Which Loans Do We Take? A Micro-Level Analysis of Croatian Households' Debt Participation

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Abstract

This paper uses a new data set in order to explore micro-level patterns of household borrowing in Croatia. By analyzing cross-section data from the *Household Finance and Consumption Survey*, conducted for the first time in Croatia in 2017, we present the structure of household debt holdings and identify several household characteristics associated with debt participation in three types of bank debt: secured debt, non-collateralized loans, as well as overdrafts and/or credit card debt. Our results indicate that: a) households with middle-aged heads tend to participate more and hold larger amounts of all three debt types; b) credit constrained households are more likely to take non-collateralized loans; c) inability to finance consumption and willingness to take risks when making

saving and investment decisions contribute to participation in overdrafts and/or credit card debt.

Keywords: age profiles of borrowing, credit constraints, household debt, Household Finance and Consumption Survey, secured vs. unsecured debt

JEL classification: G51, D15, G21

1 Introduction[1]

Household debt is an important element of macro-financial stability within and across economies. The sensitivity of indebted households to shocks in employment, house prices, and interest rates implies that the level and structure of household debt in the economy can strongly influence the dynamics of consumption, asset prices, and economic growth. Indeed, some of the available research suggests that a strong rise in the household debt-to-GDP ratio, while supporting short-run economic growth, tends to precede a fall in economic output over the medium term (Mian et al., 2017; Mian & Sufi, 2018; Jorda et al., 2015). This makes the study of household debt a worthwhile endeavor.

The dynamics of household debt in Croatia has been marked by periods of acceleration and deceleration (Figure A1). As the Croatian economy went through the transition in the first half of the 1990s, one that was marked by war and inflation, household debt levels were quite low, reflecting low capitalization of the banking sector and high lending rates (Kraft & Jankov, 2005). The first lending boom emerged in the years 1996–1998, followed by a wave of bank failures in 1998–1999 and a brief slowdown in lending thereafter. As the consolidation and restructuring of the banking system ended in 2000, household credit growth started to recover (Kraft, 2007). Over the most part of the 2000s, household debt grew immensely, from around 17 percent of GDP in 2001 to 41 percent in 2009.

1 Disclaimer: All opinions expressed in this article are the authors' own and do not necessarily reflect the views of the Croatian National Bank.

During this period, liquidity constraints on households eased, mostly under the influence of the development of the banking system and an increase in capital inflows. Moreover, strong demand for housing and consumer durables, reinforced by robust economic growth and high-income expectations, further stimulated growth in household borrowing (Kraft, 2007).

After the onset of the financial crisis, however, and during the subsequent recession, the vulnerabilities in the Croatian economy started to materialize. As unemployment rose and incomes fell, growth in household credit slowed down, eventually turning negative as households started to deleverage. This culminated with the appreciation of the Swiss franc, which was followed by the legally binding conversion of loans linked to the Swiss franc, resulting in a one-time sharp decline of household credit in 2016. More recently, credit growth has been recovering[2]. Until 2020 and the outbreak of the COVID-19 pandemic, non-collateralized (i.e., general-purpose) cash loans were a particularly popular form of lending, while housing loans were reinforced by the government subsidy program which started in late 2017. Currently, around 30 percent of assets held by credit institutions in Croatia are in the form of household credit, with total household debt amounting to around 36 percent of GDP.

While it can help in analyzing macroeconomic trends, aggregate data can only tell us so much about household borrowing. Therefore, in order to study micro-level patterns of household borrowing in Croatia, we use a new data source, the Household Finance and Consumption Survey (HFCS), conducted for the first time in 2017 on a sample of Croatian households. The survey collects information about household finances, such as their assets and liabilities, as well as other detailed information about households' financial situations, and is expected to be carried out regularly in three-year intervals.

In this paper, we are interested in the determinants of the frequency of household borrowing. We explore the relation between household characteristics and its debt

2 In the period after the crisis, the foreign debt of banks decreased and rising domestic deposits started to constitute a sufficient funding source for the supply of bank credit to the economy (Kraft & Huljak, 2018).

holdings for three types of bank debt: secured debt, the bulk of which is made up of housing loans, and two types of unsecured debt, namely non-collateralized loans, which are mostly composed of general-purpose cash loans, and overdrafts and credit card debt. We study them at the extensive margin ("Which households hold these loans?").

Compared to the existing research, the main contribution of our analysis is threefold. First, the novel and detailed HFCS data set provides information on households' assets and liabilities allowing us to extend the analysis of previous research on household debt in Croatia and investigate it in detail, focusing on the more recent period (2016/2017). Second, we differentiate between debt instruments in order to identify the unique features of each: secured (mortgage) debt, non-collateralized loans, and overdrafts/credit card debt. Finally, our work attempts to reveal the possible importance of other aspects of a household's financial situation, such as credit constraints or the inability to finance current consumption.

Since we use a cross-section data set, it is important to emphasize the limits of our analysis. The fact that we do not follow the same individuals though time prevents us from testing the predictions of various theories of consumption, specifically the life-cycle and permanent income hypotheses and their more recent refinements, briefly summarized in the next section. Accordingly, the issue of household debt sustainability, i.e., the effects of households' borrowing decisions on their subsequent ability to repay, is also outside the reach of our analysis. Finally, the use of cross section data limits our conclusions about the financial inclusion of households. While our results do indicate a group of households experiencing credit constraints, why this is so and how the constraints of this group change over time remains unexplained.

Our results indicate that debt participation is the highest for households with middle-aged heads, whereby the age profile of indebted households' reference persons assumes a "hump-shaped" pattern for both secured debt and credit

cards and overdrafts. Furthermore, credit constraints have a positive effect on households' likelihood of holding non-collateralized loans, possibly reflecting simpler credit approval procedures or wider affordability in terms of typically lower debt service than for mortgages. Finally, we find that the inability to finance current consumption and the willingness to take risks when making saving and investment decisions contribute to the participation in overdrafts and/or credit card debt.

The rest of the paper is structured as follows. We start with an overview of the theories of consumption and saving and continue by providing a short review of the empirical literature on household debt participation. Subsequently, we turn to the descriptive characteristics of household debt participation and holdings, according to HFCS data. In the fifth section, we explain the methodology used in the econometric estimation of the determinants of debt participation and provide a description of the variables. Finally, we present the results, conclude with the main findings of our analysis, as well as their possible implications, and suggest potential directions for future research.

2 Literature Review

2.1 Theories of Consumption and Saving (and Their Implications for Borrowing)

The main theories which have shaped modern economic theorizing about household consumption and saving and which have important implications for household borrowing are the life-cycle (LC) theory of consumption (Modigliani & Brumberg, 1954) and the permanent income hypothesis (PIH) (Friedman, 1957). According to both theories, a household maximizes its consumption utility with respect to the constraint given by its expected lifetime resources (LC theory) or permanent component of its income (PIH). While the goal of the LC theory is to explicitly explain the relationship between age, saving, and the creation of

wealth, the PIH is generally concerned with how households react to the effects of income shocks in their economic environment (Deaton, 1992).

In the absence of borrowing constraints, consumption in any period is constrained only by lifetime resources (or permanent income). This implies that in periods in which income is atypically low compared to other periods, consumption will not be as low because that would be suboptimal for the household. In order to be able to fully use the lifetime available resources, it is beneficial for households to borrow, which helps them smooth consumption. For example, as they enter early adulthood and decide to form independent households, individuals' marginal utility from consuming dwellings or other durables is increased. It is worthwhile to increase debt holdings in order to acquire these assets, increasing their consumption over future periods and allowing the associated costs to be borne out of lifetime resources, only a small part of which is available at the moment of acquisition.

Households differ in their debt holdings due to differences in their lifetime budget constraints[3], their patience, and household sociodemographic characteristics such as age or number of family members. Furthermore, households may differ in their debt holdings if they are faced with borrowing constraints, as well as uncertainty. Introduction of borrowing constraints implies that some households will not be able to borrow as much as they want, forcing them to consume suboptimally over their lifetime, particularly in periods in which they are faced with increased consumption needs and low income. Likewise, since increased uncertainty about future consumption will also increase current ("precautionary") saving (Deaton, 1998), households may differ in how they perceive uncertainty and how much of their future income they are willing to devote to debt repayments. In the presence of uncertainty, prudent households will smooth their consumption less than is predicted by the LC and PIH theories because, although loans allow increased consumption now, they have to be repaid in the future when incomes may be very low.

3 Determined by education levels, income, inherited assets, as well as labor market status, among others.

As mentioned in the introduction, direct testing of the theories of consumption is not possible with cross-section data. Without following the same households through time, it is not possible to evaluate individual lifetime consumption patterns, borrowing decisions or to approximate their permanent incomes. However, because it is so general, the LC/PIH theory provides a useful framework for interpreting our results as it is not necessary to assume optimizing households to point to possible motives for holding (or not holding) debt. It is sufficient that households try to hold more debt in periods in which they need or want to consume more, an aspect in which many are similar, due to significance of supporting families and acquiring dwellings.

2.2 Empirical Literature on Household Debt Participation

Recently, empirical work on household borrowing has been a part of the field of household finance that studies how "households use financial instruments in order to attain their objectives" (Campbell, 2006, p. 1553; see also Tufano, 2009; Zinman, 2015). Particularly, since the establishment of the ECB's *Household Finance and Consumption Network* (HFCN) in 2006, a significant amount of empirical research has been oriented towards the analysis of household debt both within and across EU countries. One of the findings is that while household debt holdings differ within, they also differ across economies, both with respect to the number of indebted households and the levels of debt outstanding (Badarinza et al., 2016).

The determinants of household debt holdings differ among countries as well. Bover et al. (2013) ran a set of regressions to study the differences in the determinants of debt participation among euro-area countries with respect to two types of debt: secured and unsecured. They found that, for a number of countries, a household reference person (RP) belonging to ages between 35 and 44 positively predicted holding secured debt and that households with younger as well as older reference persons had a lower probability of holding secured debt, suggesting a

"hump-shaped" pattern. Similar age effects are found by other researchers as well: Yilmazer and DeVaney (2005) and Fulford and Schuh (2015) for the US, Del-Rio and Young (2005) for the UK, and Fessler et al. (2015), Hake and Poyntner (2020), and Riedl (2019) for Central, Eastern and Southeastern Europe countries (CESEE) countries.

Some of the variables representing the potential of household RPs to build-up their lifetime resources, i.e., higher education, income, and being employed are, for most euro-area countries, positively associated with holding secured debt (Bover et al., 2013). On the other hand, the effect of education on unsecured debt is less certain. Some authors find that a high level of education predicts a lower probability of holding unsecured debt (Bover et al., 2013; Yilmazer & DeVaney, 2005) while others find that the relationship is positive (Del-Rio & Young, 2005). Focusing on transition economies and debt participation in general, Riedl (2019) uses survey data for 10 CESEE countries to find that participation increases with education, a result which is also found by others researching CESEE countries (Allinger & Beckmann, 2021; Hake & Poyntner, 2020; Fessler et al., 2015).

Continuing with the review of debt participation research across transition economies, the effect of being employed is often found to be positive. Beck and Brown (2011) use survey data for 29 transition countries to find that households with formally employed members are more likely to use bank (i.e., credit or debit) cards. Likewise, Riedl (2019) finds that households with employed RPs have a higher probabilty of holding debt while those with unemployed RPs have a lower probability. The negative effect of unemployment on having debt in CESEE countries is also found by Allinger and Beckmann (2021), as well as Hake and Poyntner (2020). Other comparable results for CESEE economies suggest debt participation is higher for households belonging to upper tiers of the income distribution (Allinger & Beckmann, 2021; Hake & Poyntner, 2020) as well as households with children (Hake & Poyntner, 2020; Riedl, 2019).

Among the available domestic research of household debt it is worthwhile to mention Herceg and Šošić (2011), as well as Herceg and Nestić (2014), with the former providing an analysis of household debt participation similar to the current one. Herceg and Šošić (2011) use household level data from the HBS for the years 2005 and 2008 to explore the determinants of change in household aggregate indebtedness between the two periods. With respect to the probability of households holding debt, they find that income and medium education level positively predict debt participation, as well as that the age profile of debt participation is the highest for households with middle-aged heads, resembling a "hump-shaped" pattern.

3 Data: The Household Finance and Consumption Survey

In 2017, Croatia participated for the first time in the Household Finance and Consumption Survey (HFCS), a survey which has been regularly conducted in the euro-area and some other EU countries[4]. The data gathered within HFCS contain detailed information on household finances, including various forms of real and financial assets, private businesses, income from various sources, different forms of liability and debt service, as well as consumption and other information, such as demographics and attitudes. The survey for Croatia was conducted in the first half of 2017, with the data on flows reflecting the state of affairs during 2016 and stocks referring to the end of 2016. The whole sample includes observations on 1357 households. Personal variables, such as age, education or labor status, are represented through the household's reference person (RP), identification of whom is based on the Canberra definition, which defines the RP through several criteria such as being married, having children, having the highest income or being the eldest (United Nations Economic Commission for Europe, 2011). Concerning bank debt, the survey provides details on mortgage debt, while

4 Detailed information about HFCS methodology, as well as the main results of the survey, are available in Jemrić and Vrbanc (2020).

unsecured debt is represented by non-collateralized loans, containing somewhat less detail, such as loan purpose, as well as credit card debt and overdrafts for which the outstanding amounts are available.

4 Descriptive Statistics on Household Debt Participation

Before turning to econometric analysis, we investigate the descriptive patterns present in the survey data itself. We focus on the shares of households holding different debt instruments, as well as on the distributions of outstanding debt amounts. In this respect, we identify several *micro-level* stylized facts about household debt in Croatia, according to HFCS data.

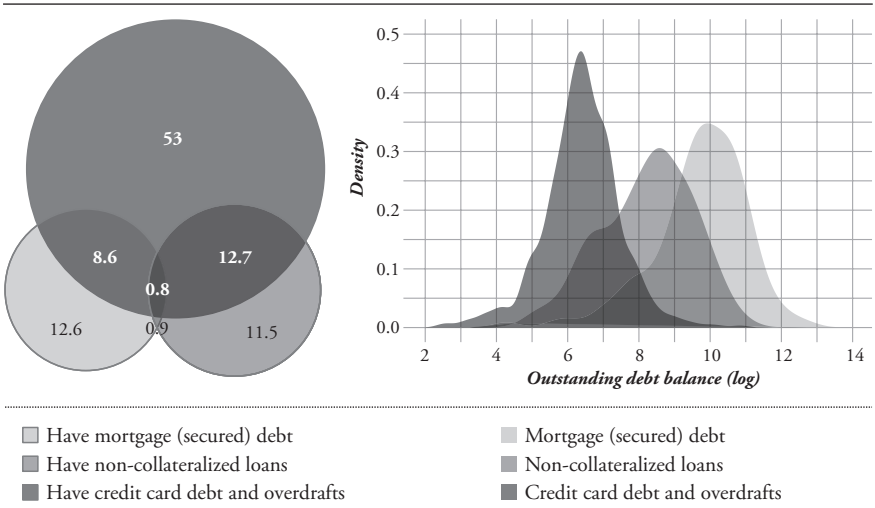
First, household bank debt participation in general is 40 percent, a result that has also been obtained from the OeNB Euro Survey (Riedl, 2019), covering Croatian households as well, and carried out in the fall of 2017, less than a year after the HFCS had been conducted. However, the three debt instruments significantly differ with respect to the share of households holding them. The participation rate for secured debt, representing housing loans, but also other mortgages is 9 percent. A modest share of households holding these loans may reflect various factors, such as banks' credit standards and procedures, affordability, the importance of housing inheritance, demographic structure, and possibly others.

Somewhat higher participation is present with respect to non-collateralized loans, amounting to 10.2 percent. For the most part, these represent general-purpose cash loans, which are the second largest group of loans in Croatia in terms of outstanding principal. Finally, overdrafts and credit card debt are more widespread, with 29.7 percent of households using these instruments. Out of all indebted households in the sample, around 75 percent have overdrafts/credit card debt, and the likelihood of holding the other two debt instruments is higher if a household has overdrafts/credit card debt (Figure 1, left, Appendix Table A1).

Conversely, co-participation in secured and non-collateralized loans is much lower with most participating households holding only one of these instruments.

Second, the three debt types differ in the density distribution of the outstanding amounts. The typical amounts of debt outstanding are expectedly the highest for mortgages and the lowest for overdrafts and credit card debt, reflecting differences in the purpose and maturity of these loans (Figure 1, right). According to HFCS data, the average initial maturity is 19.8 years for secured loans, and 7.8 years for non-collateralized loans. Although maturity data for credit cards and overdrafts is not available, these are short-term instruments, mostly with maturity shorter than a year. Furthermore, it is worthwhile noting that the amounts of non-collateralized loan holdings typically take the largest range of values, some of them having the characteristics of overdrafts/credit card debt while others are, in this respect, more similar to secured loans. This most likely reflects the variation in the purpose of these loans, elaborated later in the text.

Figure 1: *Euler Diagram of Indebted Households (Left) and the Distribution of Outstanding Debt Amounts (Right) by Debt Instrument*

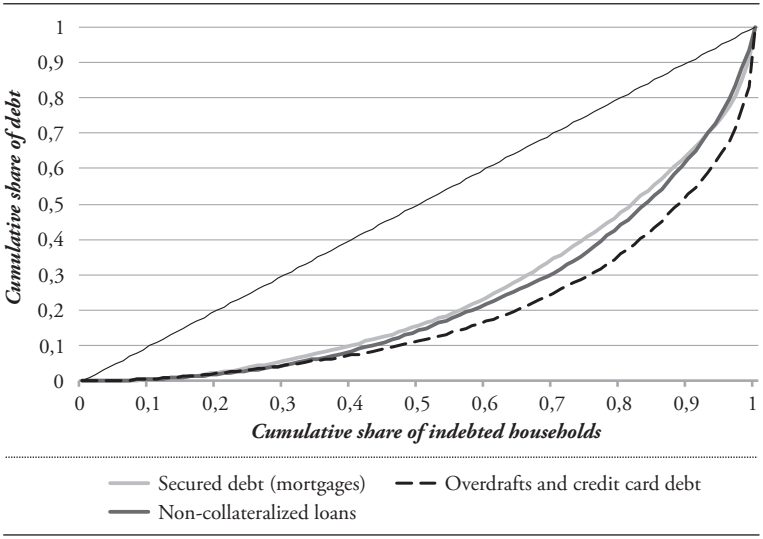


Note: The numbers in the left figure refer to the shares of households holding a particular combination of debt instruments (in percentage terms, out of all indebted households).

Sources: European Central Bank (2020), authors' calculations.

Third, the outstanding debt amounts are unevenly distributed among indebted households (Figure 2), which, particularly for mortgages and non-collateralized loans, reflects not only the differences in amounts taken but also in the time passed since loan origination, affecting the share of principal already repaid. Among the three debt types, the most evenly distributed are mortgages, whereby the 10 percent most indebted mortgage users hold around 36 percent of all mortgage debt. Likewise, the distribution of non-collateralized loans is only slightly less even, with the mentioned statistic amounting to 37 percent. Finally, the distribution of overdrafts and credit card debt is less equal with 47 percent of credit cards and overdraft debt being concentrated in the 10 percent most indebted users of these debt instruments.

Figure 2: *Empirical Cumulative Distributions (Lorenz Curves) of the Outstanding Amounts of Different Debt Instruments, Conditional on Having a Particular Debt Instrument*

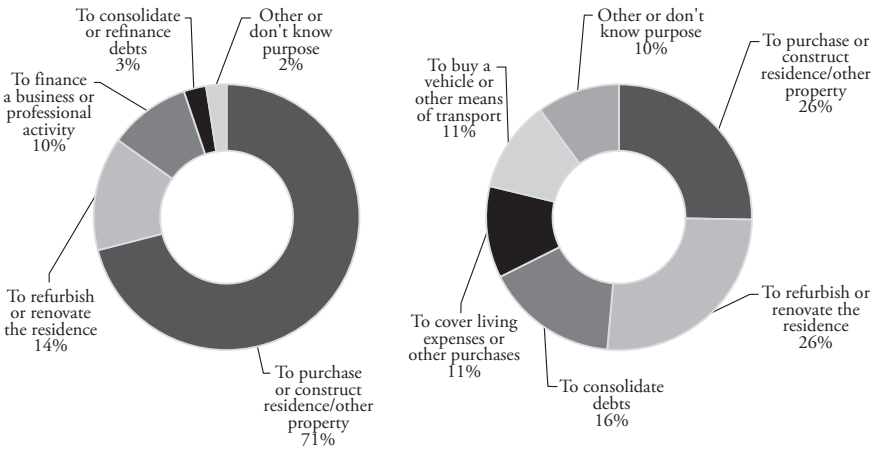


Sources: European Central Bank (2020), authors' calculations.

Finally, the distribution of outstanding debt amounts, according to loan purpose reported by households, reveals the multi-purpose nature of non-collateralized

loans (Figure 3). While 85 percent of outstanding mortgages are used for housing-related purposes (i.e., either renovating or purchasing/constructing the residence), non-collateralized loans are used for many more purposes. Although these are usually more expensive than mortgages in terms of interest rates[5], around half of these loans are used for housing-related purposes. This is because non-collateralized loans may be more attractive to a group of borrowers due to simpler credit approval procedures and possibly more relaxed banks' credit standards, especially if they aim to acquire lower priced properties or do a low-cost construction or renovation, for which the medium-sized amounts typical of these loans may be sufficient. Other uses of non-collateralized loans include consumption (covering living expenses, buying a vehicle) and debt consolidation. In the econometric estimation, we explicitly control for these purposes.

Figure 3: *Distribution of Outstanding Debt Amounts with Respect to Reported Loan Purpose for Secured Debt (Left) and Non-Collateralized Loans (Right)*



Sources: European Central Bank (2020), authors' calculations.

5 Unfortunately, the HFCS dataset does not contain information that would allow the comparison of the three debt instruments' interest rates. However, an external source reveals that in 2016 average lending rates on newly-granted housing loans stood at around 4.5 percent, the interest rates for general-purpose cash loans, here represented by non-collateralized loans, were at a bit more than 8 percent, while the interest rates for credit cards and overdrafts moved between 8 percent and 9.5 percent (see Figure 3.11 in Croatian National Bank, 2021).

5 Econometric Analysis: Methodological Background and Variables Used

In order to explore the association of various household characteristics or other factors with the fact that a household holds debt, we use a limited dependent variable model of the probit type. The dependent variable, named debt participation, is binary and takes the value of 1 if a household holds a particular type of bank debt and zero otherwise. The probit model approach uses the assumption that the probability of a household holding debt can be modelled as a latent variable that follows a standard cumulative normal distribution function (Wooldridge, 2002).

$$Pr(Has\ debt = 1|\boldsymbol{X}) = \mathrm{G}(\boldsymbol{\beta X}),\ z = \boldsymbol{\beta X} \tag{1}$$

$$G(z) = \Phi(z) = \int_{-\infty}^{z} \varphi(v)\mathrm{d}v,\ \varphi(z) = (2\pi)^{-1} \exp\left(-\frac{z^2}{2}\right) \tag{2}$$

Accordingly, we model the probability of a household being indebted as a function of socioeconomic and other characteristics $\boldsymbol{X}$. We run five regressions, for each of the data implicates provided in the HFCS dataset, the results of which are then combined, using "Rubin's rules" in order to get to the final estimate (Phillips Montsalto & Yuh, 1998). We present the results using average marginal or "partial" effects of the independent variables (Greene, 2012), whereby the marginal effects for the continuous independent variables are interpreted through a unit increase of the independent variable, while the marginal effects for discrete independent variables are interpreted with respect to the omitted categories. As an anonymous referee suggested, unit non-response may influence regression results. Therefore, we also run regressions using household weights as a robustness check, with the results provided in the Table A3 of the appendix.

The independent variables can be divided into socioeconomic characteristics, indebtedness characteristics, and self-reported attitudes or other household characteristics. Among socioeconomic characteristics, we include age, number of dependent children, education, and labor status of the household reference person (RP), as well as household income and assets. We model age as a continuous

variable and include age squared in order to estimate the non-linear effect on the dependent variables. In order to capture the demography of the household more completely, we also include the number of dependent children, where a dependent child is defined as a person aged 24 or younger and outside of the labor force.

The variables describing households' lifetime earning potential are included next. Education takes the value of one if the household RP has a tertiary education, as opposed to having primary or secondary education. Furthermore, we include two variables capturing the labor market status of the household RP: whether the RP is employed, including employees and the self-employed, and whether he/she is retired, to be interpreted against the omitted categories, i.e., being unemployed or outside of the labor force. We describe the current income through three binary variables referring to whether the household belongs to the third, the fourth or the fifth income quintile[6].

With respect to assets, we include logarithms of real and financial assets, with zero values transformed into ones before taking logarithms. However, the direction of causality between real wealth and mortgage debt is not clear cut: the value of a household's main residence property (HMR) constitutes a significant part of its real assets, so when taking a housing loan (i.e., a mortgage) a household increases its real assets. The same is also true for financial assets, because when financing real estate acquisition, in addition to credit financing, households often use own funds, decreasing their financial assets. In order to capture the possible influence that household wealth has on the likelihood of holding a mortgage, we therefore exclude real and financial assets from the respective estimation equation. Instead, we include a dummy variable describing the way a household acquired its main residence property (HMR), taking the value of one if it was inherited or received as a gift, since inheritance of an HMR is a useful predictor of a household's net assets (Kunovac, 2020), especially regarding the effect on the decision to take out a housing loan.

6 We exclude both the first and the second income quintiles because the descriptive statistics on debt holdings provided in Table A1 suggest there is little variation between the two.

Household indebtedness characteristics are captured by dummy variables describing whether a household has other debt instruments. In this respect, we include dummies for each of the three types of debt and omit the one for which we are estimating the probability of participation. However, instead of including a dummy for non-collateralized loans, we include four dummies, each describing whether a household holds a non-collateralized loan with a specific purpose. If the declared purpose is to purchase, construct or refurbish the residence we define this as a housing related purpose. Furthermore, we include the purpose of debt consolidation, as well as a consumption purpose (covering living expenses, buying a vehicle) while all other purposes are grouped together (see Figure 3 in the previous section).

Further, we include a binary variable describing whether the household is credit constrained, based on answers to three survey questions, essentially encompassing households that either were denied credit or were discouraged from applying for credit (see Table A2 for detailed survey questions). Subsequently, we include a variable capturing a household's ability to finance consumption, based on the self-reported relation between the household's expenses and income, and taking the value of one if the household reported having expenses higher than income and zero otherwise. Furthermore, households were asked to what extent they were ready to take financial risks when saving or making investments with four possible answers, ranging from "no risks" to "substantial risks". We define a risk-related binary variable, taking the value of one if the household reported a willingness to take at least "average" risks and zero if it reported not being ready to take any risks at all[7]. An interaction term between expenses exceeding income and the risk-taking variables is also used. We believe this interaction term helps identify risk-averse households faced with insufficient income to cover their expenses, implying their overspending is not a consequence of risky behavior. Conversely, households willing to take at least average risks when making investment decisions, but also

7 With only 48 households reporting "above average" or "substantial risks", making the cut-off at a different level was not feasible, as most households in our sample (n=1021) reported not being willing to take any risks.

overspend, may reveal that they are imprudent to a degree, because their willingness to take risks is not justified by their financial situation.

Finally, we control for regional variation by dividing households into four regions: the City of Zagreb, North-West Croatia, the Adriatic region as well as "East" Croatia, covering a large area east of Zagreb, with the City of Zagreb used as a reference category.

6 Results

The results of the estimation of household debt participation determinants are reported in Table 1, while Table A3 in the appendix provides the results of weighted regressions, against which we check the robustness of the effects estimated. Concerning household demographic characteristics, the probabilities of holding each type of debt are significantly associated with age in a non-linear "hump-shaped" pattern, i.e., there is a large positive coefficient associated with age and a small negative coefficient associated with age squared, often found in other research as well (Fessler et al., 2015; Hake & Poyntner, 2020; Riedl, 2019). We use a simple linear extrapolation of the estimated coefficients on age and age squared to illustrate the differences in the implied age profiles of participation for the three debt types (Figure A2 and A3).

The "hump-shaped" age profile of debt participation is pronounced both for secured debt, as well as overdrafts and credit card debt, while the age effects on the probability of holding non-collateralized loans are much weaker and even absent in the weighted estimation. This is most likely because non-collateralized loans are multi-purpose, implying various motives for holding these loans, many of which may be unrelated to the consumption planning implied by the age of the household's RP. On the other hand, the effect of age on secured debt and credit cards and overdrafts likely reflects housing and other goods' consumption patterns of households with middle-aged heads, typically those with children or other dependent members.

Table 1: *Results of the Estimation of Debt Participation Determinants by Debt Instrument*

	Secured (mortgage) debt		Non-collateralized loans		Overdrafts and credit card debt	
	dy/dx	***Std. Err.***	***dy/dx***	***Std. Err.***	***dy/dx***	***Std. Err.***
Has secured debt			-4,93*	*2,74*	7,86*	*4,36*
Has overdrafts/credit card debt	3,05*	*1,69*	9,13***	*1,70*		
Age	1,363***	*0,45*	0,792*	*0,46*	1,448**	*0,60*
Age2	-0,014***	*0,00*	-0,011**	*0,00*	-0,015***	*0,01*
Income quintile 3	1,93	*2,34*	4,15	*2,57*	0,82	*3,98*
Income quintile 4	2,6	*2,40*	5,75**	*2,63*	2,87	*4,05*
Income quintile 5	6,54***	*2,38*	10,07***	*2,72*	-7,33	*5,37*
No. of dependent children	1,62**	*0,77*	-0,4	*0,88*	0,61	*1,55*
Education - high	7,18***	*1,84*	-1,39	*2,33*	2,84	*3,48*
RP employed	3,05	*3,13*	4,02	*3,67*	13,84**	*6,23*
RP retired	2,65	*3,39*	7,21*	*3,93*	10,99	*6,41*
Way of acquiring property - gift/inherited	-6,91***	*1,92*	-1,88	*1,93*	-3,53	*3,24*
Credit constrained	-4,72	*3,11*	6,95***	*2,66*	6,2	*4,75*
Risk attitude - take average risks	2,76	*1,78*	4,21**	*1,96*	9,7***	*3,44*
Expenses above income	5,97**	*2,34*	4,54*	*2,65*	13,48***	*3,83*
Take average risks * Expenses above income	-11,21**	*5,25*	-8,37	*5,18*	-4,51	*7,86*
Financial assets (log)			0,13	*0,26*	-0,25	*0,48*
Real assets (log)			0,32	*0,40*	-0,9	*0,56*
Purpose of non-collateralized loans: consololidate debt	-5,22	*5,77*			30,26***	*8,42*
Purpose of non-collateralized loans: housing related	-5,44*	*3,26*			14,83***	*5,34*

Purpose of non-collateralized loans: consumption	-2,66	*3,34*			11,67**	*5,24*
Purpose of non-collateralized loans: other	0,11	*5,15*			13,95	*9,41*
Region: East	5,04**	*2,51*	11,88***	*2,82*	6,71*	*3,95*
Region: North-west	2,22	*2,84*	3,77	*3,21*	8,93**	*4,26*
Region: Adriatic	2,13	*2,65*	1,59	*3,12*	2,74	*4,07*
Observation	1357		1357		1357	
Chi^2	133***		165,6***		159,4***	
Pseudo R^2	0,157		0,166		0,097	
Log likelihood	-357,5		-415,5		-739,6	
Akaike inf. crit.	761		874,9		1529,2	

Notes: The table reports average marginal effects on the probability of a household holding debt, estimated using a probit regression and multiplied by 100. Dy/dx – marginal effect, Std. Err. – standard error, * p < 0.1; ** p < 0.05; *** p < 0.01.

Sources: European Central Bank (2020), authors' calculations.

Among other demographic variables, the number of dependent children increases the demand for housing and as such constitutes a motive for holding secured debt, with the marginal effect of the additional dependent child on the likelihood of holding a mortgage estimated at 1.6 percent[8]. With respect to other demographic variables, we ran a separate regression including the characteristics of the household RP's partner (whether the RP has a partner, partner's education and labor status), which yielded no additional significant results and was therefore omitted from the paper.

The effects of the variables representing household's position in the income distribution are mixed across the three debt instruments, being completely absent for credit cards and overdrafts. With respect to secured debt, income is significant only to the extent that households belonging to the fifth quintile of the income distribution are 6.5 percent more likely to hold it. For non-collateralized loans, the effects of income include the fourth quintile as well, with households in the two upper quintiles of the income distribution being 5.8 percent and 10 percent more likely to hold these loans, respectively. Hake and Poyntner (2020) and Riedl (2019) also find positive effects of belonging to upper tiers of the income distribution on the probability of holding debt, with the size of effects being comparable, e.g., 5 percent and 6 percent for second and third income terciles, found by Riedl (2019).

High education of the household's RP is predictive only of the participation in secured debt, suggesting around 7 percent higher probability of holding this type of debt, while the effects on unsecured debt instruments are absent. Although this is in relation to elementary education, Riedl (2019) finds an effect of comparable size (6 percent) while Fessler et al. (2015), and Hake and Poyntner (2020) seem to find even stronger effects. The effects of labor market status are mostly insignificant and predict a higher likelihood of holding overdrafts and credit card debt for households with employed RPs, with the retired being more likely to hold non-collateralized loans. However, we ran a separate regression to find that the absence of the effect of labor status variable on the probability of holding mortgages is due

8 While not directly comparable, this effect is in line with the results from other research: e.g., Riedl (2019) finds a 4 percent effect on the probability of holding a loan for a dummy variable representing households with children.

to the inclusion of income and education variables. Without those, the marginal effect of household RP being employed on the probability of holding mortgages is 6.2 percent and significant at 5 percent. This is in line with other research whereby being unemployed has a strong negative effect of a similar size on the probability of having a loan (Hake & Poyntner, 2020; Riedl, 2019).

With respect to assets, we find that households which acquired their real estate property either through inheritance or as a gift, are, as expected, much less likely to hold secured debt, with the average marginal effect on the probability of holding mortgages being -6.9 percent. On the other hand, there are no effects of the values of real and financial assets on debt participation.

Interestingly, households identified as credit constrained are almost 7 percent more likely to hold non-collateralized loans, possibly because these are more accessible than mortgages in terms of credit approval procedures and standards, as well as typical debt service amounts. This makes them more attractive for modestly sized purchases, such as low-priced real estate, low-cost construction or renovation, cars, or other durable goods.

Regarding regional variation, we find that households in Eastern Croatia are 5 percent more likely to hold secured debt, although this result is proven not to be robust in the weighted estimation (Table A3). However, these households are also almost 12 percent more likely to hold non-collateralized loans. Similar explanations as for credit constrains may apply: low-priced real estate and low-cost construction renovation is more likely to be present in Eastern Croatia, which may make these loans particularly attractive in this part of the country due to their accessibility, but also sufficiency. Nevertheless, there may be a number of other possible explanations, e.g. a comparatively large number of agricultural households and craftsmen in Eastern Croatia may imply that some of these loans may be used for various investments or other production-related costs[9]. Furthermore, other

9 In order to provide a more complete explanation, this issue needs to be separately researched, which falls outside the scope of this paper.

results indicate that households in the North-West are almost 9 percent more likely to hold overdrafts and credit cards than households in the City of Zagreb.

Variables reflecting weak risk affinity and the insufficiency of income to cover current expenses give a few insights. Households reporting expenses above income are 6 percent more likely to hold secured debt, a result that most likely reflects reverse causality. Some households have insufficient income to cover expenses precisely because of high debt service costs of mortgages. On the other hand, the outstanding amounts associated with overdrafts/credit card debt are much lower, which makes it more likely that these households hold these instruments precisely because they are faced with insufficient income, with the average marginal effect being quite strong, amounting to 13.4 percent. On the other hand, if a household is weakly identified as a "risk taker", the effect on the probability of holding overdrafts/credit card debt is only a bit lower, estimated at 9.7 percent. Finally, if a household reported both expenses above income and a positive risk attitude, the likelihood of holding this type of debt is even higher, possibly as high as 18 percent. This effect is less certain for non-collateralized loans and secured debt, however, as the effect of these variables is not robust (Table A3).

In conclusion, as shown in the descriptive statistics, households use more than one debt instrument with the effect being particularly strong between non-collateralized loans and overdrafts/credit card debt. Households that have non-collateralized loans used to consolidate debt are also more likely to hold overdrafts and credit card debt, but the effect is also strong for housing-related purposes. Furthermore, households using non-collateralized loans seem to be somewhat less likely to hold mortgages; however, this effect is only marginally significant.

7 Conclusion

In the present work, we have used the data from the 2017 *Household Finance and Consumption Survey* to describe the characteristics of household debt holdings in Croatia and the main household characteristics particularly related to these holdings. We have done so by distinguishing three debt instruments: secured or mortgage debt, non-collateralized loans, and overdrafts/credit card debt, all of which are qualitatively different in their typical amounts, maturity, and accessibility in terms of stringency of credit approval procedures and standards.

According to the results of the HFCS data analysis, several conclusions about household debt participation in Croatia can be reached. First, both descriptive and regression analyzes suggest a "hump-shaped" age profile of debt participation, suggesting households with middle-aged heads are more likely to hold debt, as well as to hold higher debt amounts. This debt participation age-profile is prominent for both secured debt, as well as overdrafts and credit cards, possibly reflecting specific consumption patterns of households with middle-aged heads.

Second, our results identify a group of credit-constrained households more likely to hold non-collateralized loans, which seems to be a unique feature of this debt instrument. However, because this is partly a subjective measure and may reflect factors other than credit capability of the household, there may be various possible explanations for the popularity of these loans. This is because, although they tend to be more expensive than mortgages, non-collateralized loans may be more attractive to a group of borrowers due to simpler credit approval procedures and possibly more relaxed banks' credit standards. At the same time, the medium sized amounts typical of these loans may be sufficient for different purposes for which these are acquired: low-cost housing acquisition, renovation or construction, purchases of durable goods or even debt consolidation, possibly overdrafts and credit card debt which is short-term and somewhat more expensive in terms of interest rates.

Finally, risk affinity and having expenses above income may be important factors in the willingness of households to use credit cards and overdrafts, with the

combination of the two strongly predicting participation in these instruments. Namely, to achieve their desired or necessary level of consumption, it seems some households will use these short-term debt instruments, while the use of credit cards and overdrafts for others may somehow be related to their risk attitude.

In conclusion, the possible ways for future research could include household vulnerability, i.e., a situation where a household holds very high amounts of debt in relation to its income or assets, resulting in debt overhang, forcing the household to make strong consumption cuts in downturns and implying other risks to financial stability. This kind of analysis could be supplemented by a stress-testing exercise which could reveal how many and which households are at risk of becoming vulnerable. We believe the present work may be seen as providing an introduction to such research, because it estimates the factors contributing to household borrowing, some of which may be associated with excessive debt taking or over-indebtedness.

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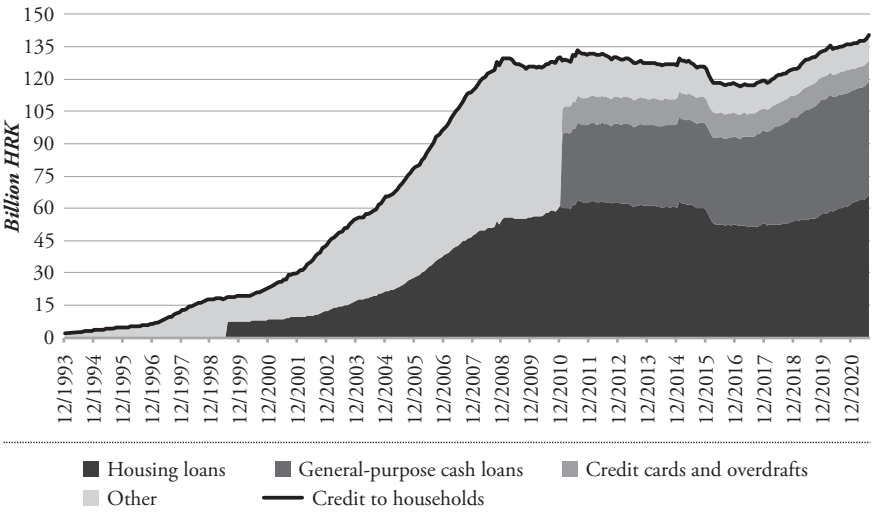
Appendix

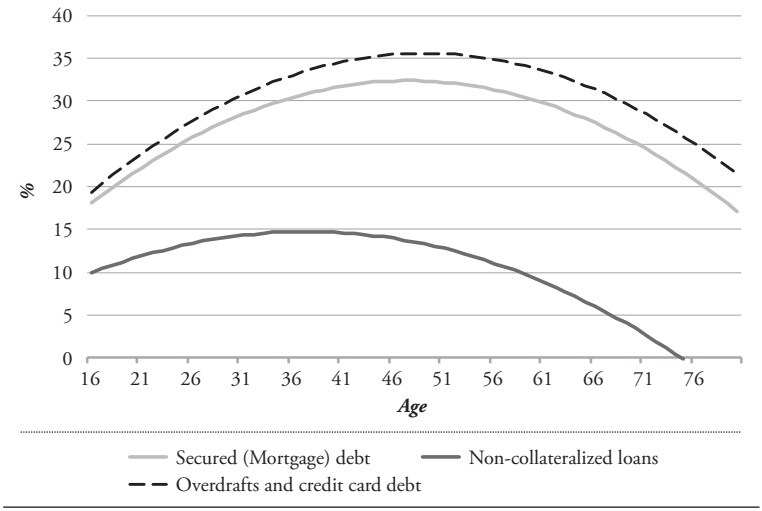
Figure A1: *Stock of Household Debt Held by Credit Institutions in Croatia*



Note: The data show nominal outstanding credit to households held by credit institutions. From June 1999, housing loans have been separated from the category of other loans. From March 2011, general-purpose cash loans, as well as credit cards and overdrafts, have been separated from the category of other loans. Besides transaction growth (newly disbursed credit less repayments), the dynamics of the series shown is also affected by exchange rate movements, write-offs, as well as other changes.

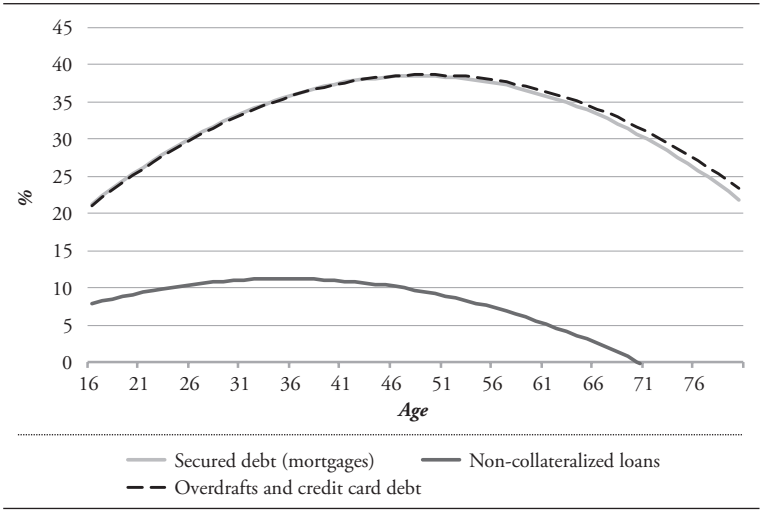
Sources: Croatian National Bank, authors' calculations.

Figure A2: *Marginal Probabilities of Holding Either Type of Debt Implied by the Regression Coefficients on Age and Age Squared - Regular Regressions*



Sources: European Central Bank (2020), authors' calculations.

Figure A3: *Marginal Probabilities of Holding Either Type of Debt Implied by the Regression Coefficients on Age and Age Squared - Weighted Regressions*



Sources: European Central Bank (2020), authors' calculations.

Table A1: *Characteristics of Indebted Households with Respect to Debt Type*

Variable	Category	Secured (mortgage) debt			Non-collateralized loans			Overdrafts and credit card debt		
		n (sample)	*Participation**	*Median*	*n (sample)*	*Participation**	*Median*	*n (sample)*	*Participation**	*Median*
TOTAL	TOTAL	128	9,0%	19.889	163	10,2%	4.500	400	29,7%	817
Age of RP	16-30	0	0,0%	NA	7	10,8%	10.286	10	20,9%	715
	31-35	12	18,5%	47.207	9	19,3%	11.016	19	38,9%	1.236
	36-40	13	13,6%	50.936	20	16,0%	2.600	46	44,1%	813
	41-45	18	19,9%	28.781	21	13,9%	5.200	50	43,3%	1.214
	46-50	26	15,1%	19.735	23	11,6%	5.817	48	35,5%	651
	51-55	22	14,6%	14.622	24	12,3%	5.192	52	31,6%	1.019
	56-60	17	8,0%	14.859	29	14,9%	3.376	53	28,3%	649
	61+	20	2,7%	2.558	30	4,4%	1.292	121	21,3%	677
Number of dependent children	0	53	5,4%	14.839	76	7,2%	3.156	230	25,7%	671
	1	32	13,9%	18.313	40	19,6%	4.994	70	37,0%	1.132
	2	28	17,5%	30.262	32	14,5%	4.826	63	33,3%	912
	3+	15	14,5%	34.352	15	9,8%	15.073	37	44,3%	1.428
Education	Low	1	1,0%	2.600	2	2,5%	9.027	15	20,6%	1.400
	Middle	85	8,2%	18.976	134	10,9%	4.500	312	29,9%	880
	High	42	16,5%	23.251	27	10,3%	5.058	73	32,8%	649
Labor status of RP	Employee	81	14,0%	25.293	99	14,6%	5.096	204	36,7%	911
	Self-employed	10	22,6%	13.501	9	19,8%	5.853	24	43,5%	905
	Unemployed	8	7,6%	24.946	6	4,8%	1.946	23	25,4%	1.239
	Retired	29	3,6%	5.374	47	6,1%	2.828	145	23,5%	664
	Other	0	0,0%	NA	2	2,4%	602	4	7,6%	970

Way of acquiring property	Purchased	61	21,8%	24.258	28	6,1%	4.321	91	30,4%	671
	Own construction	47	8,5%	15.211	66	11,5%	3.628	142	28,4%	900
	Inherited	17	4,4%	19.640	34	9,0%	5.592	78	22,8%	940
	Gift	1	1,8%	19.539	6	9,7%	6.549	20	54,5%	1.019
	50% purchased or constructed	1	2,5%	5.200	7	20,1%	3.032	8	22,0%	769
	Renter	1	0,4%	17.073	22	15,2%	4.482	59	37,9%	703
Has secured debt	Doesn't have	0	0,0%	NA	145	10,5%	4.353	346	28,6%	823
	Has secured debt	128	100,0%	19.889	18	7,2%	5.064	53	41,1%	848
Has overdrafts/credit card debt	Doesn't have	75	7,6%	28.278	72	7,0%	3.290	0	0,0%	NA
	Has overdrafts/ credit card debt	53	12,5%	14.282	91	18,0%	4.916	400	100,0%	817
Has non-collateralized loans	Doesn't have	110	9,3%	19.867	0	0,0%	NA	309	27,1%	808
	Has non-collateralized loans	18	6,4%	21.446	163	100,0%	4.500	91	52,2%	906
Has a non-collateralized loan with purpose: Consolidate debt	No	126	9,1%	19.932	136	9,0%	4.225	380	29,0%	789
	Yes	2	7,1%	25.382	27	100,0%	5.459	20	80,0%	1.300
Has a non-collateralized loan with purpose: Housing related	No	121	9,1%	19.848	94	6,1%	3.172	362	28,8%	818
	Yes	7	8,4%	35.544	69	100,0%	5.663	38	50,1%	722
Has a non-collateralized loan with purpose: Consumption	No	120	9,2%	19.903	98	6,7%	4.538	365	29,1%	806
	Yes	8	4,0%	15.446	65	100,0%	4.137	35	46,1%	1.060
Has a non-collateralized loan with purpose: Other	No	125	9,1%	19.898	138	8,8%	5.000	387	29,3%	818
	Yes	3	5,0%	21.214	25	100,0%	1.490	12	52,0%	1.083
Credit constrained	No	121	9,2%	19.862	140	9,2%	4.745	506	28,2%	910
	Yes	7	7,5%	31.597	23	19,9%	4.437	51	44,5%	455
Willing to take at least average risks when making investment decisions	No	79	7,9%	20.000	99	8,5%	4.645	265	25,7%	786
	Yes	49	12,8%	20.460	64	15,7%	4.408	135	42,3%	893

Expenses above income	No	106	8,5%	20.318	134	10,1%	4.290	318	27,5%	902
	Yes	22	12,0%	9.993	29	11,2%	5.240	82	42,6%	587
Income quintile	1st	13	4,4%	21.601	12	4,2%	2.691	62	22,4%	1.036
	2nd	11	3,4%	2.586	20	4,4%	2.649	72	24,3%	557
	3rd	24	8,2%	19.078	34	10,5%	2.958	85	32,6%	654
	4th	31	11,5%	19.908	42	13,8%	3.233	102	40,1%	792
	5th	48	17,5%	25.328	55	18,1%	5.963	79	29,5%	1.253
Region	Adriatic	31	8,8%	20.145	27	6,9%	4.000	95	25,3%	650
	City of Zagreb	15	8,5%	24.669	14	9,3%	4.247	46	28,3%	763
	East	61	9,8%	18.595	95	15,9%	3.263	176	32,2%	1.207
	North-West	21	9,0%	15.654	27	9,1%	5.069	82	35,3%	812

*Percentage of the household group (row) holding the debt instrument (column). Median refers to outstanding median amounts in Euros.

Note: RP – Reference person.

Sources: European Central Bank (2020), authors' calculations.

Table A2: *Question Wording*

Variable name	HFCS variable code	HFCS variable name	Question	Answers	Comment
Credit constrainted	HC1310	was denied credit	In the last three years, has any lender or creditor turned down any request you [or someone in your household] made for credit, or not given you as much credit as you applied for?	1 - Yes, turned down 2 - Yes, not given as much credit 3 - No	Coded 1 if either: a) the answer to HC1310 is (1 or 2) and the answer to HC1320 is 2, or b) the answer to HC1400 is 1. Otherwise 0
	HC1320	re-applying for credit	(Were you/Was your household) later able to obtain the amount requested, by reapplying to the same institution or somewhere else?	1 - Yes 2 - No	
	HC1400	not applying for credit due to perceived credit constraints	In the last three years, did you (or another member of your household) consider applying for a loan or credit but then decided not to, thinking that the application would be rejected?	1 - Yes 2 - No	
Risk attitude - take average risks	HD1800	investment attitudes	Which of the following statements comes closest to describing the amount of financial risk that you (and your husband/ wife/partner) are willing to take when you save or make investments?	1 - Take substantial financial risks expecting to earn substantial returns 2 - Take above average financial risks expecting to earn above average returns 3 - Take average financial risks expecting to earn average returns 4 - Not willing to take any financial risk	coded 0 for 4 - Not willing to take any financial risk" and 1 otherwise
Expenses above income	HI0600	last 12 month expenses were below/above income	Again aside from any purchases of assets, over the last 12 months would you say that your (household's) regular expenses were higher than your (household's) income, just about the same as your (household's) income or that (you/your household) spent less than (your/its) income?	1 - Expenses exceeded income 2 - Expenses about the same as income 3 - Expenses less than income	coded 1 for "1 - Expenses exceeded income" and 0 otherwise

Way of acquiring property - gift/inherited	HB0600	way of acquiring property	How (did you/your household) acquire the (part of the) residence (you own/your household owns): did you purchase it, did you construct it yourself, did you inherit it or did you receive it as a gift?	1 - Purchased 2 - Own construction 3 - Inherited 4 - Gift5 - 50% PURCHASED OR CONSTRUCTED/50% INHERITED OR RECEIVED AS A GIFT [SILENT]	coded 1 for "3 - Inherited" and "4 - Gift" and 0 otherwis
Purpose of non-collateralized loans	HC050$x	non-collateralised loan $x: purpose of the loan	Why did you take on this loan? Please start with the most important purpose.	1 - To purchase or construct the HMR 2 - To purchase other real estate 3 - To refurbish or renovate the residence 4 - To buy a vehicle or other means of transport 5 - To finance a business or professional activity 6 - To consolidate debts 7 - For education purposes 8 - To cover living expenses or other purchases 9 - To support relatives and friends 10 - Other (specify)	Consolidate debt: 6 Housing: 1,2,3 Consumption related: 4,5,8 Other: 7,9,10

Source: European Central Bank (2020).

Table A3: *Results of the Estimation of Debt Participation Determinants by Debt Instrument – Regressions Using Household Weights*

	Secured (mortgage) debt		Non-collateralized loans		Overdrafts and credit card debt	
	dy/dx	***Std. Err.***	***dy/dx***	***Std. Err.***	***dy/dx***	***Std. Err.***
Has secured debt			-8,93***	*2,83*	7,29	*5,47*
Has overdrafts/credit card debt	2,69	*2,04*	6,79***	*1,92*		
Age	1,595***	*0,50*	0,641	*0,44*	1,574**	*0,69*
Age2	-0,017***	*0,01*	-0,009**	*0,00*	-0,016**	*0,01*
Income quintile 3	1,5	*2,42*	3,82	*2,65*	2,38	*4,52*
Income quintile 4	2,78	*2,83*	6,07**	*2,52*	4,56	*5,19*
Income quintile 5	7,06***	*2,60*	10,04***	*2,74*	-6,11	*6,44*
No. of dependent children	1,64*	*0,87*	-1,1	*0,88*	0,96	*1,92*
Education - high	6,78***	*1,94*	-1,07	*2,47*	4,68	*4,43*
RP employed	5,13	*3,73*	5,34	*3,48*	15,87*	*7,86*
RP retired	2,63	*3,72*	7,69*	*4,06*	13,98	*8,78*
Way of acquiring property - gift/inherited	-9,1***	*2,21*	-2,34	*1,97*	-2,87	*3,45*
Credit constrained (ECB definition)	-4,42	*3,26*	6,35**	*2,78*	7	*5,79*
Risk attitude - take average risks	0,47	*2,12*	2,05	*2,10*	12,77***	*3,74*
Expenses above income	6,72**	*2,70*	2,89	*2,68*	14,06***	*4,67*
Take average risks * Expenses above income	-6,96	*5,24*	-7,84	*4,79*	-8,75	*8,71*
Financial assets (log)			0,38	*0,28*	-0,49	*0,53*
Real assets (log)			0,18	*0,33*	-0,93*	*0,52*
Purpose of non-collateralized loans: consololidate debt	-5,26	*5,54*			36,24***	*10,33*
Purpose of non-collateralized loans: housing related	-6,32*	*3,83*			13,02**	*6,28*
Purpose of non-collateralized loans: consumption	-9,97***	*3,34*			6,76	*7,43*
Purpose of non-collateralized loans: other	-4,88	*5,57*			14,23	*11,79*
Region: East	3,45	*2,72*	8,72***	*2,87*	4,69	*4,57*

Region: North-west	1,38	*3,16*	0,13	*3,59*	9,28*	*5,16*
Region: Adriatic	1,78	*2,83*	-0,58	*3,19*	0,52	*4,75*
Observation	1357		1357		1357	
Chi^2	96,92***		121,3***		123***	
Pseudo R^2	0,181		0,163		0,102	
Log likelihood	-371860,5		-413296,2		-813727,6	
Akaike inf. crit.	743767,1		826636,5		1627505,2	

Notes: The table reports average marginal effects on the probability of a household holding debt, estimated using a weighted probit regression and multiplied by 100.
dy/dx - marginal effect, Std. Err. - standard error, * p < 0.1; ** p < 0.05; *** p < 0.01.

Sources: European Central Bank (2020), authors' calculations.

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