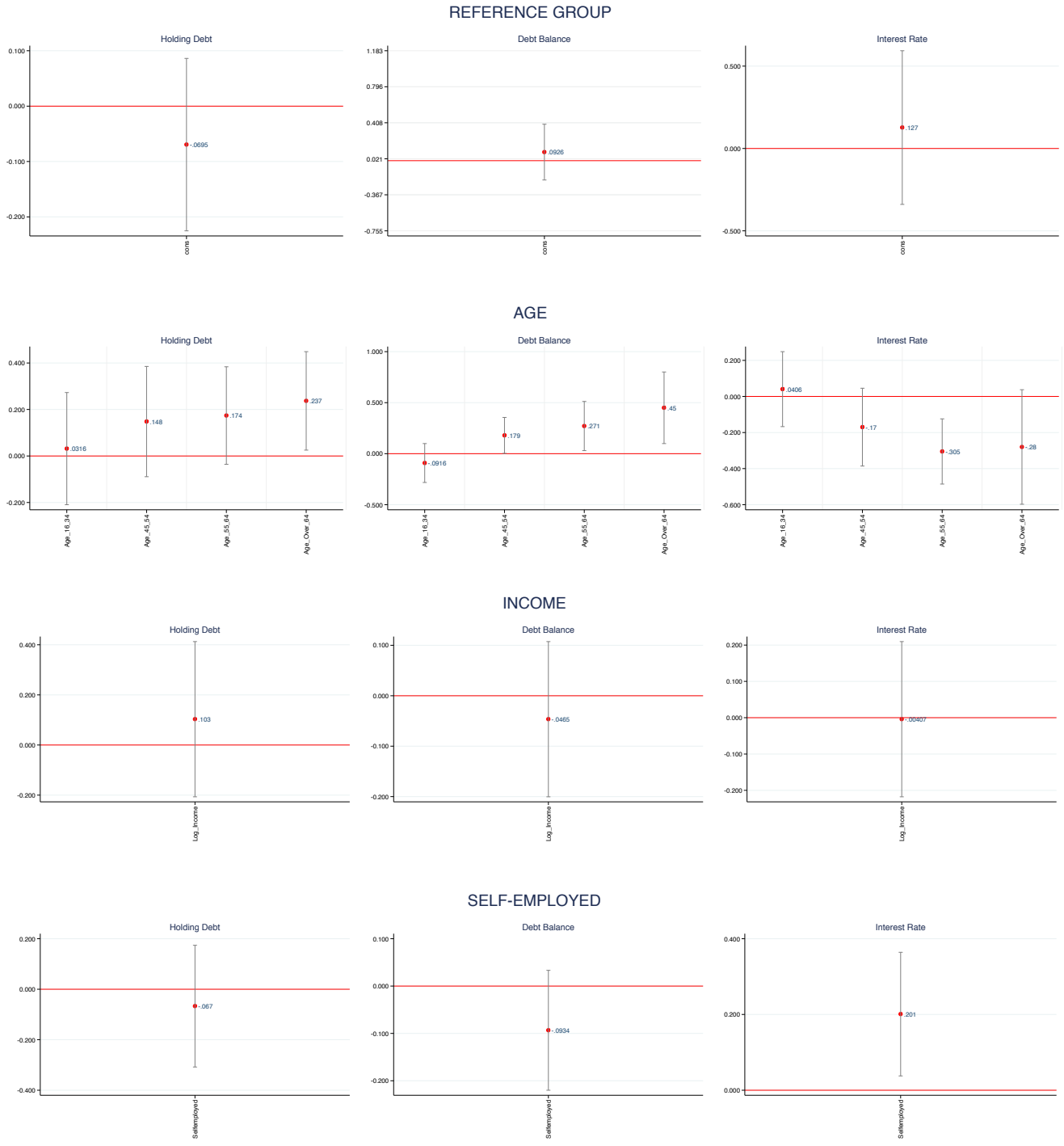
Dummy indicating if % of mortgages on FR for a period longer than 10 year is $>$ 50%



Each graph shows the OLS coefficient and its 95% CI in a regression of the first-step coefficient of the variable in the horizontal axis on the institution that gives title to the figure. The estimates and standard errors are shown in Table 5.

Figure 9: INFORMATION ON BORROWERS

Depth of credit information index (0-6)



Each graph shows the OLS coefficient and its 95% CI in a regression of the first-step coefficient of the variable in the horizontal axis on the institution that gives title to the figure. The estimates and standard errors are shown in Table 5.

Appendix A.1.: Institutions and Credit Conditions: Definitions and Sources

Variable	Definition	Source
A. Legal enforcement		
A.1. Foreclosure procedures		
Duration of foreclosure	The period typically required for the completion of foreclosure proceeding, taking into account the time needed for the completion of court proceedings, the sale of the asset and the distribution of the proceeds to the creditors; measured in number of months.	ESCB[1]
B. Regulation: Fiscal and macro-prudential framework		
B.1. Taxation of mortgage financing		
Deductibility of payments	Main features of the deductibility of mortgage payments (interest and/or principal) from personal income tax, measured as the (non) existence of such deductibility.	ESCB[1]
Limit on deductibility	Limitations to the deductibility above, in terms of time and or amount (fixed amount, percentage or ceiling), measured as the (non) existence of such a limit.	ESCB[1]
Tax relief	The tax favouring of owner-occupied housing with respect to debt financing, looking at whether the interest payments on mortgages are deductible from taxable income and if there are limits on the allowed period of deduction or on the deductible amount, and looking at whether tax credits on mortgage loans are available. The indicator estimates the difference between the market interest rate and the after-tax debt financing cost of housing, in percentage points.	OECD[2]
B.2. Regulatory loan-to-value ratio		
Existence of LTV limit	Formal restrictions, threshold loan-to-value ratios above which banks are required to provision more capital under Basle II, or limits applying for loans to be eligible as collateral for covered bonds or mortgage bonds, measured as the (non) existence of such limits.	ESCB[1]
LTV limit	The value of the limit above, measured as a percentage of the value of the property.	ESCB[1]
C. Credit conditions		
C.1. Prevalence of fixed interest rates		
Fixed-rate mortgages	The prevalence of housing loans with a longer-term fixation of interest rates. Because of the variability over time of the share of variable-rate loans (rate fixation up to one year) and loans with relatively short periods of fixed rates, this variable is measured as the share of loans with very long periods of fixed rates (over ten years), as a percentage of all housing loans. As such, fixed-rate countries are Belgium, Germany, France and The Netherlands.	ESCB[1]
C.2. Financial development and literacy		
Credit information	The depth of credit information on borrowers, i.e. the rules and practices affecting the coverage, scope and accessibility of credit information available through either a public credit registry or a private credit bureau, measured on a scale from 0 to 6.	WB[3]

Sources: ESCB, OECD, World Bank.

[1] The information comes from the Structural Issues Report: Task Force of the Monetary Policy Committee of the European System of Central Banks, "Housing Finance in the Euro Area", ECB Occasional Paper N° 101, March 2009; and from the replies from National Central Banks and commercial banks to ad hoc questionnaires that alimented this report. Data refer to originations in 2007.

[2] The tax data are taken from Figure 3 in: Andrews, Dan and Aida Caldera Sánchez, "The Evolution of Homeownership Rates in Selected OECD Countries: Demographic and Public Policy Influences", OECD Journal: Economic Studies, Vol. 2011/4, pp 207-243; and are based on the OECD Housing Market Questionnaire presented in Johansson, Asa, "Housing Policies in OECD and Candidate for Accession Countries: Survey-Based Data and Implications", OECD Economics Department Working Papers, OECD, Paris, forthcoming. Data refer to 2009. Students' performance in mathematics is taken from the 2009 PISA.

[3] Data from Chapter 5.5 on financial access, stability and efficiency of: World Bank, "World Development Indicators 2012". The indicator is based on information from banking supervision authorities and surveys on the public credit registry's or private credit bureau's structure, laws and associated rules, administered to the entity itself. It refers to 2011.

Appendix A.2.: Institutions and Credit Conditions: Data Used

COUNTRY / INSTITUTIONAL VARIABLES	AT	BE	DE	ES	FR	GR	IT	LU	NL	PT	SK
A. Legal enforcement											
A.1. Foreclosure procedures											
Typical duration of a foreclosure procedure (in months)	9	18	9	8	20	24	56	12	5	24	…
B. Regulation: Fiscal and macro-prudential framework											
B.1. Taxation of mortgage financing											
Existence of tax exemption	1	1	0	1	1	1	1	1	1	1	0
Absence of a limit to deductibility	1	0	0	0	0	0	0	0	1	0	0
B.2. Regulatory loan-to-value ratio											
Existence of LTV limit	0	0	1	1	1	1	1	0	0	1	1
LTV limit	0	0	60	80	60	75	80	0	0	75	70
C. Credit conditions											
C.1. Prevalence of fixed interest rates											
Dummy indicating if % of mortgages on FR for a period longer than 10 years > 50%	0	1	1	0	1	0	0	0	1	0	0
C.2. Financial development											
Depth of credit information index (0-6)	6	4	6	5	4	5	5		5	4	4

Sources: ESCB, OECD, World Bank.