The Distribution of Debt across Euro-Area Countries: The Role of Individual Characteristics, Institutions, and Credit Conditions*

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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

*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 Åsa 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 (Bover) e-mail: bover@bde.es.

from the first wave of a new survey of household finances, the Household Finance and Consumption Survey. Adjusting for household composition, we find substantial cross-country variation in secured debt outcomes and in their distribution across age and income groups. Among all the institutions considered, the length of asset repossession periods best accounts for the differences across countries in 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.

JEL Codes: D14, G21, G28, K35.

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 debtholders are three times smaller than those of Dutch households. The age-cohort profile of debt holding itself varies 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 step 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, and 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 some key country-specific estimates to various institutions and credit conditions. The country-specific estimates we focus on are measures of the age-cohort and income profiles.[2]

We emphasize 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 (LTV) ratios at origination, the share of fixed-rate mortgages, and depth of information about borrowers.[3]

We note three advantages of our strategy. Firstly, the two-step approach we follow leads to effects of the institutional variables on differential household debt outcomes by age and income 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, and an explicit comparison to the theoretical and quantitative papers in the literature, which 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

[1] Among others, Crook and Hochguertel (2007) and Georgarakos, Lojschova, and Ward-Warmedinger (2010) 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 United States).

[2] 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] Andrews and Caldera Sánchez (2011), European Central Bank (2009), and World Bank (2012) report the substantial heterogeneity of these institutions across countries in the euro area.

profiles we consider. However, this correlation may not hold in a multivariate setting when we consider the importance of a number of institutions simultaneously.

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 eleven countries. This is necessarily so, because this 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 and income 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 thirty-five to forty-four 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 and income profiles of borrowers are substantial. There is also substantial heterogeneity in how mortgage interest rates are related to 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 heterogeneity in differential debt by age and income across countries. In countries with fifteen months longer (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 percent smaller, the amount borrowed by the youngest set of households (conditional on borrowing)

is 12 percent lower, and the interest rates paid by low-income (high-income) households are 0.3 percentage point higher (lower).[4] These results are robust to the inclusion of other institutions. The analysis of the remaining institutions—regulatory LTV ratios, 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, Garriga, and Schlagenhauf (2009) 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, Pagano, and Bianco 2005), or by the presence of the bankruptcy option—Chatterjee et al. (2007) and Livshits, MacGee, and Tertilt (2007). Gervais (2002) uses an overlapping-generations (OLG) model to show that tax exemptions for the implicit rents of owner-occupied housing and mortgage payments lead mid- and high-income households to anticipate housing consumption over the life cycle. Finally, 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 United States on the pricing of default risk and, ultimately, on the distribution of debt.

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

[4]The reference group is a two-person household with the median income in the country, where both members are aged between thirty-five and forty-four years and have mid-level schooling, where the core member with the highest earnings is an employee, and where the other core member works.

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, McLiesh, and Shleifer 2007; Jappelli, Pagano, and Bianco 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 United States—Gropp, Scholz, and White (1997)—or lengthier repossession periods across Italian provinces—Fabbri and Padula (2004)—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 predicted impact of the institutions we consider on several debt outcomes. Section 4 discusses the empirical approach employed to examine debt across euro-area countries. Section 5 presents the results from the first part of our empirical investigation. In section 6 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 with the previous literature. Finally, in section 7, 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 fifteen countries of the Eurosystem between end-2008 and mid-2011, with the majority of countries conducting the survey in 2010.

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

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 most 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 charged on the main mortgage, across the countries in the HFCS data set.[5] The proportion of households with secured debt ranges from a low of around 10 percent in Italy and Slovakia to a high of almost 45 percent 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, and socioeconomic 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 the highest level of schooling, and the

[5] In table 1 we do not control for differences in fieldwork periods across countries (but do so in our econometric analysis).

Table 1. Summary Statistics (% of households, unless otherwise stated)[a]

	Countries										
	AT	**BE[a]**	**DE**	**ES**	**FR**	**GR**	**IT**	**LU**	**NL[a]**	**PT**	**SK**
Variables ↓ Sample Size →	**2,380**	**2,327**	**3,565**	**6,197**	**15,006**	**2,971**	**7,951**	**950**	**1,301**	**4,404**	**2,057**
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 rate 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
Education Difference	15.7	25.5	21.6	25.1	25.0	21.8	24.5	24.0	22.8	20.9	11.0
Labor 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
Household Size											
No. of Adults (median)	2	2	2	2	2	2	2	2	2	2	2
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

[a]Some observations in Belgium and the Netherlands had no information on labor status and were dropped from our estimations (22 in Belgium and 140 in the Netherlands).

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. Institutions

3.1 Modeling Background and the Impact of Institutions

The permanent-income hypothesis predicts that a consumer's desired non-durable 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.[6] Holding such preference shifters constant, the desired amount of debt is then determined by a household's current income and by the discounted stream of future earnings. These basic results highlight the need to control for variables like the household's current income as well as the age, level of education, and employment status of "core" household members when modeling debt outcomes.[7]

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, earnings capacity, or current assets. Furthermore, cross-country differences in the degree of legal enforcement or in access to past information about borrowers will affect how the bank's assessment of risk is transmitted into risk pricing and, ultimately, the distribution of debt outcomes across groups of the population.

There is a wide dispersion across euro-area countries in the availability of information needed to screen borrowers—such as the existence of credit bureaus, for example—and also in the costs banks incur in the case of non-repayment of a loan, measured in terms

[6]See Dynan and Kohn (2007) for a related discussion. Note that those predictions are not specific to 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.

[7]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.

of the time needed to repossess an asset that serves as mortgage collateral. Both factors are likely to affect a bank's cost of granting loans, thus altering the supply of credit. On the other hand, the taxation on mortgage interest rate payments is also quite different across countries, generating dispersion in a household's effective discount rate when borrowing. Finally, to mitigate macroprudential risks, countries in the euro area may set different regulatory LTV ratios. The cross-country variation in these institutions is likely to change households' demand for mortgages. We briefly review the potential impact on each of these institutions on debt outcomes.

3.1.1 Time to Repossess

A longer repossession period generally increases the cost of a lender's asset recovery process in the event that a borrower does not repay a mortgage, thus shifting inwards the lending supply curve. However, we may expect that longer repossession periods make access to loans especially tight for groups who, from the perspective of lenders, have higher ex ante chances of not repaying their loans. Empirically, these are typically low-income individuals or younger households, who have had less time to accumulate assets over the life cycle—see Duygan and Grant (2009).[8]

As an illustration, in the context of unsecured lending, simulations of general equilibrium models, calibrated to reproduce the distribution of debt in the United States, suggest that lenders react to the increase in uncertainty about loan repayment by charging higher group-specific interest rates on loans granted to young and to low-income households. In equilibrium, these groups hold lower amounts of debt. Hintermeier and Koeniger (2011) and Livshits, MacGee, and Tertilt (2007) present simulations ilustrating how the existence of bankruptcy lowers debt holdings and increases interest rates paid by younger households, while Chatterjee et al. (2007) also examine low-income households.[9]

[8]Duygan and Grant (2009) explore the determinants of falling into arrears using panel data on European households. They find that the probability of paying behind schedule falls with household income and with age—the latter, once non-linearities are taken into account.

[9]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

In sum, we expect that in countries with shorter repossession periods, the fraction of mortgage borrowers and secured-debt-to-income ratios will be higher, especially among young and low-income households, while interest rates on the mortgages granted to those groups are likely to be relatively lower.

3.1.2 Taxation

The (partial) tax exemption on mortgage interest rate payments raises the return on housing purchases financed with secured loans, relative to other financial investments. These fiscal incentives are especially strong in countries where owner-occupied housing consumption is not taxed. Hence, we expect that generous tax incentives to borrowing will increase the demand for secured debt.

Mortgage tax incentives are especially attractive for young households, who find it advantageous to anticipate secured borrowing to benefit from a high return to investment early in the life cycle. Furthermore, if downpayments are necessary to obtain a mortgage, high-income households should be especially responsive to tax incentives. This is because high-income households are most likely to accumulate the funds necessary for the downpayment, and thus benefit from tax incentives (see Gervais 2002). However, tax-induced increases in the demand for loans can be partially captured by banks in the form of higher interest rates. For example, Devereux and Lanot (2003) document that mortgage tax relief in the United Kingdom was passed through to borrowers via higher interest rates, due to a limited degree of competition in the lending market.

Overall, in countries where a higher fraction of mortgage payments are tax exempt, one should observe a greater fraction of indebted households and, among these, higher debt-to-income ratios. Again, these impacts are expected to vary by age and income and should be strongest among young and high-income households.

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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 time periods to repossess make secured debt look like unsecured debt.

3.1.3 Regulatory Loan-to-Value Ratios

An increase in the regulatory LTV ratio can be modeled as an increase in the demand for secured debt borrowing.[10] This is because higher regulatory LTV ratios relax the need to accumulate funds prior to a house purchase, making secured borrowing especially attractive for individuals with a lower ability to save for a down-payment, such as the young and those with lower income levels. The increase in the demand for housing among these groups can be met by property sales of older agents, thus flattening the age profile of borrowers (see Ortalo-Magné and Rady 1999, 2006). In addition, the relaxation of the LTV ratio allows younger households to hold higher debt amounts.

As is the case with any demand-induced boost in lending, these effects may be dampened if lenders react to the increased demand for loans by raising the interest rate charged to borrowers (see Chambers, Garriga, and Schlagenhauf 2009).

In sum, in countries with higher regulatory LTV ratios, young and low-income households are relatively more likely to hold secured debt and to have larger debt-to-income ratios, at the cost of paying higher interest rates on their secured loans.

3.1.4 Information about Borrowers

Access to past credit information can be viewed as a factor that expands the supply of loans. Access to credit bureaus allows banks to discriminate among borrowers and, possibly, to price in, at higher interest rates, consumers who may otherwise have their credit applications rejected—see Edelberg (2006).[11] Without information on borrowers, banks may use "one-size-fits-all" mortgages, whereby they reject the applications from riskier profiles. Improved access to borrowers' information allows banks to develop better scoring

[10] In practice LTV regulations are often implemented as increases in the cost of provisioning when granting a loan that exceeds a threshold. In that sense, these regulations also affect the supply of loans by altering the cost of granting loans. In the discussion we mainly follow the theoretical literature that models loan-to-value ratios as mainly a demand factor that allows new borrowers to access the credit market.

[11] See Magri and Pico (2010) for application of Edelberg's insights to Italy.

mechanisms, so that riskier profiles can now be observed borrowing but paying above-average interest rates.

As argued above, young and low-income individuals are more likely to run into loan arrears, so we could expect that better borrower information would increase both the interest rate paid by these groups (reflecting their relative risk) and their chances of borrowing (because their applications would be otherwise rejected). It is less clear how borrower information might impact the amount of debt held once a borrower's credit application has been accepted; the high interest rate faced by these potentially risky borrowers may depress the amount borrowed, thus lowering the average amount borrowed.

Finally, a potentially important institution that varies across countries is the prevalence of fixed- or adjustable-rate mortgages (FRMs vs. ARMs). 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 considerations about the borrower's repayment probability. Given the relevance of that institution, we condition for the share of FRMs in the multivariate analysis below.

3.2 Data on Institutions

We review now how the institutions described above vary across euro-area countries (for sources and measurement of the institutions used, see table 2A). Turning first to the length of repossession, in the event that a mortgage is not repaid, the average time needed to repossess the collateral is short in the Netherlands, Spain, Germany, and Austria (where it takes less than ten months), is somewhat longer in Belgium and France (twenty months), and reaches fifty-six months in Italy (see the first row of table 2B). Figure 9, panel A (in the appendix) shows that the fraction of households with secured debts is indeed lower among countries with longer repossession periods. Furthermore, the median debt-to-income ratio held by indebted households is slightly smaller in countries where repossession periods are longer.

Countries in the euro area vary substantially in the taxation of secured debt repayments. All countries in the euro area, with the exception of Germany and Slovakia, feature some form of tax exemption on mortgage repayments for the house of residence.

Table 2A. Institutions and Credit Conditions: Definitions and Sources

Variable	Definition	Source
Legal Enforcement		
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[a]
Regulation: Fiscal and Macroprudential Framework		
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[a]
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[a]
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 Basel 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[a]
LTV Limit	The value of the limit above, measured as a percentage of the value of the property.	ESCB[a]

(*continued*)

Table 2A. (Continued)

Variable	Definition	Source
	Credit Conditions	
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[a]
Financial Development 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[b]

Sources: European System of Central Banks (ESCB), World Bank (WB).
[a]The information comes from the structural issues report by the Task Force of the Monetary Policy Committee of the ESCB "Housing Finance in the Euro Area," ECB Occasional Paper No. 101, March 2009, and from the replies from national central banks and commercial banks to ad hoc questionnaries that alimented this report. Data refer to originations in 2007.
[b]Data are from chapter 5.5 on financial access, stability, and efficiency in the World Bank's *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.

Table 2B. Institutions and Credit Conditions: Data Used

Institutional Variables	Countries										
	AT	**BE**	**DE**	**ES**	**FR**	**GR**	**IT**	**LU**	**NL**	**PT**	**SK**
Legal Enforcement											
Foreclosure Procedures											
Typical Duration of a Foreclosure Procedure (in months)	9	18	9	8	20	24	56	12	5	24	N/A
Regulation: Fiscal and Macroprudential Framework											
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
Regulatory Loan-to-Value Ratio											
Existence of LTV Limit	0	0	1	1	1	1	1	0	0	1	1
LTV Limit	–	–	60	80	60	75	80	–	–	75	70
Credit Conditions											
Prevalence of Fixed Interest Rates											
Dummy Indicating if Percentage of Mortgages on FR for a Period Longer than Ten Years > 50 Percent	0	1	1	0	1	0	0	0	1	0	0
Financial Development											
Depth of Credit Information Index (0–6)	6	4	6	5	4	5	5	N/A	5	4	4

Source: ESCB, World Bank.

Furthermore, these exemptions have no caps in the Netherlands and Austria. Panel B of figure 9 suggests that the fraction of households with secured debt is larger in countries with a higher mortgage tax relief. However, debt-to-income ratios vary little with tax relief measures.

The regulation of LTV ratios also varies across the euro zone. There are no explicit maximum LTV thresholds in Austria, Belgium, the Netherlands, or Luxembourg, although actual bank practices vary across these countries. All other countries specify a maximum threshold above which lenders usually need to provide extra capital or, in some instances, cannot make the loan eligible as collateral for covered or mortgage bonds. Such thresholds vary from 60 percent in Germany and France to 80 percent in Spain and Italy. Panel C of figure 9 shows that the fraction of indebted households is greater in countries where regulatory LTV ratios are higher or non-existent.

According to a World Bank index, which ranges from 0 to 6, information about borrowers is greatest in Germany and Austria (six points) and least complete in Belgium, France, Portugal, and Slovakia (four to six points). The index is not available for Luxembourg. Panel D in figure 9 suggests that variation in depth of information does not correlate much with the fraction of indebted households or with the debt-to-income ratio.

Finally, most countries in the euro area can be classified as mostly issuing FRMs—in the case of Belgium, France, and the Netherlands—or mostly ARMs—in the case of Austria, Spain, Greece, Portugal, and Slovakia. Only Germany and Italy are intermediate cases, where FRMs accounted for 58 percent and 48 percent of originations in 2007, respectively. See table 2B for details.

3.2.1 Summary

The arguments reviewed above suggest that longer repossession periods, lower tax relief for mortgage interest payments, stricter regulatory LTV ratios, or limited information about borrowers may reduce the overall probability of holding secured debt and amount of debt held. Most importantly, these effects vary across age and income groups. On the other hand, each institution has very different implications for the distribution of interest rates across groups.

Our reduced-form approach in the first step regresses the three outcomes of interest (the incidence of debt, the amount of debt held, and the cost of debt) on the set of demographics and socioeconomic variables mentioned above. The previous discussion suggests that country-specific estimates of the age and income profile of debt reflect the impact of the institutions reviewed above, among other factors. Similarly, the constants of these regressions (or the fitted probability, in the case of the incidence of debt) reflect the impact of country characteristics on the probability of holding debt, the amount of debt held, or the interest rate for a reference group, holding household characteristics constant.

The second step of our analysis examines how the specific country-level institutions reviewed affect those coefficients separately. The impacts on the age or income coefficients inform about how the specific institution affects the relative chances of holding debt among the young or the low-income groups relative to the reference group in that country. The impact on the intercept identifies instead how each institution affects the probability that a household in the reference group holds debt, the amount of debt held, or the interest rate paid. Arguably, unobserved country-level characteristics may be more likely to bias the estimates of the impact of institutions on the intercept than the estimates of the impact on age or income coefficients from the first step. However, the previous discussion has highlighted that most institutions reviewed affect the overall chances of having secured debt and the amount of debt held, so we report the impact of institutions on intercepts. Furthermore, intercepts capture the outcomes of relatively young households (aged thirty-five to forty-four) with median income—among other characteristics, described below. That is a group likely affected by all the institutional differences reviewed above.[12]

[12]Our analysis deliberately ignores 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-Sorensen 2009). In a similar vein, we do not include housing price dynamics, as variation in the institutions we analyze in the second step has a separate impact on house prices through the credit market—see Ortalo Magné and Rady (1999, 2006).

4. Empirical Strategy

This paper has two aims. The first is 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 examined by estimating country-specific equations, thus allowing for country effects both in the intercepts and in the slopes. The second aim is to examine the role of institutions in accounting for these differences. In this second part, we regress a selection of the first-step coefficients—in particular, those relating to age and income—on relevant country-level legal and financial institutions.

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

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

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 $c = AT, BE, DE, \ldots, SK$). 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. 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 thirty-five to forty-four 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 use OLS regression techniques to assess the effect of the independent variables on the mean 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. We make no adjustment for the fact that the amount of debt cannot be negative.[13]

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.[14]

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

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

where ν_{0c} is an error term that captures unobserved country-level variables as well as possible specification errors. In this stylized example, x_2 denotes the household characteristics we focus on (income and age) and x_1 denotes other household-level controls.

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

However, in a separate specification, we regress on as many as five institutions (measured using seven variables). In that case, we

[13]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. We also examine if responses are heterogeneous using a location-scale model—i.e., a model where we regress the absolute value of OLS residuals on the same regressors, providing the effects on the variance of log secured debt. In both cases, we find that, with some exceptions, the age and income coefficients vary little over the distribution of outcomes.

[14]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.

present standard errors that take into account only the sampling variability due to estimated $\hat{\beta}_c - \beta_c$, 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). A related point has been made in a recent paper by Abadie et al. (2014).

4.1 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 as follows: four age dummies for the age of the oldest core member (the omitted group is thirty-five to forty-four years of age) as well as the age difference between core 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).

4.2 A Digression: Alternative Modeling Methods

The estimates $(\hat{\gamma}_{20}, \hat{\gamma}_{21})$ 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:

$$y_{hc} = \beta_{0c} + \beta_{1c}x_{1hc} + \gamma_{20}x_{2hc} + \gamma_{21}z_c x_{2hc} + u_{hc}. \quad (1)$$

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}. In a nutshell, estimates of γ_{21} in (1) control not only for additive country fixed effects but also for slope country fixed effects interacted with x_1.

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 $k = 1, 2$.

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

Note that equation (2) is a special case of equation (1) but subject to the additional restriction $\beta_{1c} = \gamma^*_{10} + \gamma^*_{11}z_c$. In this case the estimated effects $\hat{\gamma}^*_{11}$ and $\hat{\gamma}^*_{21}$ will have causal validity only under more restrictive conditions than $\hat{\gamma}_{11}$ or $\hat{\gamma}_{21}$. For example, $\hat{\gamma}^*_{11}$ and $\hat{\gamma}^*_{21}$ allow for additive country-effect endogeneity but not for country-effect endogeneity operating interactively through other household characteristics.[15]

4.3 Interpretation of the Coefficients

The weakest interpretation of our estimates $\hat{\gamma}_{01}, \hat{\gamma}_{11}, \hat{\gamma}_{21}$ is that these reflect unbiased predictive (not causal) effects of the corresponding β's. In our view, assessing the predictive ability of institutional

[15]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 the European Union Statistics on Income and Living Conditions, 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 ten.

variables in explaining differences in debt held by comparable households across euro-area countries is in itself of considerable economic interest.[16]

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 $\hat{\beta}_{2c}$ on several institutions z_c at the same time. By comparing the estimated impact of z_c on $\hat{\beta}_{2c}$ across univariate and multivariate specifications, we obtain indications of whether the estimated γ_{21} is causal.[17]

4.4 Issues Related to Timing

Finally, it should be noted that while we examine cross-country variation in debt outcomes as of 2009–10, 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.

[16] 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.

[17] As noted above, eight of eleven 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. Hence, the coefficients in the second-step regressions, when we include 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.

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 extent—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 its extent.

Secondly, in discussing the impact of institutions on age profiles, we focus mainly on those age profiles up to fifty-four years of age and, in some instances, below forty-four 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 age forty-four 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 forty-four 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.

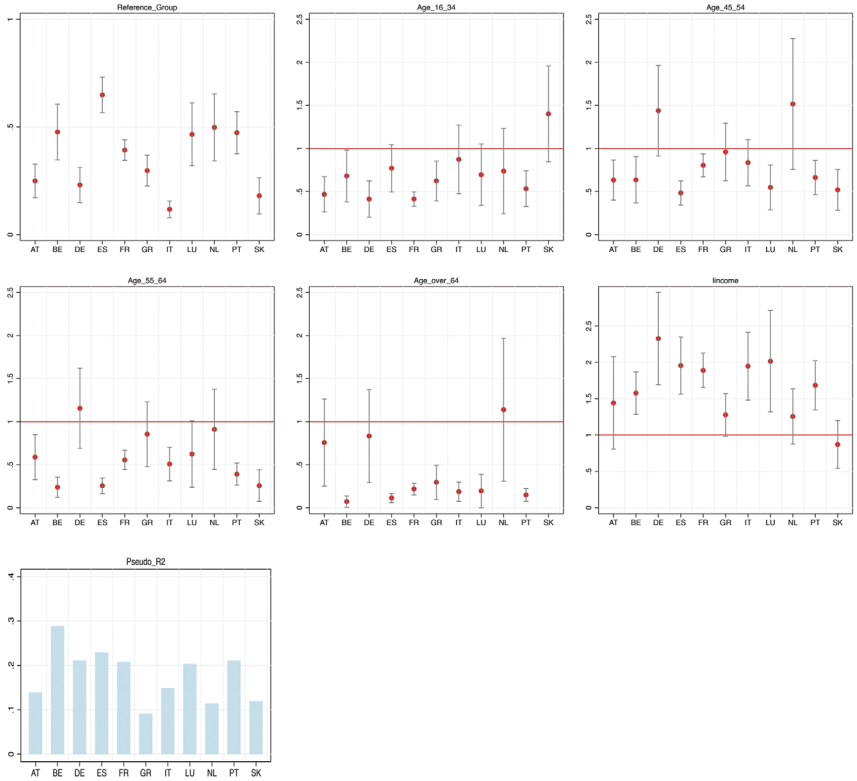
5. First-Stage Results: The Association between Debt Holdings and Household Characteristics

5.1 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 3. We present the probability of holding debt for the reference group, the country-specific odds ratios, and the associated confidence intervals only for the age and income coefficients—while the results of the rest of the conditioning variables are presented in the appendix. The odds ratios should be interpreted relative to the omitted category for each group.[18]

[18]For example, in the case of the Netherlands, the odds ratio for the "age forty-five to fifty-four" variable is 1.52. Since the omitted category here is "age thirty-five to forty-four," this implies that the odds of holding secured debt among

Figure 1. Has Secured Debt: Logit Regressions, Odds Ratios



Notes: Odds-ratio estimates and standard errors are 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. Aside from the covariates shown, we include as control variables educational level, labor and marital status, and household size as detailed in table 1.

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 percent, and

households where the eldest core member is between forty-five and fifty-four years is about 1.5 times that of households where the eldest core member is between thirty-five and forty-four.

Table 3. Has Secured Debt (logit regressions, odds-ratios)

Control Variables	Countries											F-Statistic
	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	3.970
	(0.105)	(0.154)	(0.108)	(0.140)	(0.042)	(0.118)	(0.203)	(0.182)	(0.252)	(0.106)	(0.284)	(0.000)
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	3.790
	(0.119)	(0.137)	(0.268)	(0.072)	(0.068)	(0.170)	(0.137)	(0.133)	(0.389)	(0.101)	(0.120)	(0.000)
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	5.800
	(0.134)	(0.059)	(0.237)	(0.046)	(0.057)	(0.191)	(0.100)	(0.197)	(0.238)	(0.066)	(0.094)	(0.000)
Age_Over_64	0.757	0.072	0.833	0.113	0.218	0.296	0.187	0.196	1.139	0.149	–	7.180
	(0.258)	(0.034)	(0.276)	(0.027)	(0.035)	(0.102)	(0.057)	(0.099)	(0.424)	(0.038)	–	(0.000)
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	3.160
	(0.324)	(0.149)	(0.323)	(0.201)	(0.121)	(0.151)	(0.238)	(0.356)	(0.194)	(0.172)	(0.168)	−(0.001)
Cons	0.326	0.881	0.299	1.847	0.646	0.422	0.133	0.870	1.014	0.898	0.218	13.540
	(0.073)	(0.229)	(0.070)	(0.339)	(0.066)	(0.074)	(0.026)	(0.260)	(0.293)	(0.179)	(0.063)	(0.000)
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	

Notes: 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. Aside from the covariates shown, we include as control variables educational level, labor and marital status, and household size as detailed in table 1. The full set of results can be found in the appendix (table 8). The sample includes all households in the country HFCS. All estimates are weighted by population weights and averaged across the five implicates. The last column shows the F-statistics where the null hypothesis is that all coefficients in the row are equals to each other (p-values in parentheses).

lowest in Italy, where this type of household has about a 10 percent probability of holding secured debt.

In keeping with the existing literature on household debt, 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 thirty-five to forty-four years and decreases thereafter—see table 3 or figure 1. However, the age profiles vary across countries. In the case of Austria, France, or Germany a head of household who is aged between sixteen and thirty-four years has a much lower chance of holding secured debt relative to the reference group (which is thirty-five to forty-four years of age); the odds ratio in these cases is below 0.5. However, the odds of the sixteen to thirty-four age group holding debt in Netherlands, Spain, or Slovakia are not statistically different from 1, which implies that the probability of holding debt is very similar between both groups.

The probability of having secured debt increases with income in almost all countries, consistent with the notion that mortgages are a derived demand of owner-occupied housing consumption, which is a normal good—see the fifth row of table 3. The rate at which the probability of borrowing increases with income is, however, modest in the Netherlands, Greece, and Slovakia, where the null hypothesis of no change in the odds of holding secured debt along the income distribution cannot be rejected. On the other hand, the odds of holding secured debt responds strongly to household income in Italy, Spain, and Germany.

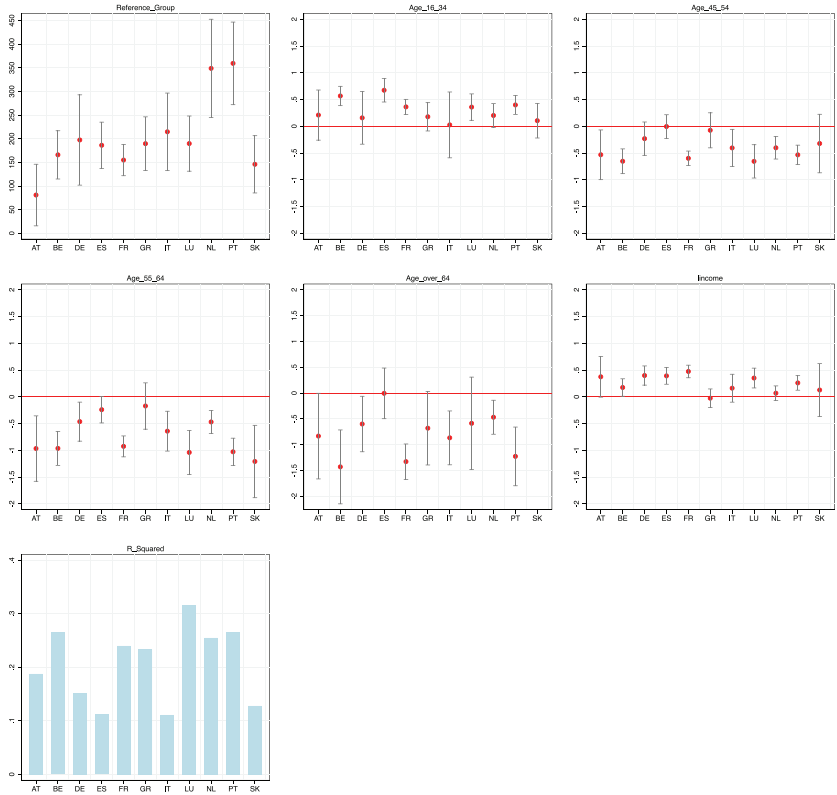
The differences in the coefficients discussed above are statistically significant. We conducted an F-test of equality of the coefficients of the age sixteen to thirty-four dummy across countries and, separately, another one on the equality of the income coefficient. In both cases, the null of identical coefficients across countries is rejected at the 1 percent confidence level—see the last column of table 3.

We show the pseudo R-squared value from our estimated regressions in the final chart in figure 1 and in table 3. It is relatively high in Belgium, at a value of close to 0.3, and lowest in Greece, at just under 0.1.

5.2 The Amount of Debt Held

The country-level results for the OLS regressions for the amount of debt are presented in figure 2, where we show the estimated

Figure 2. Debt Balance of Secured Debt



Notes: OLS estimates and standard errors are shown in table 3. The first panel on the left plots the mean of the debt-to-income ratio for the reference group in each country. Aside from the covariates shown, we include as control variables educational level, labor and marital status, and household size as detailed in table 1.

average debt-income ratio held by indebted households in the reference group as well as the estimated age and income coefficients and their confidence intervals—a subset of the full set of covariates.[19] The omitted categories for the dummy variables are detailed

[19]Given the definition of the covariates, the constant of the OLS regression reflects the estimated log debt amount of the reference household. We take the

in section 4.2. The first chart on the top row of figure 2 reports the results for the reference group.

The chart in the top left corner of figure 2 shows the average debt-income ratio among the reference group specified earlier. The predicted ratio for this type of household is around 200 percent in most countries except in the Netherlands and Portugal—where it is around 350 percent—or in Austria and Slovakia—where it lies at or below 150 percent.

Across all countries, the log amount of secured debt holdings is highest for households where the reference person is aged sixteen to thirty-four years—see table 4, first row. Households with heads older than forty-five years hold lower amounts of debt relative to the omitted group, thirty-five to forty-four year olds.

Relative to the reference group, the amount of debt held by young adults is largest in Belgium, Spain, and Portugal, where the sixteen to thirty-four age group holds at least 40 percent higher debt amounts than the reference group. Conversely, indebted youths in Italy, Greece, and Germany hold an amount of debt that is less than 18 percent higher than that of the reference group.

As is the case with the probability of holding debt, the elasticity of the amount of debt with respect to household income is positive in all countries—but well below 1, indicating that debt-income ratios fall over the income distribution. As mentioned above, a positive elasticity of the amount of debt with respect to income is consistent with the idea that secured borrowing is tied to housing—a normal good. The elasticity of the debt amount with respect to income is highest in Germany, Spain, and France, but it is relatively modest in Greece, the Netherlands, and Slovakia. 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.[20]

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exponential of the constant and normalize it by the median household income in the country—we ignore in the computation the variance of the errors that would arise in a log-normal distribution. Confidence intervals were computed using the delta method.

[20]The location-scale model described in footnote 13 suggests that the within-country dispersion of the logarithm of secured debt increases with age, a finding that could be explained by differences in the speed of mortgage repayment across countries—see Bover et al. (2013).

Table 4. Debt Balance of Secured Debt (OLS estimates)

Control Variables	Countries											F-Statistic
	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	2.100
	(0.239)	(0.092)	(0.251)	(0.112)	(0.072)	(0.135)	(0.314)	(0.126)	(0.114)	(0.090)	(0.165)	(0.022)
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	3.140
	(0.237)	(0.118)	(0.159)	(0.113)	(0.069)	(0.167)	(0.177)	(0.159)	(0.107)	(0.093)	(0.279)	(0.001)
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	4.380
	(0.312)	(0.162)	(0.186)	(0.126)	(0.100)	(0.221)	(0.190)	(0.210)	(0.110)	(0.130)	(0.345)	(0.000)
Age_Over_64	−0.833	−1.429	−0.599	−0.005	−1.328	−0.680	−0.867	−0.586	−0.468	−1.226	–	3.160
	(0.423)	(0.365)	(0.274)	(0.250)	(0.175)	(0.363)	(0.266)	(0.457)	(0.168)	(0.290)	–	(0.001)
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	3.840
	(0.194)	(0.083)	(0.092)	(0.080)	(0.060)	(0.089)	(0.133)	(0.094)	(0.070)	(0.070)	(0.252)	(0.000)
Cons	10.840	10.720	10.770	10.390	10.670	10.750	10.690	11.540	11.890	10.740	9.693	6.720
	(0.481)	(0.156)	(0.222)	(0.152)	(0.089)	(0.169)	(0.175)	(0.198)	(0.144)	(0.128)	(0.347)	(0.000)
R^2	0.188	0.265	0.152	0.112	0.240	0.234	0.111	0.316	0.255	0.266	0.128	

Notes: 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. Aside from the covariates shown, we include as control variables educational level, labor and marital status, and household size as detailed in table 1. The full set of results can be found in the appendix (table 9). The sample includes only the households that report holding secured debt. All estimates are weighted by population weights and averaged across the five implicates. The last column shows the F-statistics where the null hypothesis is that all coefficients in the row are equals to each other (p-values in parentheses).

The absence of cross-country differences in the aged sixteen to thirty-four dummy or in the coefficient of household income is rejected at usual confidence levels (see the last column of table 4). Finally, we show the R-squared value for the estimated regressions in the final chart of figure 2 and table 4, which varies from a low of .11 in Italy and Spain to a high of .32 for Luxembourg.

5.3 Cost of Secured Debt

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 percent in Germany (see the second-to-last row of table 5 and figure 3).

The youngest households pay higher interest rates on their mortgages than the reference group in Austria, Portugal, and Greece but lower ones in the Netherlands, France, and Luxembourg. However, an F-test does not reject the null hypothesis that coefficients are equal in all countries.

Regarding household income, the cost of debt falls smoothly along the income distribution in all countries, but it is most precisely estimated in France, Italy, Portugal, and Luxembourg, countries where the semi-elasticity of interest rates to household income is larger than in the rest of the countries and statistically different from zero (see table 5). An F-test rejects the null hypothesis of equality of coefficients of income across countries at the 10 percent confidence level. 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. Furthermore, the magnitudes can be substantial: the country-specific income coefficients imply that, holding the rest of the covariates constant, the predicted difference in the interest rate paid by households in the 10th centile of the income distribution and those in the 90th centile amounts to 202 basis points in Italy, 69 in Portugal, and 54 in Luxembourg and in Greece. Finally, the R-squared value is typically small, ranging from about .03 in Spain to .12 in Italy.

5.4 Summary

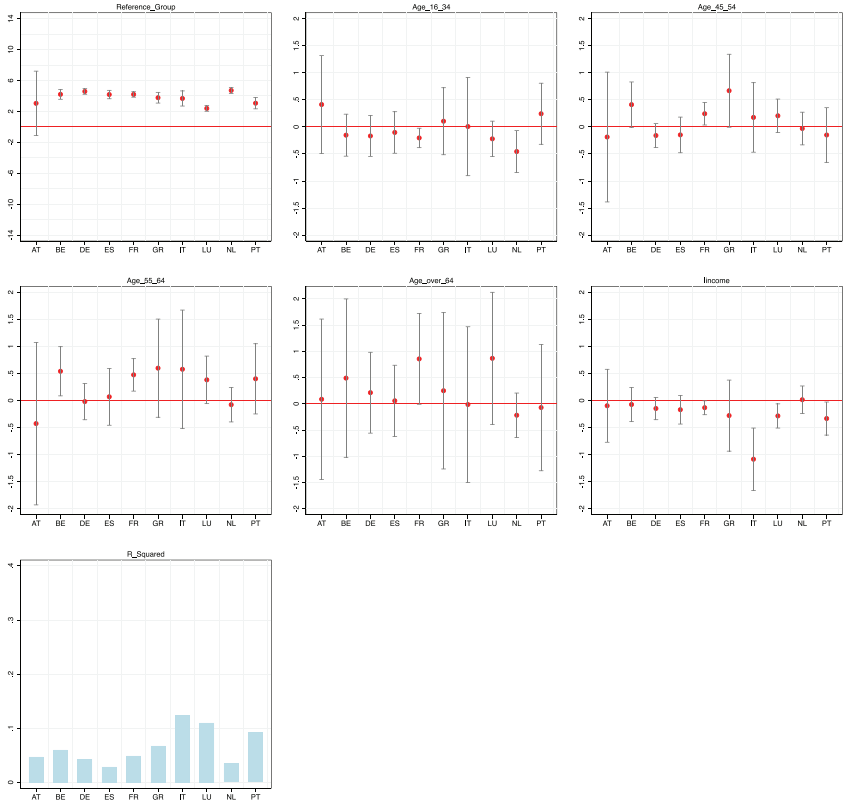
The results thus far suggest that age and income are important determinants of debt holdings. A possible interpretation of the

Table 5. Current Interest Rate of HMR Mortgage (OLS estimates)

Control Variables	Countries										F-Statistic
	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	0.940
	(0.462)	(0.198)	(0.193)	(0.196)	(0.092)	(0.316)	(0.463)	(0.167)	(0.198)	(0.288)	(0.495)
Age_45_54	−0.187	0.411	−0.160	−0.148	0.243	0.668	0.175	0.205	−0.030	−0.150	1.480
	(0.612)	(0.214)	(0.113)	(0.168)	(0.106)	(0.344)	(0.328)	(0.158)	(0.154)	(0.258)	(0.143)
Age_55_64	−0.427	0.541	−0.020	0.069	0.474	0.598	0.578	0.382	−0.078	0.401	1.310
	(0.766)	(0.232)	(0.171)	(0.268)	(0.153)	(0.463)	(0.558)	(0.224)	(0.162)	(0.331)	(0.222)
Age_Over_64	0.086	0.489	0.211	0.056	0.855	0.248	−0.015	0.866	−0.219	−0.073	0.750
	(0.780)	(0.770)	(0.393)	(0.346)	(0.441)	(0.760)	(0.757)	(0.642)	(0.216)	(0.614)	(0.660)
Ln(Income)–	−0.098	−0.074	−0.148	−0.170	−0.133	−0.279	−1.085	−0.285	0.014	−0.333	1.610
Ln(Median_Income)	(0.344)	(0.161)	(0.105)	(0.135)	(0.066)	(0.335)	(0.294)	(0.114)	(0.130)	(0.156)	(0.100)
Cons	3.318	4.053	4.641	4.208	4.370	4.002	4.423	2.452	4.622	3.033	3.410
	(1.997)	(0.312)	(0.150)	(0.244)	(0.132)	(0.312)	(0.379)	(0.202)	(0.200)	(0.351)	(0.001)
R^2	0.047	0.060	0.043	0.029	0.049	0.068	0.124	0.110	0.034	0.092	

Notes: 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. Aside from the covariates shown, we include as control variables educational level, labor and marital status, and household size as detailed in table 1. The full set of results can be found in the appendix (table 10). The sample includes only the households that report holding secured debt. All estimates are weighted by population weights and averaged across the five implicates. The last column shows the F-statistics where the null hypothesis is that all coefficients in the row are equals to each other (p-values in parentheses).

Figure 3. Current Interest Loan of HMR Mortgage



Notes: OLS estimates and standard errors are shown in table 4. Aside from the covariates shown, we include as control variables educational level, labor and marital status, and household size as detailed in table 1.

general tenor of the results is that secured debt is a derived demand of housing, as it correlates strongly with income and age in most countries. 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. (2014) and Le Blanc et al. (2015) 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.

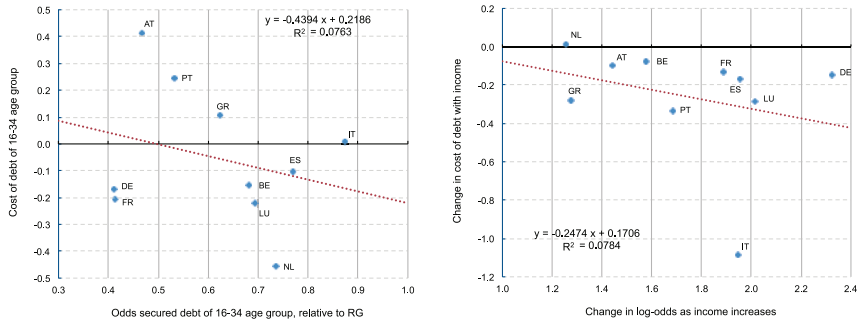
We now examine the expected effects of the institutions discussed in section 3 on the heterogeneity detected in the magnitude and the sign of the first-step coefficients. Assume that variation in the taxation of mortgage interest rates, in regulatory LTV ratios, or in the degree of information about borrowers were key explanatory factors accounting for the differences in figures 1–3. As explained in section 3, we should then expect, in the case of higher LTVs or a more generous tax treatment of mortgage payments, that young households borrow comparatively more than prime-age households do, and that such high demand for mortgages leads banks to charge a higher interest rate for the loans granted to these groups. On the other hand, in countries with more credit information about borrowers, lenders charge higher interest rates to the younger households who borrow and whose applications would be rejected in the absence of such information. In other words, in those cases, the cross-country correlation between the odds that young households hold secured debt and the interest rate they pay should be positive.

Alternatively, imagine that the differences in the banks' expected cost of lending account for the heterogeneity in borrowing outcomes across countries. That is, in countries with long repossession periods, banks end up charging higher interest rates to households more prone to default (younger households), who would end up borrowing comparatively less. In such a scenario, the cross-country correlation between the incidence and amount of debt borrowed by young households and the differential interest rate they pay—both magnitudes relative to the reference group in the country—would be negative.

In the left panel in figure 4, we plot in the vertical axis the first-step coefficient of the "age sixteen to thirty-four group" in the regression with interest rates as a dependent variable (the coefficients displayed in the first row of table 5). The horizontal axis contains the chances that the youngest group of households have secured debt, relative to the reference group (i.e., the coefficients displayed in the first row of table 3).

In countries like Austria and Portugal, young households pay about 20 basis points higher interest rates than the reference group in those countries and have lower odds of holding secured debt relative to the reference group. Conversely, the youngest set of households in Spain and the Netherlands pay lower interest rates than the reference groups in their countries, while their odds of having

Figure 4. Relative Chances of Holding Debt vs. Relative Cost



secured debt are similar to the reference group. That is, the relationship between the cost of debt and the odds of holding debt is negative, consistent with the hypothesis that the variation in the repossession periods accounts for cross-country differences in debt outcomes.

Furthermore, the right panel of figure 4 plots the country-specific change in the interest rate when household income increases (table 5) against the country-specific change in the odds of holding secured debt when household income increases (table 3). The relationship is also negative: in countries where interest rates fall with household income, the odds of holding secured debt increase with income. Again, the pattern in figure 4 is inconsistent with the notion that variation in the tax relief accounts for the variation in debt outcomes, because in that case high-income households would borrow relatively more and pay higher interest rates—resulting in a positive correlation between the elasticity of borrowing to income and the semi-elasticity of interest rate to income. However, it is consistent with the notion that higher costs of repossession lead banks to charge higher rates to low-income borrowers, who end up borrowing less.[21]

[21] A negative relationship between the change in the chances of borrowing with household income and the semi-elasticity of interest rates with respect to household income is also consistent with the notion that LTVs explain the variation in the odds of holding debt across countries in the euro area. The reason is that countries with higher LTV ratios would feature both a low sensitivity of the

Overall, figure 4 suggests that variation in the banks' expected cost of debt associated with longer repossession periods may be more important than tax relief of mortgage payments, LTV ratios, or the depth of information about borrowers in accounting for cross-country differences in the odds of holding debt in the euro zone. The second step of the analysis examines the role of particular country-level institutions in driving the differences in the first step.

6. Second-Stage Results: The Influence of Institutions and Credit Conditions

6.1 The Effect of Institutions

Figures 1–3 highlight the varying impacts of the socioeconomic and demographic factors in explaining household debt behavior 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.

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 the charts shows the impact of the institutional variables on the odds of holding debt—the dependent variable corresponds to the estimated coefficients from the first step shown in table 3 and in figure 1.[22] The second column of the charts reports the effect of institutions on the amount of debt held (the dependent variable is the estimated OLS coefficients from the first step). The third and final

odds of borrowing to household income and a low sensitivity of interest rates to household income. Conversely, countries with low LTVs would feature a high sensitivity of the odds of borrowing to income and a negative correlation between interest rates and income. The overall correlation would then be negative, as in figure 4. However, variation in LTVs shown in the left panel of figure 4 cannot account for the negative relation between the relative chances that very young households borrow and the interest rate they pay.

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

column of the 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 percent confidence intervals associated with these estimates. These estimates and their standard errors are also reported in table 6.

We focus on the effects of institutions on the intercept, age, and income differentials because those are the ones that the discussion in section 3 suggests should respond to changes in the demand and supply of debt. Moreover, the results of the first step show that the differences are most salient for those coefficients.

We consider four main institutions: duration of foreclosure, taxation of mortgage payments, regulatory loan-to-value ratios, and information about borrowers. As mentioned above, there is a literature providing insights 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.[23]

6.1.1 Duration of Foreclosure

Table 6 and the first chart in figure 5 show 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 for the reference group, and this result is statistically significant at the 95 percent confidence level. However, an increase in the duration of foreclosure tends to lead to a modest reduction in debt amounts held.[24]

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.

[23]In Bover et al. (2013), we examine the explanatory power of other country-specific institutions, such as the prevalence of fixed-rate mortgages, 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 sociodemographic groups of the population. In the case of the prevalence of fixed-rate mortgages, note that we include below a multivariate regression model where we hold that institution constant when examining the impact of the four main institutions.

[24]Du Caju, Rycx, and Tojerow (2016) use methods similar to ours to document that in countries with costlier foreclosure procedures, the reference group has a significantly lower probability of being over-indebted.

Table 6. Summary of the Effects of Institutions (one institution at a time; secured debt)

	Duration of Foreclosure (Number of Months)			Taxation of Mortgage Payments					
	Hold	Level	Cost	Hold		Level		Cost	
				Existence	No Limit	Existence	No Limit	Existence	No Limit
Reference	−0.0073*	−0.0014	−0.0037	0.1740	−0.0509	0.2920	0.5420	−0.6490	0.1140
Group	(0.0025)	(0.0058)	(0.0194)	(0.1770)	(0.2050)	(0.2830)	(0.3700)	(0.6490)	(0.6150)
Age									
Age 16–34	0.0061	−0.0084*	0.0055	−0.1630	−0.0497	0.2080	−0.1390	0.0822	−0.0265
	(0.0034)	(0.0033)	(0.0065)	(0.2750)	(0.3150)	(0.2210)	(0.2500)	(0.1720)	(0.2290)
Age 45–54	0.0000	−0.0022	0.0100	−0.3610	0.2040	−0.1610	−0.0606	0.3110	−0.2430
	(0.0057)	(0.0048)	(0.0073)	(0.2330)	(0.3060)	(0.2490)	(0.2820)	(0.2780)	(0.2400)
Income	0.0014	−0.0046	−0.0168*	0.0352	−0.4530	0.0190	−0.0518	−0.0897	0.2080
	(0.0057)	(0.0030)	(0.0037)	(0.3490)	(0.3960)	(0.1790)	(0.2090)	(0.2560)	(0.2210)

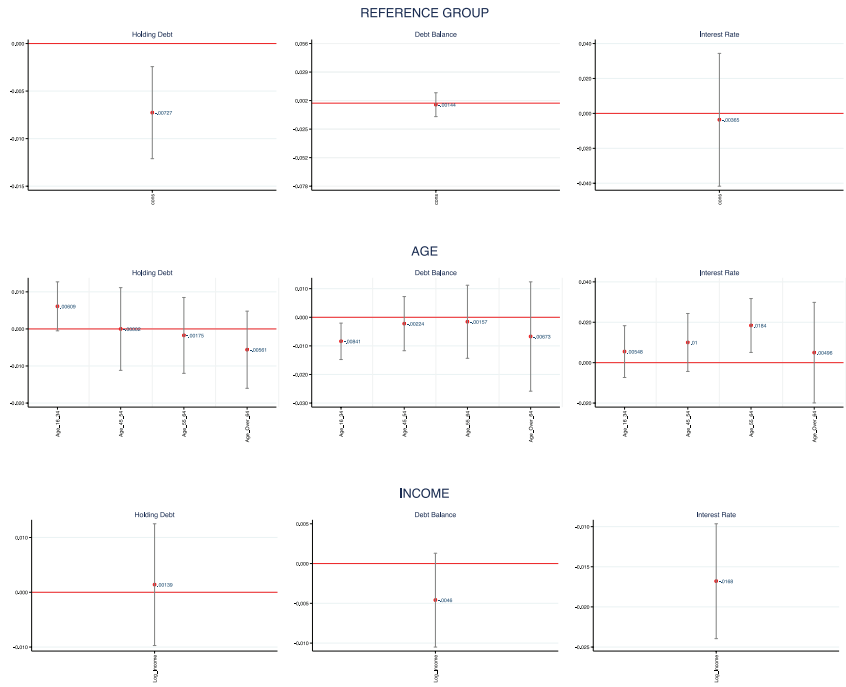
(*continued*)

Table 6. (Continued)

	Infomation on Borrowers			**Regulatory LTV**					
	Hold	**Level**	**Cost**	**Hold**		**Level**		**Cost**	
				Existence	**Limit**	**Existence**	**Limit**	**Existence**	**Limit**
Reference	−0.0695	0.0926	0.1270	−0.1220	0.0000	−0.6700	−0.0050	−0.0098	−0.0238
Group	(0.0794)	(0.1530)	(0.2380)	(0.2160)	(0.0068)	(0.3720)	(0.0117)	(0.6110)	(0.0257)
Age									
Age 16–34	0.0316	−0.0916	0.0406	0.1240	0.0191*	−0.1210	−0.0007	0.3250*	0.0103
	(0.1230)	(0.0973)	(0.1060)	(0.2400)	(0.0075)	(0.2700)	(0.0084)	(0.1420)	(0.0091)
Age 45–54	0.1480	0.1790*	−0.1700	−(0.1910)	−0.0118	0.3420	0.0144*	−0.1950	−0.0072
	(0.1210)	(0.0901)	(0.1100)	(0.3240)	(0.0100)	(0.2330)	(0.0071)	(0.2680)	(0.0115)
Income	0.1030	−0.0465	−0.0041	0.1950	−0.0060	0.0221	−0.0117*	−0.2820	−0.0115
	(0.1580)	(0.0785)	(0.1090)	(0.4060)	(0.0124)	(0.1560)	(0.0050)	(0.2120)	(0.0087)

Notes: 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 (hold, 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 eleven countries for the analysis of taxation of mortgage payments and regulatory LTV and ten countries for the other institutions. This table is a summary of figures 5–8. * indicates a statisically signficant coefficient at the 5 percent confidence level.

Figure 5. Duration of Foreclosure (number of months)



Notes: Each graph shows the OLS coefficient and its 95 percent confidence interval 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 6.

Namely, a month's delay in the time to repossess leads to a 0.84-percentage-point reduction in the relative amount of debt held by the youngest group of households (see table 6).

As discussed in section 3, one would expect that when repossession costs are higher, banks tend to lend more to "safe," high-income households and charge relatively lower rates to this group. The results 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 statistically different from zero. 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.

6.1.2 Taxation of Mortgage Payments

To quantify tax relief on mortgage payments, we define two dummies. A first dummy variable equals one if such an exemption exists, and zero otherwise. Secondly, for those countries where an exemption exists, we define 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 are presented in figure 6, where the top panel presents the results with the dummy that denotes that an exemption exists, while the bottom panel presents the results for the indicator "no limit exists."

The results shown in figure 6 and table 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.

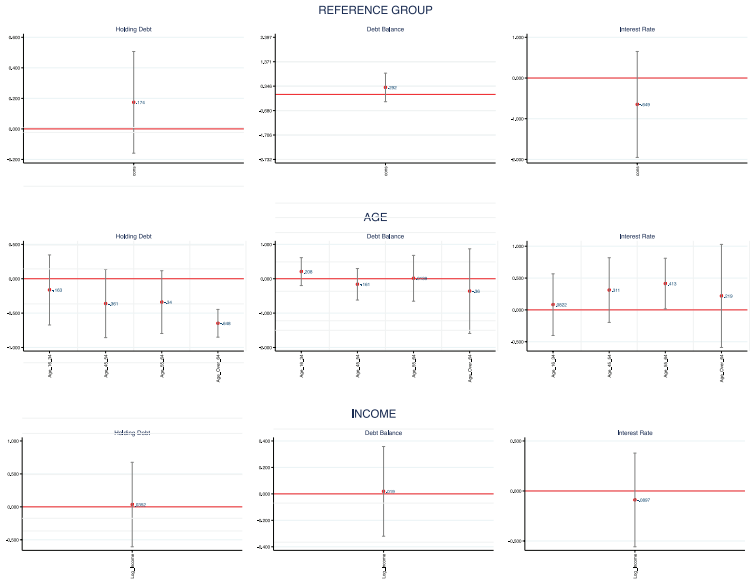
Turning to the amount of debt held by the reference group, the existence of interest payment deductibility increases the amount of debt held by a considerable 34 percent (=exp(.29)−1), but the effect is again imprecise. Furthermore, among countries where there is no limit in tax deductibility, the reference group holds 52 percent higher debt amounts (.52=exp(.54)−1). However, the estimate is not very precise.

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. However, no further response is noticeable within the set of countries without any limit to tax deductibility.

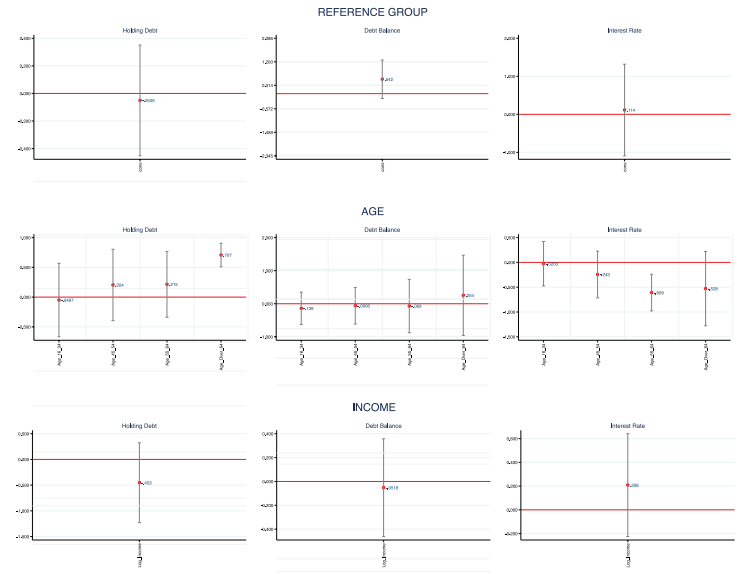
On the contrary, there is no evidence of an income profile in the results. This is contrary to Gervais' predictions, as any tax incentive

Figure 6. Taxation of Mortgage Payments

A. Existence of Tax Exemption (controlling for the existence of limit to deductibility)



B. Absence of a Limit to Tax Deductibility (controlling for the existence of tax exemption)



Notes: Each graph shows the OLS coefficient and its 95 percent confidence interval 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 6.

would reinforce the role of higher marginal taxes in shaping debt outcomes.[25]

6.1.3 Financial Regulation

To capture regulatory LTV ratio differences across countries, we define two dummies. The first takes a value of one if a threshold exists above which banks must do extra provisioning, and zero otherwise. As mentioned above, such a threshold 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 socioeconomic and demographic variables from the first-stage regression.[26] The results are shown in figure 7 and in table 6.

Looking at the reference group, the existence of a regulatory LTV does not affect the probability of borrowing but reduces the amount of secured debt borrowed by 67 percent. However, when an LTV exists, higher limits do not affect either of those outcomes.

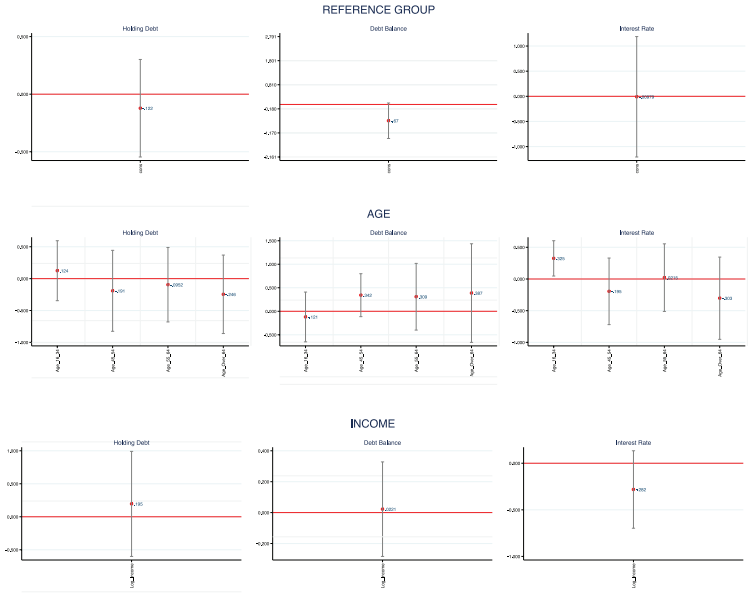
Among countries that do have a regulatory LTV, a higher limit increases the relative chances of holding secured debt among very young households while reducing those of older age groups. That result is consistent with the idea that maximum LTVs are most binding early in the life cycle. However, the same logic would predict a negative impact of a higher regulatory LTV on the odds ratio of income, because a lower downpayment would allow low-income households to borrow. Our results do not support that basic prediction.

[25]We have redone the exercise using a quantitative measure in Andrews, Caldera Sánchez, and Johansson (2011). The results on the probability of holding debt were similar and more precise than the ones we show, but some of the results—like the young borrowing more in countries with more generous tax exemptions—did not hold using that variable. In addition, we found that the income profiles obtained in the data were at odds with the hypothesis that a more generous treatment of mortgage payments increases the odds that high-income households hold debt. We decided to present the results based on dummies because the measure of tax relief in Andrews, Caldera Sánchez, and Johansson (2011) already includes the cost of mortgage debt, one of the outcome variables we examine.

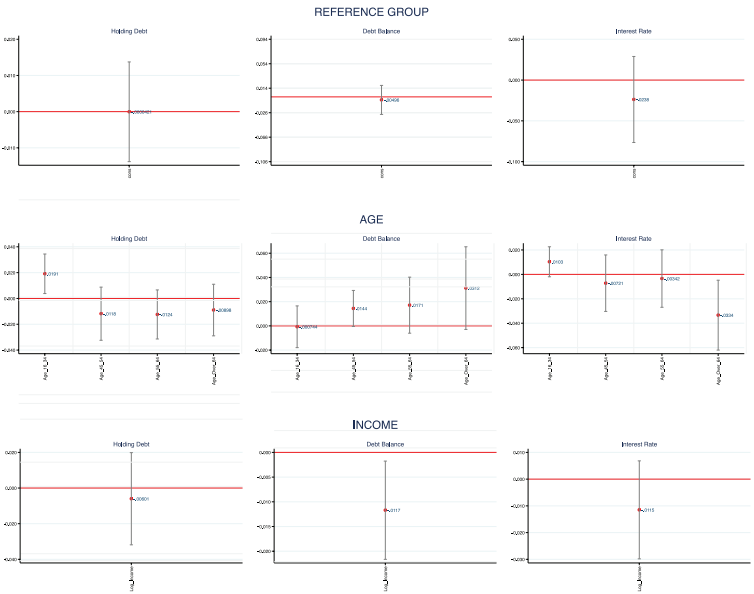
[26]We normalize this variable by subtracting 80 from the LTV value of each country.

Figure 7. Regulatory Loan-to-Value Ratio

A. Existence of Regulatory LTV Limit (controlling for the value of LTV regulatory limit)



B. Value of LTV Regulatory Limit (controlling for the existence of a regulatory LTV limit)



Notes: Each graph shows the OLS coefficient and its 95 percent confidence interval 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 6.

Finally, there is very limited evidence that changes in regulatory LTVs alter the cost of borrowing among those countries with a maximum LTV ratio. In fact, a higher LTV 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.

6.1.4 Information on Borrowers

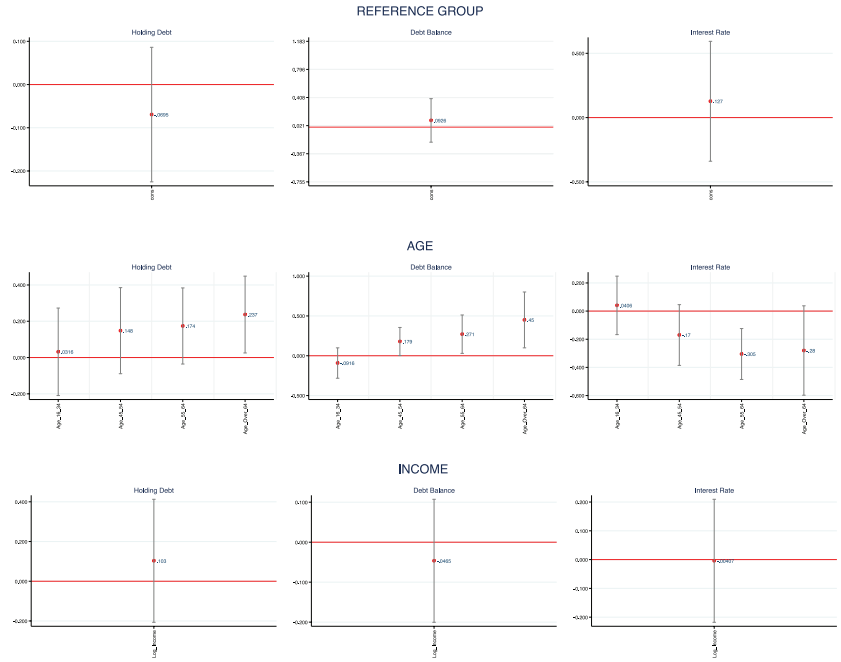
The impacts of credit information on borrowers on the age and income profiles of debt holdings and debt amounts are shown in figure 8 and table 6. In section 3, we argued that better information allows lenders to "price in" riskier borrowers—i.e., information allows banks to grant loans at high interest rates to risky borrowers whose applications would otherwise be rejected. Figure 8 presents evidence consistent with that hypothesis. In countries where more information about borrowers is available, we do observe that older (and possibly less risky) borrowers between forty-five and fifty-four face lower borrowing costs than in other countries where less information is available. 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 forty-five to fifty-four year olds and fifty-five to sixty-four year olds by 17 and 31 basis points, respectively—all estimates are relative to the impact on the reference group.

When we turn to the chances of borrowing, however, the estimates are weak. For example, age groups that are charged lower rates borrow relatively more, but the coefficients for prime-age groups are not statistically different from zero at the 95 percent confidence level. Finally, we do observe, however, that older households borrow significantly more in countries where better information about borrowers is available. Overall, we cannot reject the hypothesis that, in countries with more information about borrowers, interest rates serve as a screening mechanism.

6.2 Which Institutions Matter the Most?

We conduct a robustness analysis including the four institutions considered thus far, namely "time to repossess," "taxation,"

Figure 8. Information on Borrowers: Depth of Credit Information Index (0–6)



Notes: Each graph shows the OLS coefficient and its 95 percent confidence interval 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 6.

"loan-to-value ratios," and "depth of information," as well as an indicator for "fixed-rate mortgages" to control for differences in the cost of debt associated with the interest rate fixation mode as argued in section 3.1 and footnote 23. This is done by regressing each of the coefficients of interest on the set of five institutions at the same time. We report the standard errors that take into account the estimation error from the first step only. The results are shown in table 7.

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

Table 7. Multivariate Analysis

	RG	Age		Income
Control Variables		**16_34**	**45_54**	
A. Has Secured Debt				
Duration of Foreclosure	−0.011*	0.002	0.006*	0.001
	(0.001)	(0.004)	(0.003)	(0.005)
Existence of Tax Exemption	0.061	0.182	−0.860	−0.261
	(0.142)	(0.356)	(0.502)	(0.621)
Absence of Limit to Deductibility	0.033	−0.012	0.833	−0.122
	(0.206)	(0.608)	(0.876)	(0.530)
Existence of Regulatory LTV Limit	0.321	0.397	0.573	0.538
	(0.206)	(0.608)	(0.875)	(0.532)
Value of LTV Regulatory Limit	0.019	0.033	0.020	0.013
	(0.206)	(0.607)	(0.877)	(0.531)
Fixed Interest Rate	0.158	0.391	0.484	0.376
	(0.207)	(0.608)	(0.875)	(0.532
Depth of Credit Information Index	−0.109	0.103	−0.089	0.108
	(0.206)	(0.609)	(0.876)	(0.529)
B. Secured Debt Balance				
Duration of Foreclosure	0.005	−0.013*	−0.009*	−0.004
	(0.004)	(0.006)	(0.004)	(0.003)
Existence of Tax Exemption	−0.817	0.273	0.349	0.196
	(0.507)	(0.417)	(0.356)	(0.243)
Absence of Limit to Deductibility	1.380*	−0.394	−0.256	−0.015
	(0.446)	(0.329)	(0.348)	(0.228)
Existence of Regulatory LTV Limit	0.572	0.037	0.558	0.068
	(0.446)	(0.328)	(0.347)	(0.228)
Value of LTV Regulatory Limit	0.031	0.011	0.024	−0.011
	(0.446)	(0.327)	(0.347)	(0.227)
Fixed Interest Rate	0.430	0.072	0.267	0.015
	(0.447)	(0.329)	(0.348)	(0.228)
Depth of Credit Information Index	−0.338	−0.033	0.306	0.047
	(0.446)	(0.329)	(0.348)	(0.228)
C. HMR Interest Rate				
Duration of Foreclosure	0.005	0.002	0.008	−0.019*
	(0.013)	(0.015)	(0.011)	(0.009)
Existence of Tax Exemption	1.578	−0.320	0.923	0.120
	(1.358)	(0.749)	(0.711)	(0.472)
Absence of Limit to Deductibility	−0.324	−0.143	−0.715	−0.120
	(0.777)	(0.514)	(0.485)	(0.358)
Existence of Regulatory LTV Limit	1.517	−0.785	−0.423	−0.275
	(0.778)	(0.513)	(0.485)	(0.359)
Value of LTV Regulatory Limit	0.060	−0.037	−0.013	−0.013
	(0.778)	(0.514)	(0.484)	(0.358)
Fixed Interest	2.262*	−0.985	0.254	−0.064
	(0.778)	(0.513)	(0.485)	(0.359)
Depth of Credit Information Index	0.949	−0.129	0.292	−0.054
	(0.779)	(0.512)	(0.485)	(0.360)

Notes: 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 panel A, the secured debt balance of the RG in panel B, and the HMR interest rate of the RG in panel C. Covariates are the institutions in the rows. A constant is included in all regressions but not reported. The sample contains ten countries in panels A and B and nine in panel C. * indicates a statiscally significant coefficient at the 5 percent confidence level.

diminishes the chances that the reference group has secured debt by 1 percent. Longer repossession periods diminish less the borrowing chances of households above forty-five years of age than the chances of the thirty-five to forty-four 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 the covariates held constant at those of the reference group—by 0.008 log points (0.005–0.013). Our results also show 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, which, in principle, are most likely to default.

Mortgage tax exemptions do not robustly predict differences in the probability of holding debt. 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 role of the remaining 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. As expected, the prevalence of FRMs correlates with higher interest rates charged to the reference group—the effect is 200 basis points. Finally, 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.

6.2.1 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 fifteen months in our sample. Fifteen 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 data set, Djankov, McLiesh, and Shleifer (2007) and Jappelli, Pagano, and Bianco (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, McLiesh, and Shleifer 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 with ours since we only consider household debt and use different dependent variables, the finding that a one month longer repossession period increases the fraction of borrowers by 1 percentage point does not seem at odds with the previous ones.

On the other hand, Djankov, McLiesh, and Shleifer (2007) find that, in a subsample of rich countries like ours and holding contract enforcement constant, "depth of information" does not explain differences in private debt-to-GDP ratios. The results in tables 6 and 7 and in Bover et al. (2013) are qualitatively similar, as they suggest that "depth of information" does not correlate with the incidence, amount, or cost of debt when we hold contract enforcement constant in the multivariate analysis.

Regarding the cost of debt, we compare the predicted interest rate paid by households in the bottom income decile—with the rest of the covariates held constant at those of the reference group—in two countries: one with a twenty-month repossession period (say, France) and another with a five-month repossession period (like the Netherlands).[27] In the country with fifteen month longer repossession periods, the household in the lowest income decile and with the

[27]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.

rest of the covariates held at those of the reference group pays a 0.30-percentage-point-higher interest rate.

Finally, previous studies, like Chiuri and Jappelli (2003), have emphasized the role of quantity restrictions (the downpayment) in shaping the age profile of homeownership. Using a pool of countries, Jappelli, Pagano, and Bianco (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.

7. 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 socioeconomic and demographic characteristics on these debt outcomes. In particular, we analyze the role of legal enforcement of contracts, tax treatment of mortgage payments, regulatory loan-to-value ratios, and 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 data set—the Household Finance and Consumption Survey, a coordinated effort of fifteen countries to collect ex ante harmonized data on household wealth, debt, and income.

Our results show that the age and income level of household members are important determinants of debt. 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 thirty-five to forty-four 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 point smaller, the amount borrowed by the youngest set of households (conditional on borrowing) is 12 percent lower, and the interest rates paid by low-income households are 0.3 percentage point 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, or information about borrowers delivers less robust results. This lack of robustness highlights the importance of analyzing 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.

Appendix

Figure 9. Fraction of Indebted Households and Median Debt-to-Income Ratio by Institution

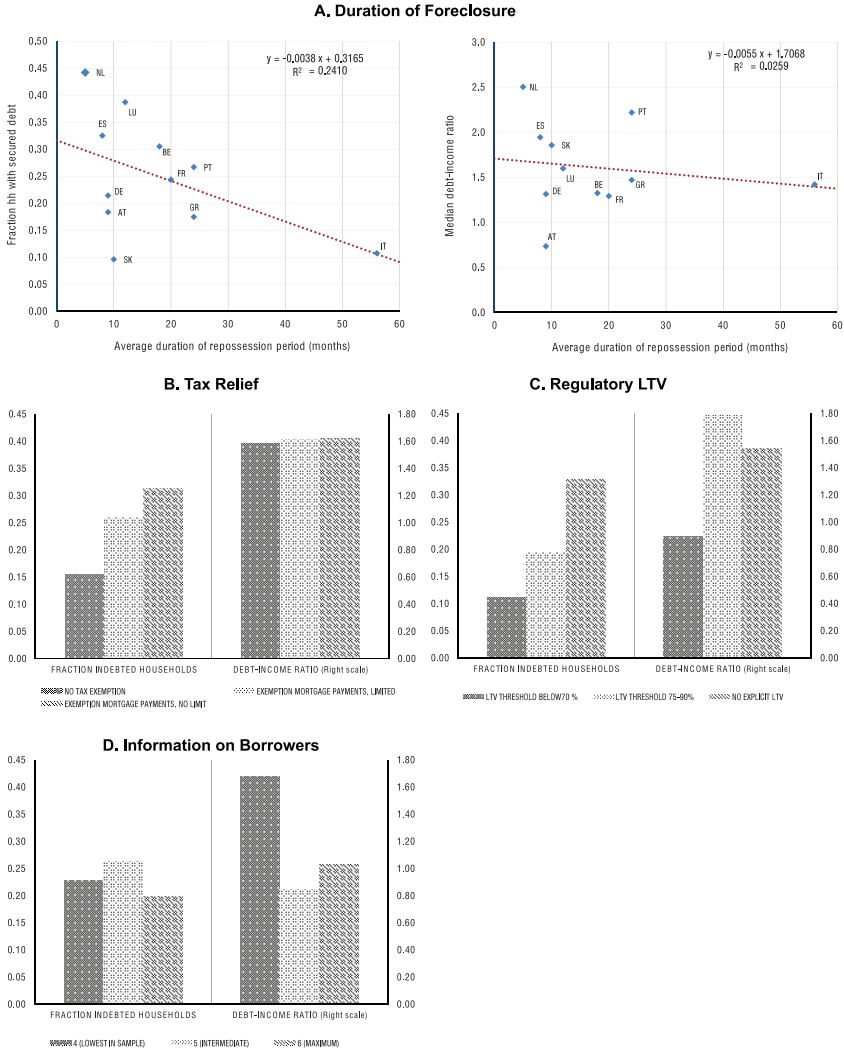


Table 8. Has Secured Debt (logit regressions, odds ratios)

Control Variables	Countries										
	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)
LnIncome	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

Notes: 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.

Table 9. Debt Balance of Secured Debt (OLS estimates)

Control Variables	Countries										
	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)
LnIncome	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^2	0.188	0.265	0.152	0.112	0.240	0.234	0.111	0.316	0.255	0.266	0.128

Notes: 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 that report holding secured debt. All estimates are weighted by population weights and averaged across the five implicates.

Table 10. Current Interest Rate of HMR Mortgage (OLS estimates)

Control Variables	Countries									
	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)	(0.244)	(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)
LnIncome	−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^2	0.047	0.060	0.043	0.029	0.049	0.068	0.124	0.110	0.034	0.092

Notes: 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 that report holding secured debt. All estimates are weighted by population weights and averaged across the five implicates.

References

Abadie, A., S. Athey, G. Imbens, and J. Wooldridge. 2014. "Finite Population Causal Standard Errors." NBER Working Paper No. 20325.

Andrews, D., and A. Caldera Sánchez. 2011. "The Evolution of Homeownership Rates in Selected OECD Countries: Demographic and Public Policy Influences." *Economic Studies* (OECD)(1): 1–37.

Andrews, D., A. Caldera Sánchez, and Å. Johansson. 2011. "Housing Markets and Structural Policies in OECD Countries." Working Paper No. 836, OECD Economics Department.

Arrondel, L., L. Bartiloro, P. Fessler, P. Lindner, T. Mathä, C. Rampazzi, F. Savignac, T. Schmidt, M. Schürz, and P. Vermeulen. 2014. "How Do Households Allocate Their Assets? Stylised Facts from the Eurosystem Household Finance and Consumption Survey." ECB Working Paper No. 1722 (August).

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." Working Paper No. 1320, Banco de España.

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

Chambers, M., C. Garriga, and D. Schlagenhauf. 2009. "Accounting for Changes in the Homeownership Rate." *International Economic Review* 50 (3): 677–726.

Chatterjee, S., D. Corbae, M. Nakajima, and J. Ríos-Rull. 2007. "A Quantitative Theory of Unsecured Debt with Risk of Default." *Econometrica* 75 (6): 1525–1989.

Chiuri, C., and T. Jappelli. 2003. "Financial Market Imperfections and Home Ownership: A Comparative Study." *European Economic Review* 47 (5): 857–75.

Crook, J., and S. Hochguertel. 2007. "US and European Household Debt and Credit Constraints: Comparative Micro Evidence from the Last 15 Years." Discussion Paper No. 07-087/3, Tinbergen Institute.

Devereux, M., and G. Lanot. 2003. "Measuring Tax Incidence: An Application to Mortgage Provision in the UK." *Journal of Public Economics* 87 (7–8): 1747–78.

Djankov, S., C. McLiesh, and A. Shleifer. 2007. "Private Credit in 129 Countries." *Journal of Financial Economics* 84 (2): 299–329.

Du Caju, P., F. Rycx, and I. Tojerow. 2016. "Unemployment Risk and Over-indebtedness: A Micro-econometric Perspective." Working Paper No. 294, National Bank of Belgium.

Duygan, B., and C. Grant. 2009. "Household Debt Repayment Behaviour: What Role Do Institutions Play?" *Economic Policy* 24 (57): 107–40.

Dynan, K., and D. Kohn. 2007. "The Rise in U.S. Household Indebtedness: Causes and Consequences." FEDS Working Paper No. 2007-37, Board of Governors of the Federal Reserve System.

Edelberg, W. 2006. "Risk-Based Pricing of Interest Rates for Consumer Loans." *Journal of Monetary Economics* 53 (8): 2283–98.

Ejarque, J., and S. Leth-Sorensen. 2009. "Consumption and Savings of First Time House Owners." Manuscript, University of Copenhagen.

European Central Bank. 2009. "Housing Finance in the Euro Area." ECB Occasional Paper No. 101 (March).

Fabbri, D., and M. Padula. 2004. "Does Poor Legal Enforcement Make Households Credit-Constrained?" *Journal of Banking and Finance* 28 (1): 2369–97.

Georgarakos, D., A. Lojschova, and M. Ward-Warmedinger. 2010. "Mortgage Indebtedness and Household Financial Distress." ECB Working Paper No. 1156 (February).

Gervais, M. 2002. "Housing Taxation and Capital Accumulation." *Journal of Monetary Economics* 49 (7): 1461–89.

Gropp, R., K. Scholz, and M. White. 1997. "Personal Bankruptcy and Credit Supply and Demand." *Quarterly Journal of Economics* 112 (1): 217–51.

Hintermeier, T., and W. Koeniger. 2011. "Debt Portfolios." IZA Discussion Paper No. 5653.

Household Finance and Consumption Network (HFCN). 2013. "The Eurosystem Household Finance and Consumption Survey—Methodological Report for the First Wave." Available at http://www.ecb.int/home/html/researcher_hfcn.en.html.

Jappelli, T., M. Pagano, and M. Bianco. 2005. "Courts and Banks: Effects of Judicial Enforcement on Credit Markets." *Journal of Money, Credit and Banking* 37 (2): 223–44.

Le Blanc, J., A. Porpiglia, F. Teppa, J. Zhu, and M. Ziegelmeyer. 2015. "Household Saving Behaviour and Credit Constraints in the Euro Area." ECB Working Paper No. 1790 (May).

Livshits, I., J. MacGee, and M. Tertilt. 2007. "Consumer Bankruptcy: A Fresh Start." *American Economic Review* 97 (1): 402–18.

Magri, S., and R. Pico. 2010. "The Rise of Risk-Based Pricing of Mortgage Interest Rates in Italy." *Journal of Banking and Finance* 35 (5): 1277–90.

Ortalo-Magné, F., and S. Rady. 1999. "Boom In, Bust Out: Young Households and the Housing Price Cycle." *European Economic Review* 43 (4): 755–66.

———. 2006. "Housing Market Dynamics: On the Contribution of Income Shocks and Credit Constraints." *Review of Economic Studies* 73 (2): 459–85.

World Bank. 2012. *World Development Indicators 2012.* Washington, DC: World Bank.